

CHIKUNGUNYA FEVER

Chikungunya fever is an acute febrile disease caused by the Chikungunya virus. The disease is characterised by fever, joint pain with or without swelling, headache, fatigue, nausea and vomiting. Some patients may develop a rash affecting the trunk and limbs. The disease is usually self-limiting. Most symptoms last for three to 10 days although the joint pain may last for weeks to months. The main vector in Singapore is the *Aedes albopictus* mosquito.

There were 13 laboratory confirmed cases of chikungunya fever reported in 2023. A total of 14 laboratory confirmed cases of chikungunya fever were reported in 2024. (Figure 3.1).

In 2023, out of the 13 cases, two cases were indigenous cases and nine were imported cases, involving four Singapore residents and five non-residents. The remaining two cases were tourists or foreigners seeking medical treatment (Table 3.1). In 2024, out of the 14 cases, 12 cases were imported cases, involving seven Singapore residents and five non-residents. The remaining two cases were tourists or foreigners seeking medical treatment (Table 3.1).

Figure 3.1
Weekly distribution of chikungunya fever cases, 2023-2024

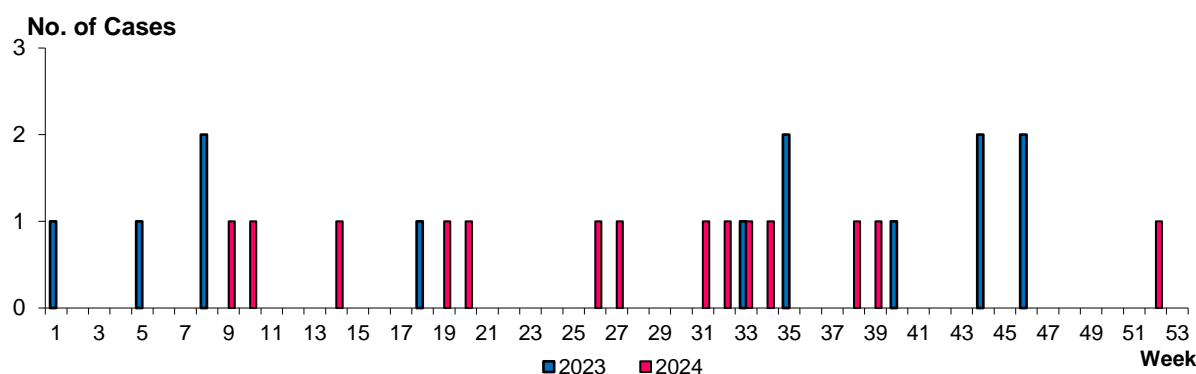


Table 3.1
Total number of notifications* received for chikungunya fever, 2020-2024

Age group	2020		2021		2022		2023		2024	
	Local	Imported	Local	Imported	Local	Imported	Local	Imported	Local	Imported
0-4	0	0	0	0	0	0	0	1	0	0
5-14	0	0	0	0	1	0	0	0	0	1
15-24	0	1	0	0	1	2	0	1	0	1
25-34	0	5	0	0	0	5	0	1	0	2
35-44	2	1	0	0	2	4	1	3	0	2
45-54	0	0	0	0	1	3	1	2	0	4
55-64	0	1	0	0	0	4	0	0	0	0
65+	0	0	0	0	2	1	0	1	0	2
Total	2	8	0	0	7	19	2	9	0	12

*Excluded tourists and foreigners seeking medical treatment in Singapore.

In 2023, of the two indigenous cases, there was one case in the 35-44 age group and another in the 45-54 age group. (Table 3.2). Among the three major ethnic groups, Chinese had the highest incidence rate in 2023 (Table 3.3).

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Table 3.2
Age-sex distribution and age-specific resident incidence rate of indigenous chikungunya fever cases[^], 2023

Age group	Number of notifications				Incidence rate per 100,000 resident population*
	Male	Female	Total	%	
0-4	0	0	0	0	0
5-14	0	0	0	0	0
15-24	0	0	0	0	0
25-34	0	0	0	0	0
35-44	0	1	1	50.0	0.2
45-54	1	0	1	50.0	0.2
55-64	0	0	0	0	0
65+	0	0	0	0	0
Total	1	1	2	100	-

[^] Cases acquired locally among Singapore and non-residents.

*Rates are computed based on 2023 mid-year population obtained from the Singapore Department of Statistics.

Table 3.3
Ethnic-sex distribution and ethnic-specific incidence rate of indigenous chikungunya fever cases[^], 2023

Residential Status	Male	Female	Total	%	Incidence rate per 100,000 population*
Singapore residents					
Chinese	1	1	2	100	0.1
Malay	0	0	0	0	0
Indian	0	0	0	0	0
Others	0	0	0	0	0
Non-residents	0	0	0	0	0
Total	1	1	2	100	-

[^] Cases acquired locally among Singapore and non-residents.

*Rates are computed based on 2023 mid-year population obtained from the Singapore Department of Statistics.

In 2023, there were 9 (81.8%) imported cases (excluding tourists and foreigners seeking medical treatment), with a history of travel to chikungunya- endemic countries within 12 days prior to the onset of illness. Majority of imported cases in 2023 had travelled to or came from India (44.4%) (Table 3.4).

In 2024, there were 12 (100%) imported cases (excluding tourists and foreigners seeking medical treatment), with a history of travel to chikungunya- endemic countries within 12 days prior to the onset of illness. Majority of imported cases in 2024 had travelled to or came from India (58.3%) (Table 3.4).

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Table 3.4
Imported chikungunya fever cases, 2020-2024^

	2020	2021	2022	2023	2024
Southeast Asia					
Thailand	0	0	2	1	0
Myanmar	0	0	0	0	0
Malaysia	7	0	11	2	0
Indonesia	0	0	4	1	4
Philippines	0	0	0	1	1
South Asia					
India	1	0	2	4	7
Sri Lanka	0	0	0	0	0
Maldives	0	0	0	0	0
Americas	0	0	0	0	0
Europe	0	0	0	0	0
Total	8	0	19	9	12

^aExcluded tourists and foreigners seeking medical treatment in Singapore.

The geographical distribution of indigenous chikungunya fever cases and *Aedes albopictus* in 2023 is as follows (Figure 3.2).

Figure 3.2
Geographical distribution of indigenous chikungunya fever cases and *Aedes albopictus*, 2023
(Source: National Environment Agency)



DENGUE FEVER/DENGUE HAEMORRHAGIC FEVER

Dengue fever (DF) is an acute febrile viral disease characterised by sudden onset of fever for two to seven days, severe headache with retro-orbital pain, joint and muscle pain, skin rashes, nausea, vomiting and bleeding from nose or gums or easy bruising of skin. The infectious agents are flaviviruses comprising four serotypes (DEN-1, DEN-2, DEN-3 and DEN-4) and are transmitted by the *Aedes* mosquito. In some cases, dengue haemorrhagic fever (DHF), a potentially fatal complication characterised by high fever, thrombocytopaenia, haemorrhagic manifestations, and evidence of plasma leakage, may develop.

Dengue cases increased in 2024 as compared to 2023 (Figure 3.3). A total of 13,651 laboratory confirmed cases of dengue (comprising 13,605 cases of DF and 46 cases of DHF) were reported in 2024, a 37% increase from the 9,949 cases reported in 2023 (comprising 9,938 cases of DF and 11 cases of DHF).

In 2023, out of the 9,949 cases, 9,748 were indigenous cases and 94 were imported cases involving 37 Singapore residents and 57 non-residents. The remaining 107 cases comprised tourists or foreigners seeking medical treatment in Singapore (Table 3.5).

In 2024, out of the 13,651 cases, 13,490 were indigenous cases and 93 were imported cases involving 48 Singapore residents and 45 non-residents. The remaining 68 cases were tourists or foreigners seeking medical treatment in Singapore (Table 3.5).

Figure 3.3
Weekly distribution of DF/DHF cases, 2023-2024

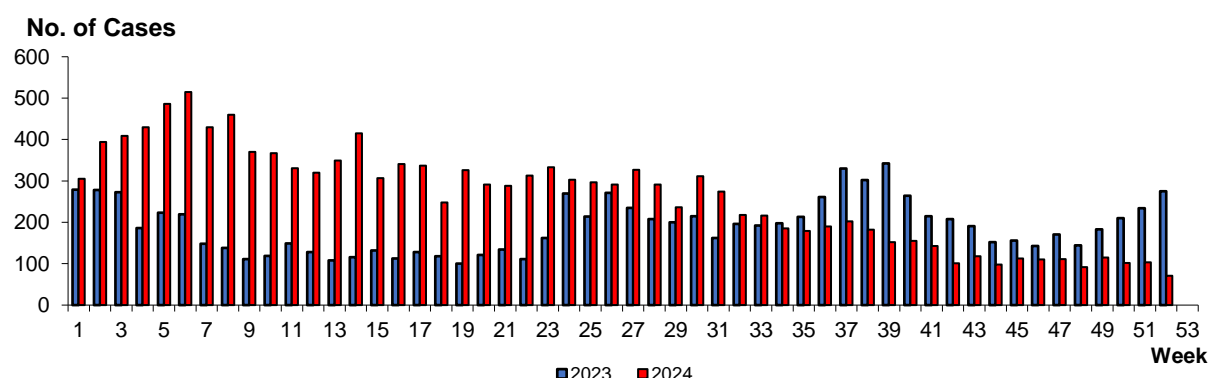


Table 3.5
Total number of notifications* received for DF/DHF cases, 2020-2024

Age group	2020		2021		2022		2023		2024	
	Local	Imported	Local	Imported	Local	Imported	Local	Imported	Local	Imported
0-4	216	1	63	0	403	0	127	3	56	2
5-14	2,032	2	211	0	2,300	4	516	8	650	5
15-24	4,180	2	553	2	3,740	4	1,086	7	1,513	7
25-34	7,816	8	1,169	2	6,843	13	2,011	19	2,648	24
35-44	6,792	3	943	1	6,294	13	1,855	25	2,755	22
45-54	5,687	0	733	2	4,900	7	1,439	19	2,021	13
55-64	4,340	1	613	0	3,699	6	1,124	9	1,728	12
65+	4,106	0	959	0	3,891	0	1,590	4	2,119	8
Total	35,169	17	5,244	7	32,070	47	9,748	94	13,490	93

*Excluded tourists and foreigners seeking medical treatment in Singapore.

In 2023, the resident incidence rate among indigenous cases was highest in the 65+ age group, with an overall male to female ratio of 1.4:1. In 2024, the resident incidence rate was highest in the 55-64 age group, with an overall male to female ratio of 1.5:1 (Tables 3.6 and 3.7). Among the three major

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ethnic groups, the incidence rate was highest among Chinese in both 2023 and 2024 (Tables 3.8 and 3.9).

Table 3.6
Age-sex distribution and age-specific resident incidence rate of indigenous DF/DHF cases[^], 2023

Age group	Number of notifications				Incidence rate per 100,000 resident population*
	Male	Female	Total	%	
0-4	74	53	127	1.3	67.3
5-14	300	216	516	5.3	110.0
15-24	659	427	1,086	11.1	192.0
25-34	1,253	758	2,011	20.6	192.3
35-44	1,137	718	1,855	19.0	179.4
45-54	811	628	1,439	14.8	187.6
55-64	585	539	1,124	11.5	174.6
65+	883	707	1,590	16.3	214.0
Total	5,702	4,046	9,748	100+	-

[^]Cases acquired locally among Singapore and non-residents.

*Rates computed are based on 2023 mid-year population from the Singapore Department of Statistics.

+Figures may not add to 100% due to rounding.

Table 3.7
Age-sex distribution and age-specific resident incidence rate of indigenous DF/DHF cases[^], 2024

Age group	Number of notifications				Incidence rate per 100,000 resident population*
	Male	Female	Total	%	
0-4	34	22	56	0.4	27.6
5-14	393	257	650	4.8	137.3
15-24	987	526	1,513	11.2	255.9
25-34	1,682	966	2,648	19.6	254.7
35-44	1,777	978	2,755	20.4	234.9
45-54	1,144	877	2,021	15.0	266.0
55-64	908	820	1,728	12.8	270.4
65+	1,101	1,018	2,119	15.7	269.3
Total	8,026	5,464	13,490	100+	-

[^]Cases acquired locally among Singapore and non-residents.

*Rates computed are based on 2024 mid-year population from the Singapore Department of Statistics.

+Figures may not add to 100% due to rounding.

Table 3.8
Ethnic-sex distribution and ethnic-specific incidence rate of indigenous DF/DHF cases[^], 2023

Residential Status	Male	Female	Total	%	Incidence rate per 100,000 population*
Singapore residents					
Chinese	3,095	2,593	5,688	58.4	185.1
Malay	479	355	834	8.6	148.6
Indian	341	236	577	5.9	153.9
Others	135	134	269	2.8	191.1
Non-residents	1,652	728	2,380	24.4	134.6
Total	5,702	4,046	9,748	100+	164.7

[^]Cases acquired locally among Singapore and non-residents.

*Rates computed are based on 2023 mid-year population from the Singapore Department of Statistics.

+Figures may not add to 100% due to rounding.

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Table 3.9
Ethnic-sex distribution and ethnic-specific incidence rate of indigenous DF/DHF cases[^], 2024

Residential Status	Male	Female	Total	%	Incidence rate per 100,000 population*
Singapore residents					
Chinese	4,170	3,653	7,823	58.0	252.9
Malay	670	457	1,127	8.4	199.3
Indian	406	286	692	5.1	183.1
Others	159	137	296	2.2	205.4
Non-residents	2,621	931	3,552	26.3	191.4
Total	8,026	5,464	13,490	100	223.5

[^]Cases acquired locally among Singapore and non-residents.

*Rates computed are based on 2024 mid-year population from the Singapore Department of Statistics.

There were 201 (2.0%) and 161 (1.2%) imported cases in 2023 and 2024, respectively, with a history of travel to dengue endemic countries within seven days prior to onset of illness. Majority of the cases were from Southeast Asian countries (57.2% in 2023, 68.3% in 2024) followed by South Asia and other regions (Table 3.10).

Table 3.10
Imported DF/DHF cases, 2020-2024

	Year				
	2020	2021	2022	2023	2024
Southeast Asia					
Brunei	0	0	0	1	0
Cambodia	0	0	3	3	1
East Timor	0	0	0	1	1
Indonesia	12	4	24	48	59
Malaysia	13	0	9	24	23
Myanmar	0	0	1	6	2
Philippines	2	0	3	7	8
Thailand	1	1	2	19	16
Viet Nam	2	0	8	6	0
South Asia					
Bangladesh	0	0	3	15	4
India	6	2	20	52	35
Nepal	0	0	1	1	1
Sri Lanka	0	0	3	5	2
East Asia					
China	0	1	0	3	2
Other Regions	5	1	7	10	7
Total	41	9	84	201	161

Residents from Housing and Development Board (HDB) flats accounted for most of the indigenous cases in both 2023 (72.6%) and 2024 (71.5%). The highest incidence rate was seen among residents in landed properties in both 2023 (311.0 per 100,000) and 2024 (490.7 per 100,000). The incidence rate of residents from landed properties was 1.9 and 2.2 times higher than residents from HDB flats in 2023 and 2024 respectively (Tables 3.11 and 3.12).

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Table 3.11
Incidence rate of reported indigenous DF/DHF cases by housing type[^] for Singapore residents, 2023

Housing Type	No.	%	Incidence rate per 100,000 resident population*
HDB Flats	5,347	72.6	168.1
Landed Properties	780	10.6	311.0
Condominiums	1,145	15.6	168.4
Others	89	1.2	240.7
Total	7,361	100	177.4

[^]Based on reported cases with known housing type.

*Rates computed are based on 2023 mid-year population from the Singapore Department of Statistics.

Table 3.12
Incidence rate of reported indigenous DF/DHF cases by housing type[^] for Singapore residents, 2024

Housing Type	No.	%	Incidence rate per 100,000 resident population*
HDB Flats	7,089	71.5	222.3
Landed Properties	1,219	12.3	490.7
Condominiums	1,538	15.5	217.7
Others	75	0.8	200.2
Total	9,921	100+	237.3

[^]Based on reported cases with known housing type.

*Rates computed are based on 2024 mid-year population from the Singapore Department of Statistics.

+ Figures may not add to 100% due to rounding.

A total of 1,135 clusters involving 9,748 epidemiologically linked cases were identified in 2023, of which 70 clusters (6.2%) had 10 or more cases (Table 3.13). Areas with more than 50 cases are listed in Table 3.14. The median number of cases was three and the median duration of transmission was 12 days (Table 3.13).

A total of 1,437 clusters involving 13,490 epidemiologically linked cases were identified in 2024, of which 122 clusters (8.5%) had 10 or more cases (Table 3.13). Areas with more than 50 cases are listed in Table 3.15. The median number of cases was three and the median duration of transmission was 12 days (Table 3.13).

Table 3.13
Dengue clusters identified, 2020-2024

Year	No. of indigenous cases	No. of clusters*	No. of cases in cluster area (% of indigenous cases)	No. of clusters with ≥10 cases (% of total clusters)	Median no. of cases per cluster	Median duration of transmission (days)
2020	35,169	3,127	29,858 (84.6)	462 (14.8)	3	13
2021	5,244	577	2,736 (52.2)	32 (5.5)	2	12
2022	32,070	3,176	27,082 (84.4)	398 (12.5)	3	13
2023	9,748	1,135	5,865 (60.1)	70 (6.2)	3	12
2024	13,490	1,437	9,316 (69.1)	122 (8.5)	3	12

*A cluster is defined as two or more cases epidemiologically linked by place [within 150m] and time (within 14 days).

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Table 3.14
Dengue clusters identified, 2023 (50 or more cases)

S/No	Locality	No. of cases	Month of Cluster Formation
1	Lor 1 Toa Payoh (Blk 148, 149, 150, 153A, 155, 156, 157) / Lor 1 Toa Payoh (Oleander Twrs) / Lor 2 Toa Payoh (Blk 141, 142, 145, 146, 147, 152, 153, 154)	326	Jun
2	Boon Lay Ave(Blk 185,216A,216B,217A,217B,218B-D)/Boon Lay Dr(Blk 174,175,197A,197C-D,198,201,204,205)/Boon Lay Pl(Blk 207-215,221)/Corporation Rd(ParcVista)/Jurong West Ave 1(Blk 530A,538-540)/Jurong West St 52(Blk 516,517A,517E,518,520-525,527-536)	303	Nov
3	Pasir Ris Ctrl / Pasir Ris St 52 (Blk 500, 501, 502, 503, 504, 507-515, 517, 518, 519, 520, 521) / Pasir Ris St 53 / Pasir Ris St 53 (Blk 570, 571, 572, 573, 574, 575, 576, 577, 578, 579, 580, 581, 582, 583, 584, 585, 586)	196	Nov
4	Lor 1 Toa Payoh (Blk 126, 128) / Lor 1A Toa Payoh (Blk 138A, 138B, 138C, 139A, 139B) / Lor 2 Toa Payoh (Blk 143, 144)	186	Jun
5	Bt Batok St 21 (Blk 201, 202, 203, 204, 205, 206, 207, 208, 209, 210, 210A, 211, 211A) / Bt Batok St 22 (Blk 296A, 297, 299)	165	Nov
6	Pasir Ris St 71 (Blk 740, 741, 742, 743, 744, 745, 746, 747, 748, 749, 750, 751, 752, 753, 754, 756, 759, 760, 761, 762, 763, 764, 765)	150	Nov
7	Amoy St / Club St / Club St (Emerald Gdn) / Gemmill Ln / McCallum St (The Clift) / South Bridge Rd	112	Aug
8	Science Pk Dr	108	Aug
9	Jln Chegar / Jln Hari Raya / Jln Isnin / Jln Khamis / Jln Kuak / Jln Minggu / Jln Pintau / Jln Rabu / Shunfu Rd (Jadescape) / Sin Ming Rd (Blk 24, 25)	90	Nov
10	Marsiling Dr (Blk 22, 23, 24, 25, 26, 28, 30, 31, 32, 33, 201, 202)	86	Dec
11	Countryside Rd / Lentor Ave, Cres, Lk, Pl, St, Ter / Lentor Loop (Bullion Pk)	84	Aug
12	Pasir Ris Dr 10 (Blk 701, 702, 703, 704, 705, 706, 707, 736, 737, 738, 739) / Pasir Ris St 72 (Blk 711, 712, 718, 719, 721, 722, 723) / Pasir Ris St 72 (Whitewater)	80	Dec
13	Elias Rd (Blk 602, 603, 604, 606, 607, 608, 609, 610, 611, 612, 613, 614, 615) / Elias Rd (Oasis @ Elias) / Pasir Ris Dr 1 (Blk 637, 638, 640, 641)	79	Dec
14	Lor 1 Toa Payoh (Blk 117, 118, 119, 123) / Lor 2 Toa Payoh (Blk 116, 120, 121, 122)	70	Jul
15	Angklong Ln (Faber Gdn Condo) / Island Gdns Walk / Lor Puntong (Country Esquire, Thomson Impressions) / Sin Ming Ave (Flame Tree Pk) / Sin Ming Walk (Bishan Pk Condo, The Gdns at Bishan) / The Inglewood	68	Jun

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S/No	Locality	No. of cases	Month of Cluster Formation
16	Lor 1 Toa Payoh (Blk 158, 159, 160, 161, 163, 168, 169, 170, 171, 173, 174) / Lor 1 Toa Payoh (Trellis Twrs) / Thomson Ln (Sky@Eleven)	67	Jun
17	Bt Batok Ctrl (Blk 103, 104, 105, 106, 107, 122, 125, 620, 622, 623, 624, 625, 626, 627, 628) / Bt Batok West Ave 6 (Blk 111, 112, 116, 118, 130)	65	Sep
18	Elias Green (Elias Green) / Elias Ter / Pasir Ris Gr (Coco Palms, D'nest, Livia, NV Residences, The Palette)	64	Dec
19	Eng Kong Rd, Ter / Lor Kismis / Lor Kismis / Toh Tuck Rd / Toh Tuck Rd (Daintree Residence, High Oak Condo, Nottingham Suites, The Creek @ Bt) / Toh Tuck Ter / Toh Yi Dr, Rd	59	Jul

Table 3.15
Dengue clusters identified, 2024 (50 or more cases)

S/No	Locality	No. of cases	Month of Cluster Formation
1	CashewRd(Blk133A,135, CashewHts)/CashewRd,Ter/GangsaRd(Blk101-111,146-148,152-155,163-166,172,173)/HazelPkTer/HazelPkTer(HazelPk Condo)/LompangRd(Blk180)/PendingRd(Blk112-123,125-128,228-229)/PetirRd(Blk137-145,149-151,167-168, Maysprings)	412	Mar
2	Ang Mo Kio Ave 1 (Blk 303-306, 307A, 307B, 307C, 308A, 308B, 310A, 310B, 310C, 319, 320, 321, 338, 339) / Ang Mo Kio Ave 3 (Blk 301, 302, 311-314, 324, 325, 326, 327, 328, 329, 343, 345, 346, 348) / Ang Mo Kio St 31 (Blk 309A, 315A, 315B, 316A, 317)	233	Jan
3	Ang Mo Kio Ave 3 (Blk 101-103, 127, 129, 130, 132-134) / Ang Mo Kio Ave 4 (Blk 105-110, 112-114, 117, 170, 256-258) / Ang Mo Kio St 11 (Blk 104A, 104B) / Mayflower Ave, Cres, Dr, Ln, Pl, Rd, Rise, Ter, Way	181	Jan
4	Jln Manis / Jln Semerbak / Jln Taman / Mar Thoma Rd / S'goon Rd / St. Francis Rd / St. George's Ln (Blk 4C) / St. George's Rd (Blk 3, 11, 13-16, 18, 20-22) / St. Michael's Rd	135	Jan
5	Jurong West Ave 1 (Blk 541, 542) / Jurong West Ave 2 / Jurong West St 42 / Jurong West St 42 (Blk 543, 545, 546, 547, 548, 549, 550, 551, 552, 553, 555, 556, 557, 559, 561A, 561B)	126	Apr
6	Ang Mo Kio Ave 1 (Blk 330, 331, 332, 334, 335, 336, 337) / Ang Mo Kio St 32 (Blk 350, 351, 352, 353, 354)	110	Mar
7	Jurong Lake Lk (Lake Grande, Lakeville) / Jurong West Ave 1 (Blk 485, 486, 488, 491) / Jurong West St 41 (The Lakeshore) / Jurong West St 41 (Blk 463, 474, 475, 476, 478, 480, 481, 483, 492, 494, 495, 498, 499)	103	Feb

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S/No	Locality	No. of cases	Month of Cluster Formation
8	Jurong East St 21 (Blk 287B, 287C, 288A, 288B, 288C, 288D, 288E) / Toh Guan Rd (Blk 265, 266, 267, 268, 269, 270, 271, 272, 273, 274, 278, 280, 286C, 286D)	97	Jul
9	Bt Batok East Ave 2 (Hillview Regency) / Bt Batok East Ave 4 (Blk 254, 255, 260, 263, 264, 265) / Bt Batok East Ave 5 (Blk 231, 233, 235, 236, 237, 242, 243, 244, 247, 248, 249, 251, 252, 253) / Bt Batok East Ave 5 (Regent Hts)	96	Feb
10	Jurong West St 73 (Blk 750) / Jurong West St 74 (Blk 752, 753, 754, 757, 758, 759, 760, 761, 764, 766) / Jurong West St 81 (Blk 860, 862) / Westwood Ave (The Floravale, Westwood Residences) / Westwood Ave, Cres, Dr, Rd, Ter, Walk	91	Aug
11	Marsiling Rd (Blk 180B, 180C) / Marsiling Rise (Blk 114, 115, 116, 118, 119, 120, 122, 123, 124, 125, 126, 127, 128, 129, 130, 131) / Marsiling Ind East Rd 3 / Woodlands St 13 (Blk 113)	89	Feb
12	Benoi Rd	80	Jun
13	Cashew Rd	79	Aug
14	Jln Bahagia (Blk 27, 28, 29, 30, 32, 33, 34, 35, 41, 48) / Jln Tenteram (Blk 19, 20, 21, 116A) / Whampoa Dr (Blk 74, 75) / Whampoa Rd (Blk 112, 113, 114, 115)	77	Feb
15	Jurong East Ave 1 / Jurong East Ave 1 (Blk 318A, 329, 330, 331, 332, 335, 336, 340) / Jurong East St 31 (Blk 317, 319, 320, 321, 322, 322A, 323, 324, 325, 327, 328) / Jurong East St 32 (Blk 374)	66	Mar
16	Ang Mo Kio Ctrl 3 (Grandeur 8)	65	Jul
17	Pasir Ris Dr 3 (Eastvale) / Pasir Ris Dr 4 (Blk 461) / Pasir Ris Dr 6 / Pasir Ris Dr 6 (Blk 405, 406, 407, 408, 409, 410, 412, 413, 414, 416, 417, 418, 419, 421, 422, 423, 453) / Pasir Ris St 41 (Blk 466)	63	Mar
18	Gul Rd	55	Feb
19	Jurong West Ctrl 1 (Blk 677B, 679A, 679C, 680C, 683A, 689, 690, 691, 692, 693, 694, 695, 696) / Jurong West Ctrl 3 (Blk 697C, 698) / Jurong West St 64 (Blk 678C, 684C)	54	Jan
20	Jln Girang, Riang / S'goon Ave 2 (Blk 321) / S'goon Ave 3 (Blk 322, 323, 324, 325, 327, 328, 329, 330, 331, 332, 334, 335) / S'goon Ave 3 (Amaranda Gdns, The Sunnydale) / Wolskel Rd	54	Mar
21	Pandan Cres	54	May
22	Hindhede Walk (Southaven I, Southaven II, Springdale Condo)	52	May

Dengue deaths

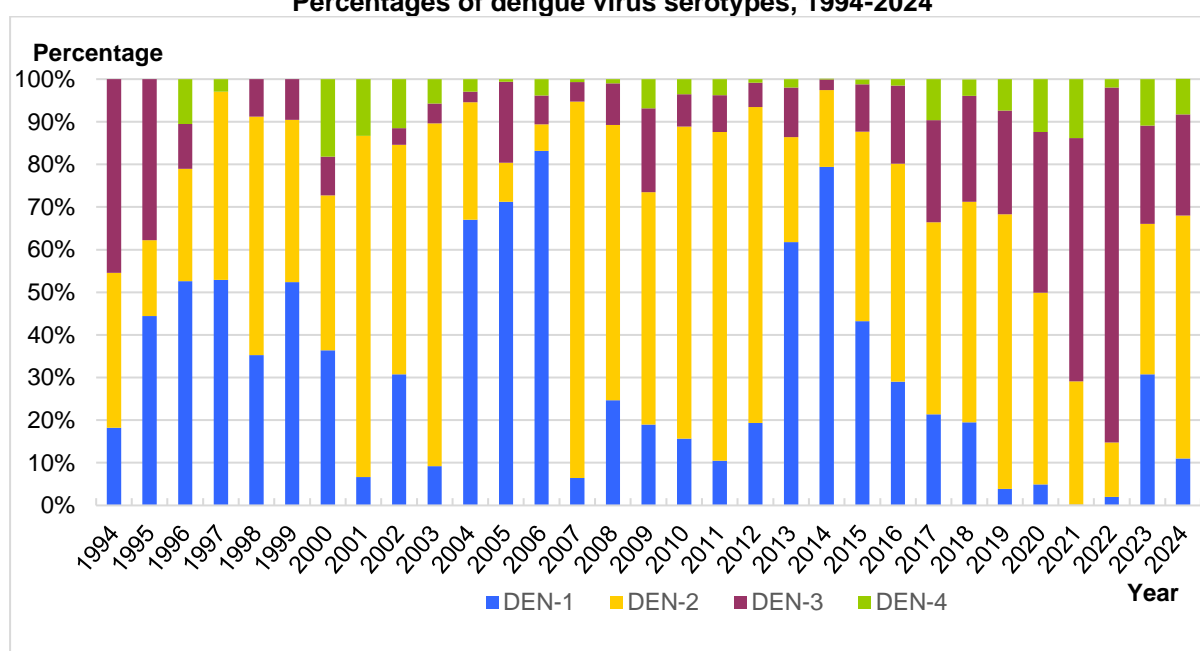
A total of 6 and 19 fatal cases were reported in 2023 and 2024 respectively. All were classified as indigenous, with the exception of two imported cases in 2024. Among the indigenous fatal cases, five (83.3%) and 11 (64.7%) cases were residing in an active dengue cluster in 2023 and 2024 respectively.

Laboratory surveillance

All reported cases of DF/DHF were confirmed by one or more laboratory tests including anti-dengue IgM antibody, enzyme linked immunosorbent assay (ELISA), and polymerase chain reaction (PCR).

A total of 3,821 and 6,690 blood samples obtained from both inpatients and outpatients tested positive for dengue virus by PCR in 2023 and 2024, respectively. DEN-2 was the predominant circulating serotype since 2023 (Figure 3.4).

Figure 3.4
Percentages of dengue virus serotypes, 1994-2024



Aedes mosquito vectors surveillance and control

Suppressing the *Aedes* mosquito vector population is the key to dengue control. The National Environment Agency (NEA) adopts an evidence-based integrated approach for the surveillance and control of *Aedes* vectors comprising of surveillance, control, community engagement, enforcement, and research.

Source reduction is central to Singapore's *Aedes* mosquito vector control efforts. NEA actively engages the community to do their part to prevent mosquito breeding in their premises. Through the Inter-Agency Dengue Taskforce, NEA coordinates source reduction efforts in partnership with stakeholders in the public, private and people sectors.

Surveillance is built on the current regime of inspecting premises and conducting ground surveys for mosquito breeding. Vector surveillance is integrated with epidemiological surveillance and laboratory-based virus surveillance, to generate risk maps that are used to guide vector control efforts. This is complemented by adult mosquito surveillance using over 70,000 Gravitraps deployed islandwide. The Gravitrapp surveillance system provides insights on mosquito population and distribution, which informs operational deployment and guides public communications for community action. To control the vector population in dengue clusters, NEA carries out search and destroy of mosquito breeding sources complemented by space spraying of insecticides to kill adult mosquitoes. Gravitraps are also used to monitor the extent of control efforts and direct officers to search and destroy at locations with higher

Aedes mosquito populations.

Since 2016, NEA's Environmental Health Institute (EHI) has been studying the use of *Wolbachia* suppression technology to complement Singapore's dengue control programme. The strategy involves the release of non-biting male *Wolbachia*-carrying *Aedes aegypti* mosquitoes. When these mosquitoes mate with urban *Aedes aegypti* female without *Wolbachia*, their resulting eggs do not hatch as such mating are biologically incompatible. Thus, the continual release of male *Wolbachia*-carrying *Aedes aegypti* leads to a decline in the *Aedes aegypti* population over time.

NEA is adopting a systematic phased approach with field trials, to allow for the building of invaluable knowledge for deployment of the technology, especially in a tropical, urbanised, high-rise landscape. Project *Wolbachia* field studies will continue to sharpen deployment strategies for a cost effective and sustainable programme for the long term. NEA will also continue to work with commercial partners to develop automated solutions to ramp up *Wolbachia*-*Aedes* mosquito production and release capacity, which will enable a large-scale, cost-effective roll-out in the next few years.

Since April 2025, Project *Wolbachia* – Singapore has covered about 480,000 households, representing approximately 35% of all households in Singapore. All studies conducted thus far have shown promising outcomes. The *Aedes aegypti* population at the study sites has reduced by 80 to 90 per cent, and the results from the completed multi-site field study demonstrated the impact in lowering the risk of acquiring dengue by 75 per cent. Residents in adjacent areas were also found to be 45 per cent less likely to contract dengue compared to those with no releases.

Project *Wolbachia* is not a silver bullet solution to stem dengue transmission in Singapore. While the technology has shown to be effective in reducing the *Aedes aegypti* population and the risk of dengue transmission in a local area, conventional vector control efforts must continue, and the community still needs to be vigilant in doing their part to suppress the presence of breeding habitats.

In 2023, NEA inspected over 813,000 premises. These included residential premises, construction sites, dormitories, factories and other premises types. The geographical distribution of dengue cases, *Aedes aegypti* and *Aedes albopictus* mosquito breeding habitats are shown in Figures 3.5, 3.6 and 3.7 respectively. The overall *Aedes* House Index (HI) was 1.41%, with landed houses showing the highest HI among the residential premises (Figure 3.11).

The top five breeding habitats for *Aedes aegypti* were domestic containers (28.3%), flower pot plates/trays (11.8%), ornamental containers (8.7%), covered perimeter drains (3.3%) and ground puddles (2.2%) (Figure 3.12). As for *Aedes albopictus*, the most common breeding habitats were domestic containers (10.4%), flower pot plates/trays (9.6%), covered perimeter drains (9.0%), discarded receptacles (8.7%) and gully traps (3.7%) (Figure 3.13).

In 2024, NEA inspected over 686,000 premises. These included residential premises, construction sites, dormitories, factories and other premises types. The geographical distribution of dengue cases, *Aedes aegypti* and *Aedes albopictus* mosquito breeding habitats are shown in Figures 3.8, 3.9 and 3.10 respectively. The overall *Aedes* House Index (HI) was 1.56%, with landed houses showing the highest HI among the residential premises (Figure 3.11).

The top five breeding habitats for *Aedes aegypti* were domestic containers (29.4%), flowerpot plates/trays (11.9%), ornamental containers (10.1%), covered perimeter drains (3.7%) and ground puddles (2.5%) (Figure 3.14). As for *Aedes albopictus*, the most common breeding habitats were discarded receptacles (10.7%), domestic containers (10.4%), covered perimeter drains (8.9%) flower pot plates/trays (8.9%), and ornamental containers (4.1%) (Figure 3.15).

Figure 3.5
Geographical distribution of dengue cases, 2023



Figure 3.6
Geographical distribution of *Aedes aegypti* breeding habitats detected, 2023

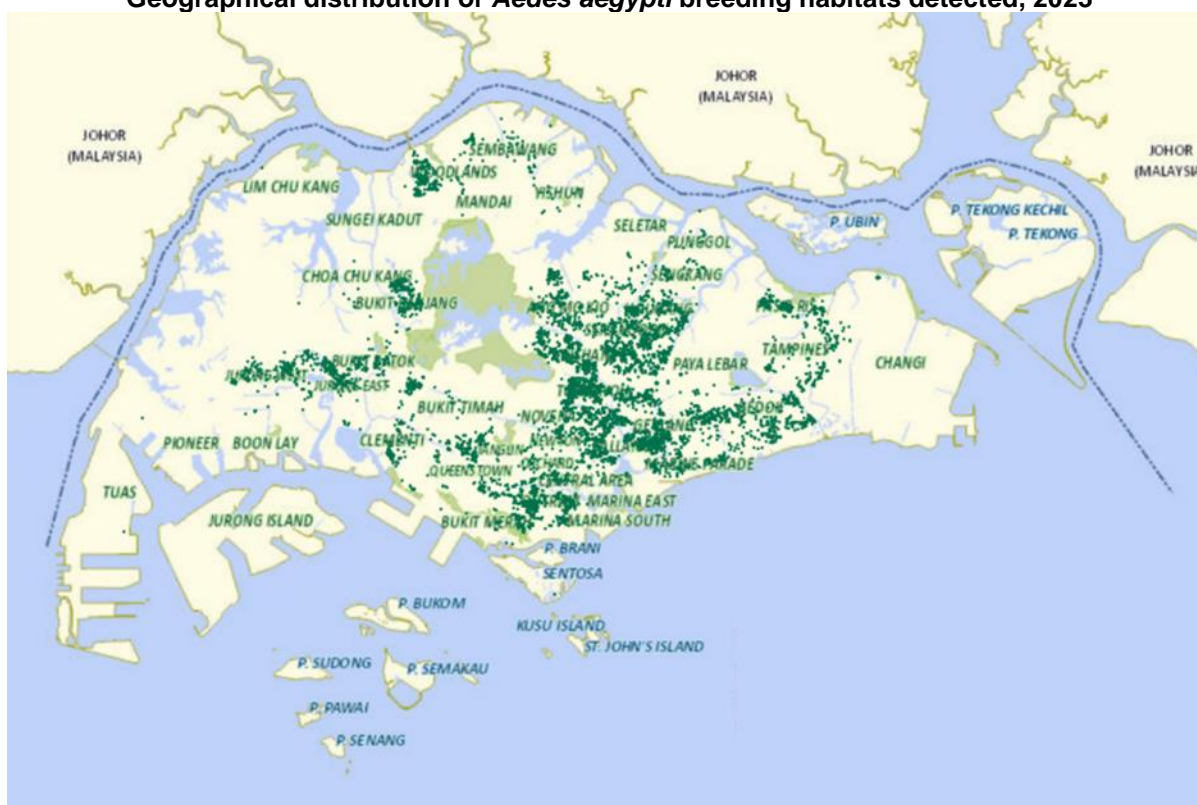


Figure 3.7
Geographical distribution of *Aedes albopictus* breeding habitats detected, 2023



Figure 3.8
Geographical distribution of dengue cases, 2024



Figure 3.9
Geographical distribution of *Aedes aegypti* breeding habitats detected, 2024



Figure 3.10
Geographical distribution of *Aedes albopictus* breeding habitats detected, 2024



Figure 3.11
***Aedes* House Index, 2020-2024**

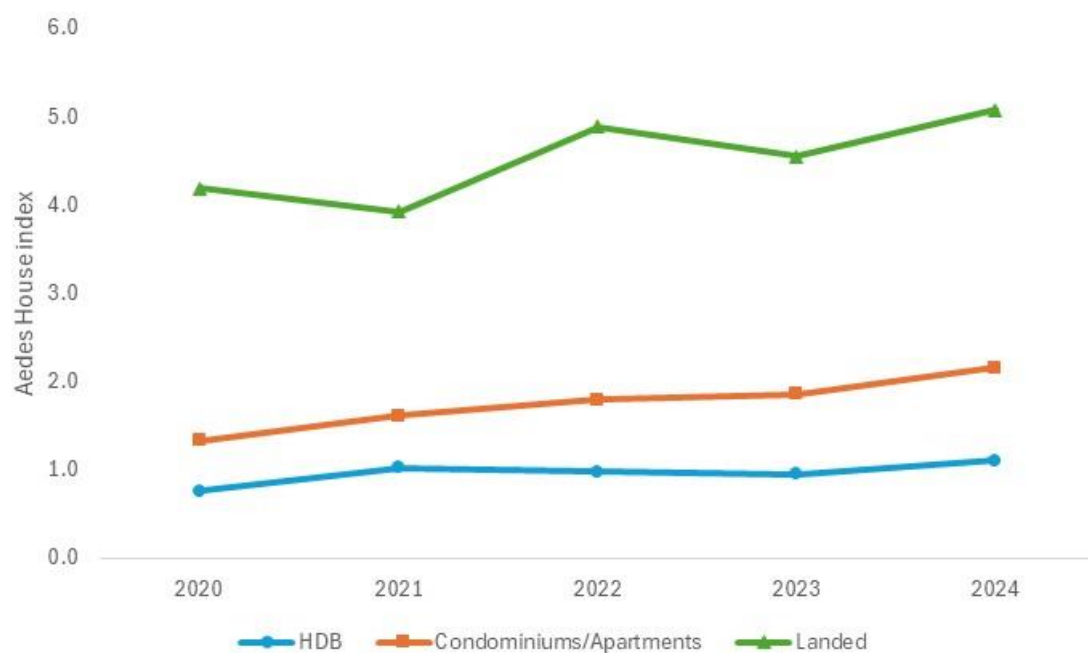


Figure 3.12
Distribution of *Aedes aegypti* top five breeding habitats, 2023

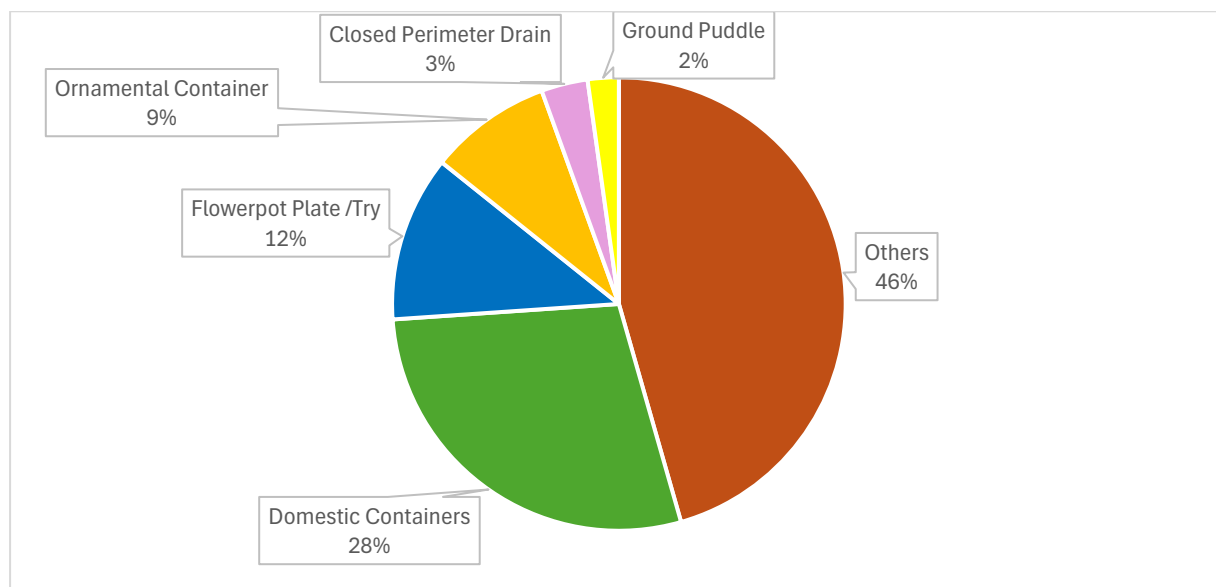


Figure 3.13
Distribution of *Aedes albopictus* top five breeding habitats, 2023

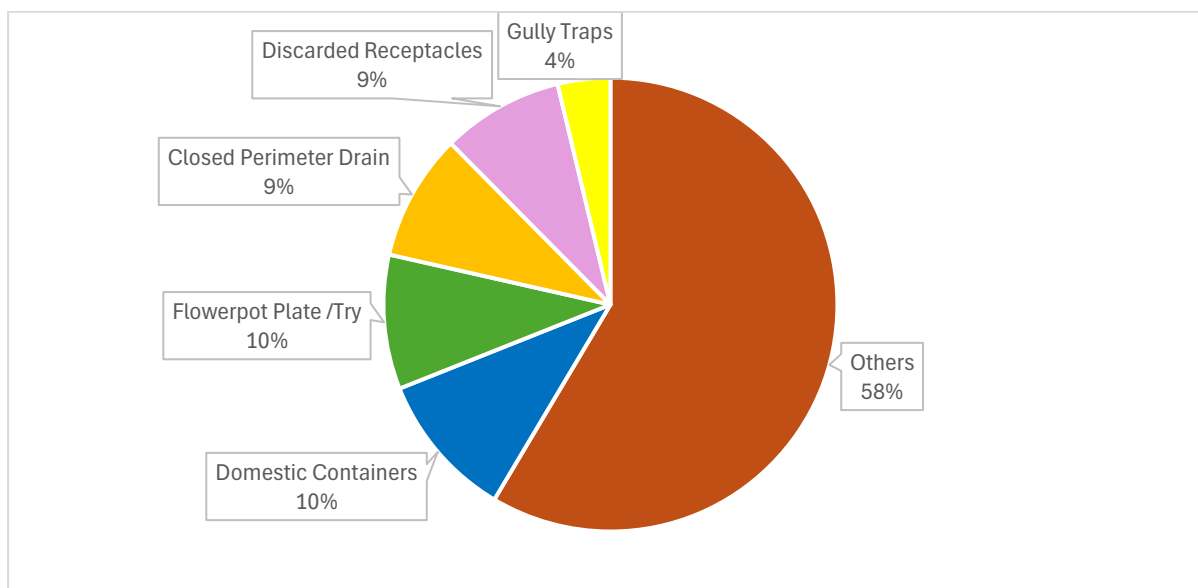


Figure 3.14
Distribution of *Aedes aegypti* top five breeding habitats, 2024

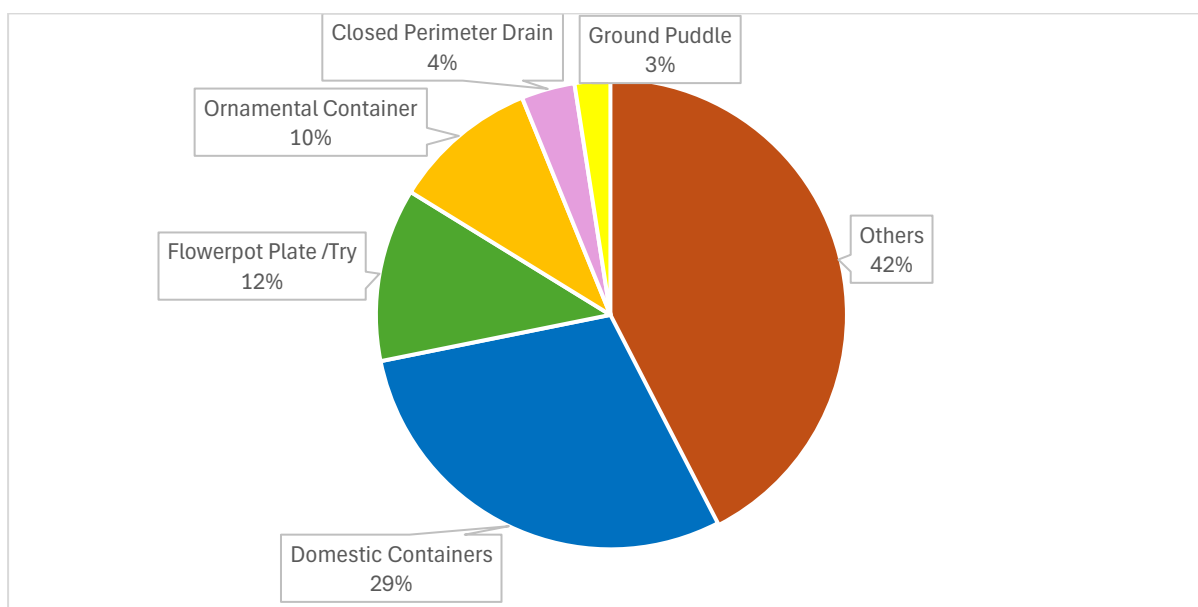
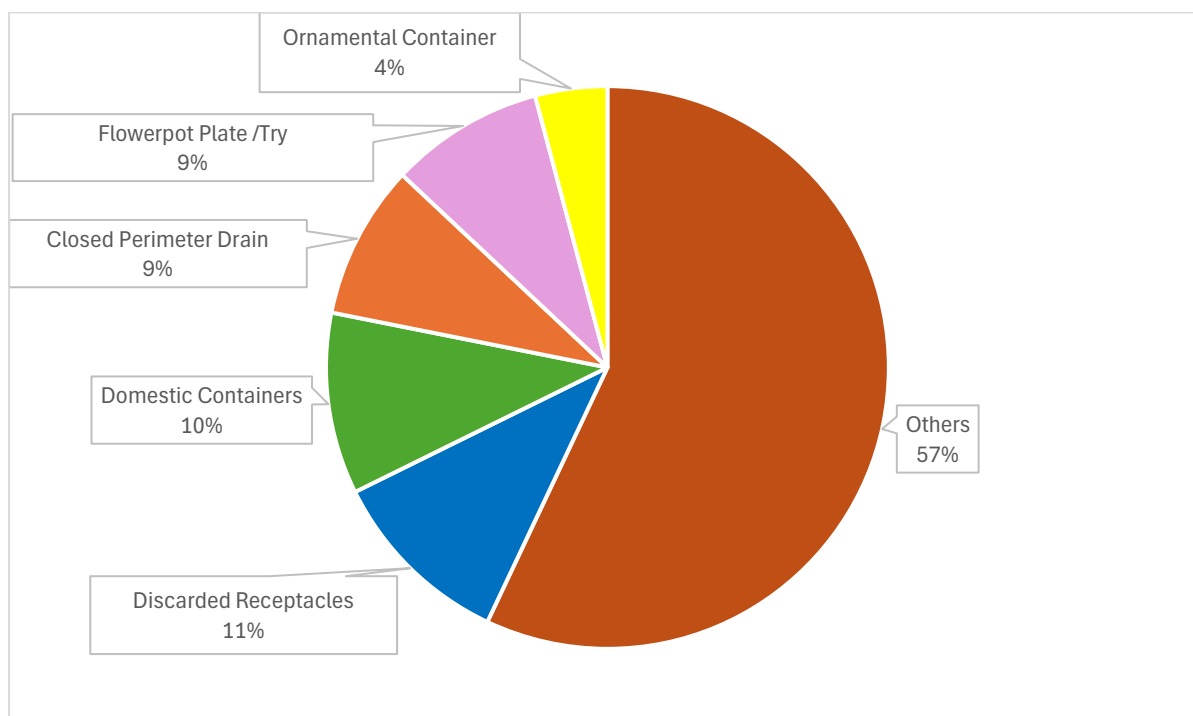


Figure 3.15
Distribution of *Aedes albopictus* top five breeding habitats, 2024



LEPTOSPIROSIS

Leptospirosis is a zoonotic bacterial disease of variable clinical manifestations. The common presenting symptoms are fever, headache, chills, severe myalgia and conjunctival suffusion. The aetiologic agent *Leptospira* is a spiral organism and a member of the order *Spirochaetales* found mainly in infected wild and domestic animals (e.g. rodents, dogs, horses, cattle and pigs). The mode of transmission is through direct contact of the skin (especially if broken) or mucous membranes with the urine or bodily fluids (except saliva) tissues of infected animals. Contact with soil or vegetation contaminated by infected animals may also cause infection. Occasionally, leptospirosis has occurred following the ingestion of food contaminated by the urine of infected rats.

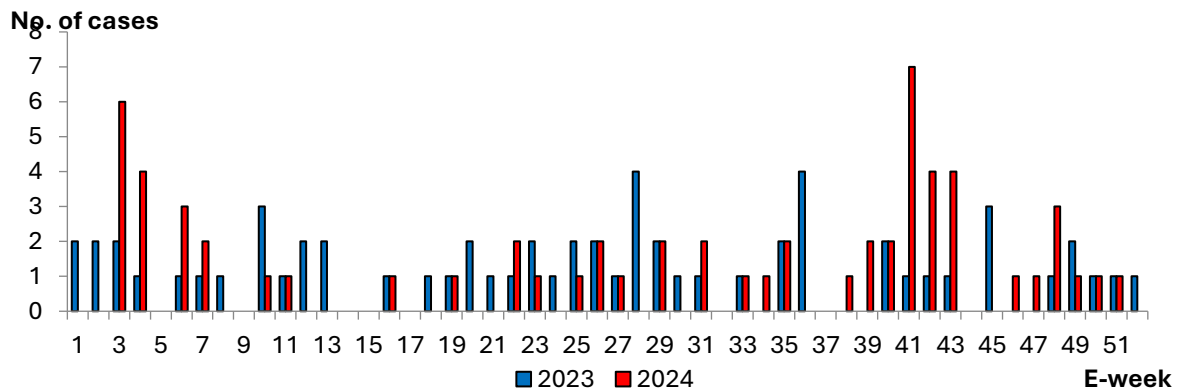
Confirmed cases are individuals who have clinically compatible symptoms with confirmatory laboratory findings such as detection of *Leptospira* via PCR. Suspected cases are individuals who have clinically compatible symptoms with either a positive *Leptospira* IgM antibodies or epidemiological risk factors.

There were 62 cases (five confirmed and 57 suspected cases) of leptospirosis reported in 2024, compared to 62 cases (11 confirmed and 51 suspected cases) in 2023 (Figure 3.16).

In 2023, out of the 62 suspected and confirmed cases, 41 were indigenous cases and 16 were imported cases, involving nine Singapore residents and seven non-residents. The remaining five cases were tourists or foreigners seeking medical treatment (Table 3.16).

In 2024, out of the 62 suspected and confirmed cases, 45 were indigenous cases and 11 were imported cases, involving eight Singapore residents and three non-residents. The remaining six cases were tourists or foreigners seeking medical treatment (Table 3.16).

Figure 3.16
Weekly distribution of confirmed and suspected leptospirosis cases, 2023-2024



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Table 3.16
Total number of notifications* received for confirmed and suspected leptospirosis cases, 2020-2024

Age group	2020		2021		2022		2023		2024	
	Local	Imported	Local	Imported	Local	Imported	Local	Imported	Local	Imported
0-4	0	1	0	0	0	0	0	0	0	0
5-14	0	1	4	0	3	0	1	0	0	0
15-24	4	0	1	0	6	4	4	2	6	5
25-34	13	2	8	0	9	3	8	8	10	1
35-44	5	0	10	0	10	1	15	4	17	3
45-54	3	0	2	0	5	1	7	2	8	1
55-64	5	0	3	0	4	1	3	0	2	1
65+	3	0	1	1	3	0	3	0	2	0
Total	33	4	29	1	40	10	41	16	45	11

*Excluded tourists and foreigners seeking medical treatment in Singapore.

In 2023, the resident incidence rate was highest in the 25-34 years age group (Table 3.17), with an overall male to female ratio of 2.6:1. In 2024, the resident incidence rate was highest in the 15-24 years age group, with an overall male to female ratio of 2.3:1 (Table 3.18). Among the three major ethnic groups, the incidence rate was highest among Indians in 2023 and Chinese and Indians in 2024 (Tables 3.19 and 3.20).

Table 3.17
Age-sex distribution and age-specific resident incidence rate of reported leptospirosis cases[^], 2023

Age group	Number of notifications				Incidence rate per 100,000 resident population*
	Male	Female	Total	%	
0-4	0	0	0	0	0
5-14	0	1	1	1.8	0.2
15-24	3	3	6	10.5	1.1
25-34	11	5	16	28.1	1.8
35-44	15	4	19	33.3	1.3
45-54	8	1	9	15.8	1.2
55-64	2	1	3	5.3	0.5
65+	2	1	3	5.3	0.4
Total	41	16	57	100.0+	-

[^]Excluded five tourists and/or foreigners seeking medical treatment in Singapore.

*Rates computed are based on 2023 mid-year population from the Singapore Department of Statistics.

+Figures may not add to 100% due to rounding.

Table 3.18
Age-sex distribution and age-specific resident incidence rate of reported leptospirosis cases, 2024

Age group	Number of notifications				Incidence rate per 100,000 resident population*
	Male	Female	Total	%	
0-4	0	0	0	0	0
5-14	0	0	0	0	0
15-24	9	2	11	19.6	2.1
25-34	7	4	11	19.6	0.7
35-44	13	7	20	35.7	1.1
45-54	7	2	9	16.1	0.8
55-64	2	1	3	5.4	0.5
65+	1	1	2	3.6	0.3
Total	39	17	56	100.0	-

[^]Excluded six tourists and/or foreigners seeking medical treatment in Singapore.

*Rates computed are based on 2024 mid-year population from the Singapore Department of Statistics.

Table 3.19
Ethnic-sex distribution and ethnic-specific incidence rate of reported leptospirosis cases[^], 2023

Residential Status	Male	Female	Total	%	Incidence rate per 100,000 population*
Singapore residents					
Chinese	14	11	25	43.9	0.8
Malay	5	1	6	10.5	1.1
Indian	5	2	7	12.3	1.9
Others	0	0	0	0	0
Non-residents	17	2	19	33.3	1.1
Total	41	16	57	100.0	1.0

[^]Excluded five tourists and/or foreigners seeking medical treatment in Singapore.

*Rates computed are based on 2023 mid-year population from the Singapore Department of Statistics.

Table 3.20
Ethnic-sex distribution and ethnic-specific incidence rate of reported leptospirosis cases[^], 2024

Residential Status	Male	Female	Total	%	Incidence rate per 100,000 population*
Singapore residents					
Chinese	18	6	24	42.9	0.8
Malay	1	2	3	5.4	0.5
Indian	0	3	3	5.4	0.8
Others	0	0	0	0	0
Non-residents	20	6	26	46.4	1.4
Total	39	17	56	100+	0.9

[^]Excluded six tourists and/or foreigners seeking medical treatment in Singapore.

*Rates computed are based on 2024 mid-year population from the Singapore Department of Statistics.

+Figures may not add to 100% due to rounding.

MALARIA

Malaria is a disease caused by a protozoan parasite, *Plasmodium*. The disease is transmitted via the bite of an infective female *Anopheles* mosquito. There are four species that cause disease in humans, namely *P. vivax*, *P. malariae*, *P. falciparum* and *P. ovale*. In recent years, *P. knowlesi* – a species that causes malaria among monkeys and occurs in certain forested areas of Southeast Asia – has also caused several human cases of malaria. Symptoms of malaria include fever, headache, chills and vomiting.

In 2024, a total of 26 laboratory confirmed cases were reported, compared to the 23 laboratory confirmed cases reported in 2023 (Figure 3.17).

In 2023, out of 23 cases, 17 cases were imported, involving eight residents and nine non-residents (Table 3.21). The remaining six comprised three tourists and three foreigners who came to Singapore for medical treatment. In 2024, out of 26 cases, 18 cases were imported, involving five residents and 13 non-residents. The remaining eight cases comprised six tourists and two foreigners who came to Singapore for medical treatment (Table 3.21).

Figure 3.17
Weekly distribution of reported malaria cases, 2023-2024

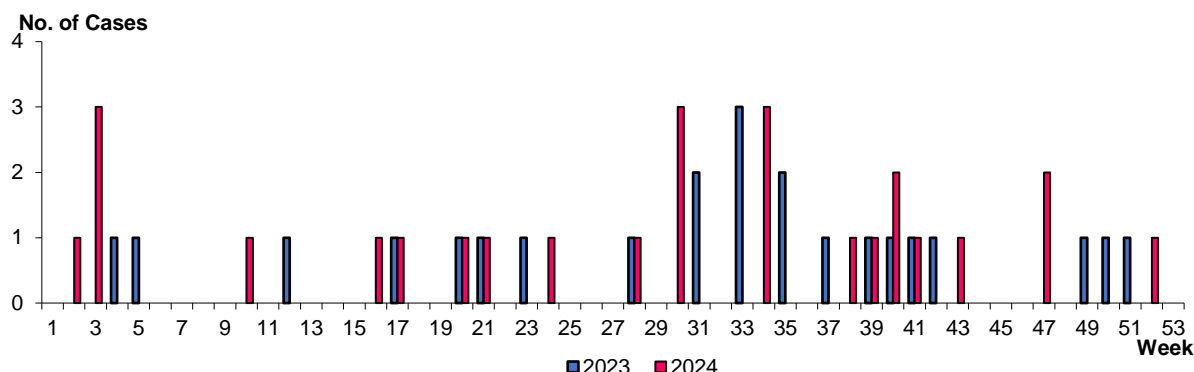


Table 3.21
Total number of notifications* received for malaria cases, 2020-2024

Age group	2020		2021		2022		2023		2024	
	Local	Imported	Local	Imported	Local	Imported	Local	Imported	Local	Imported
0-4	0	0	0	0	0	0	0	0	0	0
5-14	0	0	0	0	0	1	0	0	0	0
15-24	0	4	0	1	0	1	0	1	0	3
25-34	0	3	0	0	0	4	0	4	0	6
35-44	0	2	0	0	0	1	0	3	0	3
45-54	0	1	0	1	0	2	0	5	0	1
55-64	0	0	0	0	0	0	0	2	0	4
65+	0	0	0	0	0	1	0	2	0	1
Total	0	10	0	2	0	10	0	17	0	18

*Excluded tourists and foreigners seeking medical treatment in Singapore.

In 2023, among the imported cases, the resident incidence rate was highest in the 45-54, 55-64 and 65+ years age groups, with an overall male to female ratio of 7.5:1 (Tables 3.22). Among the three major ethnic groups, Malays had the highest incidence rate (Table 3.24). In 2024, among the imported cases, the resident incidence rate was highest in the 55-64 years age group, with an overall male to female ratio of 2.6:1 (Table 3.23). Among the three major ethnic groups, Indians had the highest incidence rate (Table 3.25).

Table 3.22
Age-sex distribution and age-specific resident incidence rate of reported malaria cases[^], 2023

Age group	Number of notifications				Incidence rate per 100,000 resident population*
	Male	Female	Total	%	
0-4	0	0	0	0	0.0
5-14	0	0	0	0	0.0
15-24	1	0	1	5.9	0.2
25-34	3	1	4	23.5	0.2
35-44	3	0	3	17.6	0.0
45-54	4	1	5	29.4	0.3
55-64	2	0	2	11.8	0.3
65+	2	0	2	11.8	0.3
Total	15	2	17	100	-

[^]Excluded six tourists and/or foreigners seeking medical treatment in Singapore.

*Rates computed are based on 2023 mid-year population from the Singapore Department of Statistics.

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Table 3.23

Age-sex distribution and age-specific resident incidence rate of reported malaria cases[^], 2024

Age group	Number of notifications				Incidence rate per 100,000 resident population*
	Male	Female	Total	%	
0-4	0	0	0	0	0.0
5-14	0	0	0	0	0.0
15-24	2	1	3	16.7	0.0
25-34	4	2	6	33.3	0.0
35-44	2	1	3	16.7	0.0
45-54	1	0	1	5.6	0.2
55-64	3	1	4	22.2	0.7
65+	1	0	1	5.6	0.0
Total	13	5	18	100+	-

[^]Excluded eight tourists and/or foreigners seeking medical treatment in Singapore.

*Rates computed are based on 2024 mid-year population from the Singapore Department of Statistics.

+Figures may not add to 100% due to rounding.

Table 3.24

Ethnic-sex distribution and ethnic-specific incidence rate of reported malaria cases[^], 2023

Residential Status	Male	Female	Total	%	Incidence rate per 100,000 population*
Singapore residents					
Chinese	4	0	4	23.5	0.1
Malay	2	0	2	11.8	0.4
Indian	0	0	0	0.0	0.0
Others	2	0	2	11.8	1.4
Non-residents	7	2	9	52.9	0.5
Total	15	2	17	100	0.3

[^]Excluded six tourists and/or foreigners seeking medical treatment in Singapore.

*Rates computed are based on 2023 mid-year population from the Singapore Department of Statistics.

Table 3.25

Ethnic-sex distribution and ethnic-specific incidence rate of reported malaria cases[^], 2024

Residential Status	Male	Female	Total	%	Incidence rate per 100,000 population*
Singapore residents					
Chinese	0	0	0	0	0.0
Malay	0	0	0	0	0.0
Indian	3	1	4	22.2	1.1
Others	1	0	1	5.6	0.7
Non-residents	9	4	13	72.2	0.7
Total	13	5	18	100	0.3

[^]Excluded eight tourists and/or foreigners seeking medical treatment in Singapore.

*Rates computed are based on 2024 mid-year population from the Singapore Department of Statistics.

Malaria parasite species

In 2023, the distribution of the cases by parasite species, for *P. vivax*, *P. falciparum*, *P. malariae* and *P. knowlesi* were 39.1%, 47.8%, 4.3% and 8.7% respectively (Table 3.26).

In 2024, the distribution of the cases by parasite species, for *P. vivax* and *P. falciparum* were 57.7% and 42.3% respectively (Table 3.27).

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Table 3.26
Classification of reported malaria cases by parasite species, 2023

Classification	Parasite species					Total (%)
	P.v.	P.f.	P.o.	P.m.	P.k.	
Imported**	9	11	0	1	2	23 (100)
Introduced	0	0	0	0	0	0
Indigenous	0	0	0	0	0	0
Cryptic	0	0	0	0	0	0
Induced	0	0	0	0	0	0
Total	9	11	0	1	2	23 (100)

P.v. - *Plasmodium vivax* P.f. - *Plasmodium falciparum* P.o. - *Plasmodium ovale*

P.m. - *Plasmodium malariae* P.k. - *Plasmodium knowlesi*

**Included relapsed cases that were imported.

Table 3.27
Classification of reported malaria cases by parasite species, 2024

Classification	Parasite species					Total (%)
	P.v.	P.f.	P.o.	P.m.	P.k.	
Imported**	15	11	0	0	0	26 (100)
Introduced	0	0	0	0	0	0
Indigenous	0	0	0	0	0	0
Cryptic	0	0	0	0	0	0
Induced	0	0	0	0	0	0
Total	15	11	0	0	0	26 (100)

P.v. - *Plasmodium vivax* P.f. - *Plasmodium falciparum* P.o. - *Plasmodium ovale*

P.m. - *Plasmodium malariae* P.k. - *Plasmodium knowlesi*

**Included relapsed cases that were imported.

Imported malaria cases

In 2023, the majority of cases who had acquired malaria overseas were infected in India (21.7%). *P. vivax* accounted for 75.0% of the infections acquired in Asia. *P. falciparum* accounted for 90.9% of the infections acquired in the African region (Table 3.28).

In 2024, the majority of cases who had acquired malaria overseas were infected in India (26.9%). *P. vivax* accounted for 88.2% of the infections acquired in Asia. *P. falciparum* accounted for 100% of the infections acquired in the African region (Table 3.29).

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Table 3.28
Imported malaria cases by country/ region of origin and by parasite species, 2023

	Parasite species					
	P.v.	P.f.	P.o.	P.m.	P.k.	Total (%)
South Asia						
India	5	0	0	0	0	5 (21.7)
Pakistan	1	0	0	0	0	1 (4.3)
Southeast Asia						
Indonesia	1	1	0	0	0	2 (8.7)
Malaysia	0	0	0	0	2	2 (8.7)
Myanmar	2	0	0	0	0	2 (8.7)
Africa						
Cameroon	0	1	0	0	0	1 (4.3)
Gabon	0	0	0	1	0	1 (4.3)
Guinea	0	1	0	0	0	1 (4.3)
Ivory Coast	0	2	0	0	0	2 (8.7)
Liberia	0	1	0	0	0	1 (4.3)
Nigeria	0	1	0	0	0	1 (4.3)
Tanzania	0	3	0	0	0	3 (13.0)
Uganda	0	1	0	0	0	1 (4.3)
Total	9	11	0	1	2	23 (100) +

P.v. - *Plasmodium vivax* P.f. - *Plasmodium falciparum* P.o. - *Plasmodium ovale*

P.m. - *Plasmodium malariae* P.k. - *Plasmodium knowlesi*

+Figures may not add to 100% due to rounding.

Table 3.29
Imported malaria cases by country/ region of origin and by parasite species, 2024

	Parasite species					
	P.v.	P.f.	P.o.	P.m.	P.k.	Total (%)
South Asia						
India	6	1	0	0	0	7 (26.9)
Southeast Asia						
Indonesia	5	1	0	0	0	6 (23.1)
Myanmar	4	0	0	0	0	4 (15.4)
Africa						
Cameroon	0	1	0	0	0	1 (3.8)
Equatorial Guinea	0	1	0	0	0	1 (3.8)
Ivory Coast	0	1	0	0	0	1 (3.8)
Kenya	0	1	0	0	0	1 (3.8)
Nigeria	0	2	0	0	0	2 (7.7)
Sierra Leone	0	2	0	0	0	2 (7.7)
Uganda	0	1	0	0	0	1 (3.8)
Total	15	11	0	0	0	26 (100) +

P.v. - *Plasmodium vivax* P.f. - *Plasmodium falciparum* P.o. - *Plasmodium ovale*

P.m. - *Plasmodium malariae* P.k. - *Plasmodium knowlesi*

+Figures may not add to 100% due to rounding.

In 2023, 86.4% of the cases had onset of fever within two weeks of entry into Singapore (Table 3.30). For *P. vivax* malaria, 25.0% of cases did not develop symptoms until more than two weeks after entry, while for *P. falciparum*, 100% of cases developed symptoms less than two weeks into Singapore.

In 2024, 73.1% of the cases had onset of fever within two weeks of entry into Singapore (Table 3.31). For *P. vivax* malaria, 40.0% of cases did not develop symptoms until more than two weeks after entry, while for *P. falciparum*, 90.9% of cases developed symptoms less than two weeks into Singapore.

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Table 3.30
Imported malaria cases by interval between period of entry and onset of illness and by parasite species, 2023

Interval in weeks	Parasite species					
	P.v.	P.f.	P.o.	P.m.	P.k.	Total (%)
<2	6	11	0	0	2	19 (86.4)
2-3	0	0	0	0	0	0
4-5	0	0	0	0	0	0
6-7	1	0	0	1	0	2 (9.1)
8-9	1	0	0	0	0	1 (4.5)
10-11	0	0	0	0	0	0
12-13	0	0	0	0	0	0
14-15	0	0	0	0	0	0
16-17	0	0	0	0	0	0
18-19	0	0	0	0	0	0
20-23	0	0	0	0	0	0
24-27	0	0	0	0	0	0
28-31	0	0	0	0	0	0
32-35	0	0	0	0	0	0
36-39	0	0	0	0	0	0
40+	0	0	0	0	0	0
Total	8*	11	0	1	2	22* (100)

P.v. - *Plasmodium vivax* P.f. - *Plasmodium falciparum* P.o. - *Plasmodium ovale*

P.m. - *Plasmodium malariae* P.k. - *Plasmodium knowlesi*

* Excluding one asymptomatic *P. vivax* case which was detected during blood screening.

Table 3.31
Imported malaria cases by interval between period of entry and onset of illness and by parasite species, 2024

Interval in weeks	Parasite species					
	P.v.	P.f.	P.o.	P.m.	P.k.	Total (%)
<2	9	10	0	0	0	19 (73.1)
2-3	1	0	0	0	0	1 (3.8)
4-5	0	1	0	0	0	1 (3.8)
6-7	0	0	0	0	0	0 (0)
8-9	0	0	0	0	0	0 (0)
10-11	0	0	0	0	0	0 (0)
12-13	1	0	0	0	0	1 (3.8)
14-15	0	0	0	0	0	0 (0)
16-17	1	0	0	0	0	1 (3.8)
18-19	1	0	0	0	0	1 (3.8)
20-23	0	0	0	0	0	0 (0)
24-27	1	0	0	0	0	1 (3.8)
28-31	0	0	0	0	0	0 (0)
32-35	0	0	0	0	0	0 (0)
36-39	1	0	0	0	0	1 (3.8)
40+	0	0	0	0	0	0 (0)
Total	15	11	0	0	0	26 (100) +

P.v. - *Plasmodium vivax* P.f. - *Plasmodium falciparum* P.o. - *Plasmodium ovale*

P.m. - *Plasmodium malariae* P.k. - *Plasmodium knowlesi*

+Figures may not add to 100% due to rounding.

In 2023, majority of the imported cases were Singapore residents (34.8%) and work permit/employment pass holders (34.8%). In 2024, majority of the imported cases (30.8%) were work permit/employment pass holders (Table 3.32).

Table 3.32
Classification of imported malaria cases, 2023-2024

Classification	2023		2024	
	Cases	%	Cases	%
Local residents				
Singapore residents	8	34.8	5	19.2
Work permit/Employment pass holders	8	34.8	8	30.8
Student pass holders	0	0	2	7.7
Other foreigners	1	4.3	3	11.5
Foreigners seeking medical treatment	3	13.0	2	7.7
Tourists	3	13.0	6	23.0
Total	23	100+	26	100+

+Figures may not add to 100% due to rounding.

In 2023, out of the eight Singapore residents who contracted malaria overseas, three contracted malaria whilst employed overseas, the rest were overseas for social visits or holiday. Only one of them were known to have taken chemoprophylaxis (Tables 3.33 and 3.34).

In 2024, out of the five Singapore residents who contracted malaria overseas, one contracted malaria overseas whilst employed overseas, while the rest were overseas for social visits or holiday. All were not known to have taken chemoprophylaxis (Tables 3.33 and 3.34).

Table 3.33
Purpose of travel for Singapore residents who contracted malaria overseas, 2020-2024

Purpose of Travel	2020	2021	2022	2023	2024
Social visits/holidays	2	0	1	5	4
Business	0	0	1	0	0
Military service	0	0	0	0	0
Volunteer/Missionary work	0	0	0	0	0
Employment	0	0	0	3	1
Total	2	0	2	8	5

Table 3.34
History of chemoprophylaxis for Singapore residents who contracted malaria overseas, 2020-2024

Chemoprophylaxis	2020	2021	2022	2023	2024
Took complete chemoprophylaxis	0	0	0	1	0
No chemoprophylaxis	2	0	2	7	5
Irregular/incomplete chemoprophylaxis	0	0	0	0	0
Total	2	0	2	8	5

MURINE TYPHUS

Murine typhus is a bacterial disease caused by *Rickettsia typhi* (formerly known as *Rickettsia mooseri*). The symptoms of murine typhus may include fever, rash, myalgia, abdominal pain, vomiting and nausea. The mode of transmission is by infective rat fleas that defecate rickettsiae while sucking blood from its host. This contaminates the bite site and other fresh skin wounds. Occasionally, cases occur following the inhalation of dried infective flea faeces.

Confirmed cases are individuals who have clinically compatible symptoms with either four-fold or greater increase in total antibody titre or *Rickettsia typhi* detected via PCR, immunohistochemistry (IHC) or culture. Suspected cases are individuals who have clinically compatible symptoms with either a positive immunofluorescent antibody test or epidemiological risk factors.

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A total of 25 suspected cases of murine typhus were reported in 2023. A total of 72 suspected and one confirmed case of murine typhus were reported in 2024 (Figure 3.18).

In 2023, out of the 25 cases, 19 cases were indigenous cases and five were imported cases, all involving Singapore residents. The remaining one case was a tourist (Table 3.35).

In 2024, out of the 73 cases, 61 were indigenous cases and eight were imported cases, involving five Singapore residents and three non-residents. The remaining four cases were foreigners seeking medical treatment (Table 3.35).

Figure 3.18
Weekly distribution of confirmed and suspected murine typhus cases, 2023-2024

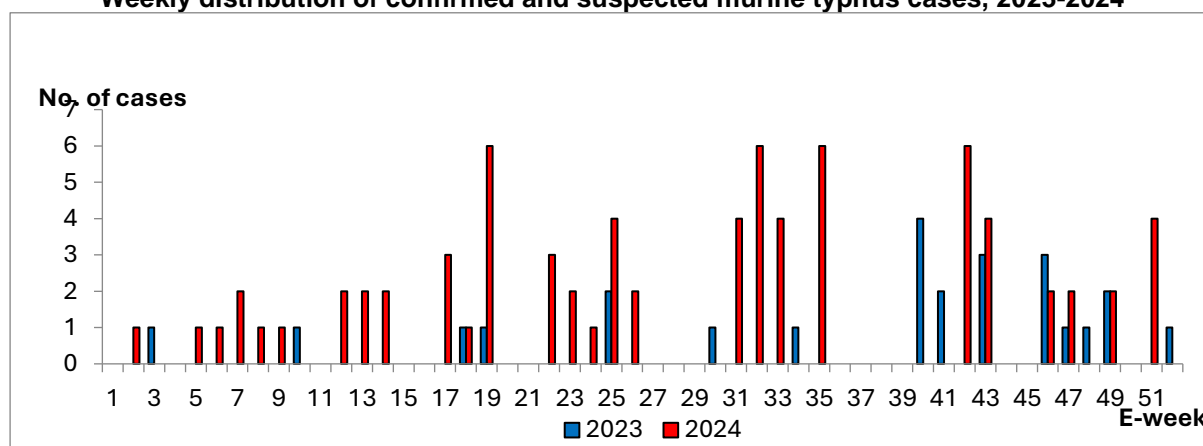


Table 3.35
Total number of notifications* received for confirmed and suspected murine typhus cases, 2020-2024

Age group	2020		2021		2022		2023		2024	
	Local	Imported	Local	Imported	Local	Imported	Local	Imported	Local	Imported
0-4	0	0	1	0	1	0	0	0	1	0
5-14	0	0	1	0	1	0	0	0	5	2
15-24	0	0	0	0	0	0	2	1	11	0
25-34	4	0	4	0	1	1	7	1	15	2
35-44	2	0	1	0	2	0	4	0	12	3
45-54	0	0	2	0	1	0	1	2	8	0
55-64	0	0	0	0	2	0	3	1	4	1
65+	1	0	0	0	0	0	2	0	5	0
Total	7	0	9	0	8	1	19	5	61	8

*Excluded tourists and foreigners seeking medical treatment in Singapore.

In 2023, 15-24 years age group had the highest resident incidence rate, with an overall male to female ratio of 1:1 (Tables 3.36). In 2024, 15-24 years age group had the highest resident incidence rate, with an overall male to female ratio of 2.1:1 (Tables 3.37). Among the three major ethnic groups, the incidence rate was highest among Indians in both 2023 and 2024 (Tables 3.38 and 3.39).

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Table 3.36
Age-sex distribution and age-specific resident incidence rate of reported suspected murine typhus cases[^], 2023

Age group	Number of notifications				Incidence rate per 100,000 resident population*
	Male	Female	Total	%	
0-4	0	0	0	0	0
5-14	0	0	0	0	0
15-24	0	3	3	12.5	0.7
25-34	6	2	8	33.3	0.5
35-44	2	2	4	16.7	0.5
45-54	1	2	3	12.5	0.5
55-64	2	2	4	16.7	0.5
65+	1	1	2	8.3	0.3
Total	12	12	24	100	-

[^]Excluded one tourist and/or foreigner seeking medical treatment in Singapore.

*Rates computed are based on 2023 mid-year population from the Singapore Department of Statistics.

Table 3.37
Age-sex distribution and age-specific resident incidence rate of reported suspected murine typhus cases[^], 2024

Age group	Number of notifications				Incidence rate per 100,000 resident population*
	Male	Female	Total	%	
0-4	1	0	1	1.4	0.6
5-14	2	5	7	10.1	1.2
15-24	7	4	11	15.9	1.6
25-34	15	2	17	24.6	0.8
35-44	10	5	15	21.7	0.8
45-54	5	3	8	11.6	0.5
55-64	4	1	5	7.2	0.7
65+	3	2	5	7.2	0.7
Total	47	22	69	100+	-

[^]Excluded four tourists and/or foreigners seeking medical treatment in Singapore.

*Rates computed are based on 2024 mid-year population from the Singapore Department of Statistics.

+Figures may not add to 100% due to rounding.

Table 3.38
Ethnic-sex distribution and ethnic-specific incidence rate of reported suspected murine typhus cases[^], 2023

Residential Status	Male	Female	Total	%	Incidence rate per 100,000 population*
Singapore residents					
Chinese	3	8	11	45.8	0.4
Malay	1	0	1	4.2	0.2
Indian	2	2	4	16.7	1.1
Others	1	0	1	4.2	0.7
Non-residents	5	2	7	29.2	0.4
Total	12	12	24	100+	0.4

[^]Excluded one tourist.

*Rates computed are based on 2023 mid-year population from the Singapore Department of Statistics.

+Figures may not add to 100% due to rounding.

Table 3.39
Ethnic-sex distribution and ethnic-specific incidence rate of reported suspected murine typhus cases[^], 2024

Residential Status	Male	Female	Total	%	Incidence rate per 100,000 population*
Singapore residents					
Chinese	12	10	22	31.9	0.7
Malay	5	0	5	7.2	0.9
Indian	1	5	6	8.7	1.6
Others	0	2	2	2.9	1.4
Non-residents	29	5	34	49.3	1.8
Total	47	22	69	100	1.1

[^]Excluded four tourists and/or foreigners seeking medical treatment in Singapore.

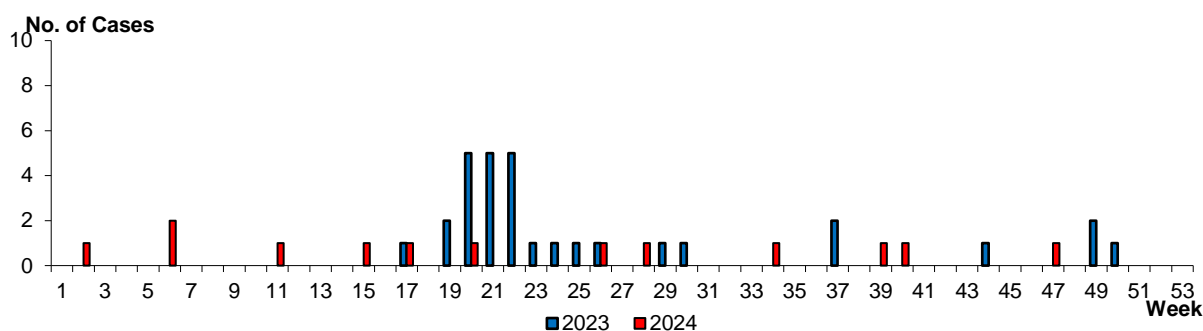
*Rates computed are based on 2024 mid-year population from the Singapore Department of Statistics.

ZIKA VIRUS INFECTION

Zika virus infection is transmitted by *Aedes* mosquitoes, similar to dengue. Only about one in five infections are symptomatic. The disease is usually self-limiting, although rarely, serious neurological complications have been reported. The disease is characterised by fever, rashes, joint pain, muscle pain, headache and conjunctivitis. Most symptoms last for four to seven days. The main vector in Singapore is the *Aedes aegypti* mosquito.

In 2023, out of the 30 laboratory confirmed cases, 27 cases were indigenous cases and three were imported cases, involving 2 Singapore residents and 1 non-resident. (Table 3.40). In 2024, out of the 13 cases, 12 were indigenous cases and 1 was an imported case. All 13 cases involved Singapore residents. (Table 3.40).

Figure 3.19
Weekly distribution of reported Zika cases, 2023-2024



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Table 3.40
Total number of notifications* received for Zika cases, 2020-2024

Age group	2020		2021		2022		2023		2024	
	Local	Imported	Local	Imported	Local	Imported	Local	Imported	Local	Imported
0-4	0	0	0	0	0	0	0	0	0	0
5-14	0	0	0	0	0	0	3	0	0	0
15-24	0	0	0	0	0	0	1	1	1	0
25-34	0	0	0	0	0	0	6	0	2	0
35-44	1	0	0	0	0	1	6	1	2	1
45-54	0	0	0	0	0	0	4	0	4	0
55-64	0	0	0	0	0	0	5	1	2	0
65+	0	0	0	0	0	1	2	0	1	0
Total	1	0	0	0	0	2	27	3	12	1

*Excluded tourists and foreigners seeking medical treatment in Singapore.

In 2023, the 35-44 years age group had the highest resident incidence rate, while among the three major ethnic groups, Chinese had the highest incidence rate. (Tables 3.41 and 3.43). In 2024, the 45-54 years age group had the highest resident incidence rate, while among the three major ethnic groups, both Chinese and Indians had the highest incidence rate (Tables 3.42 and 3.44).

Table 3.41
Age-sex distribution and age-specific resident incidence rate of indigenous Zika cases[^], 2023

Age group	Number of notifications				Incidence rate per 100,000 resident population*
	Male	Female	Total	%	
0-4	0	0	0	0	0
5-14	2	1	3	11.1	0.7
15-24	1	0	1	3.7	0.2
25-34	1	5	6	22.2	0.8
35-44	4	2	6	22.2	1.0
45-54	3	1	4	14.8	0.7
55-64	1	4	5	18.5	0.7
65+	0	2	2	7.4	0.3
Total	12	15	27	100+	-

[^]Cases acquired locally among Singapore and non-residents.

*Rates computed are based on 2023 mid-year population from the Singapore Department of Statistics.

+Figures may not add to 100% due to rounding.

Table 3.42
Age-sex distribution and age-specific resident incidence rate of indigenous Zika cases[^], 2024

Age group	Number of notifications				Incidence rate per 100,000 resident population*
	Male	Female	Total	%	
0-4	0	0	0	0	0
5-14	0	0	0	0	0
15-24	1	0	1	8.3	0.2
25-34	1	1	2	16.7	0.3
35-44	1	1	2	16.7	0.3
45-54	2	2	4	33.3	0.7
55-64	1	1	2	16.7	0.3
65+	1	0	1	8.3	0.1
Total	7	5	12	100	-

[^]Cases acquired locally among Singapore and non-residents.

*Rates computed are based on 2024 mid-year population from the Singapore Department of Statistics.

Table 3.43
Ethnic-sex distribution and ethnic-specific incidence rate of indigenous Zika cases[^], 2023

Residential Status	Male	Female	Total	%	Incidence rate per 100,000 population*
Singapore residents					
Chinese	11	12	23	85.2	0.7
Malay	1	0	1	3.7	0.2
Indian	0	0	0	0	0
Others	0	1	1	3.7	0.7
Non-residents	0	2	2	7.4	0.1
Total	12	15	27	100	0.5

[^]Cases acquired locally among Singapore and non-residents.

*Rates computed are based on 2023 mid-year population from the Singapore Department of Statistics.

Table 3.44
Ethnic-sex distribution and ethnic-specific incidence rate of indigenous Zika cases[^], 2024

Residential Status	Male	Female	Total	%	Incidence rate per 100,000 population*
Singapore residents					
Chinese	5	5	10	83.3	0.3
Malay	1	0	1	8.3	0.2
Indian	1	0	1	8.3	0.3
Others	0	0	0	0	0.0
Non-residents	0	0	0	0	0.0
Total	7	5	12	100+	0.2

[^]Cases acquired locally among Singapore and non-residents.

*Rates computed are based on 2024 mid-year population from the Singapore Department of Statistics.

+Figures may not add to 100% due to rounding.

There was 1 Zika cluster detected in 2023. The cluster had 15 cases. The rest of the cases were sporadic cases that did not form a cluster. There were no clusters detected in 2024.

Zika Cluster at Kovan

On 12 May 2023, the Ministry of Health (MOH) and National Environment Agency (NEA) confirmed 3 local cases of Zika virus infection. All 3 cases either resided or worked in the Kovan area. During May to June 2023, a total of 15 cases were reported within the Kovan area. The cases had symptom onset dates between 5 May and 3 June 2023.

Of the 15, 14 are Singapore residents while 1 was a non-resident. 9 of them were working adults, while 4 were students and the other 2 were retirees. The male to female ratio was 0.9:1.

Epidemiological investigations and vector control operations were carried out upon the notification of the cases. MOH and NEA worked to alert primary healthcare practitioners and advise residents, especially pregnant women, to monitor their health and seek medical attention if unwell with Zika symptoms.

To combat the Zika virus transmission, NEA worked with relevant premises owners to intensify vector control operations through source reduction efforts in the affected areas. NEA also worked with community leaders to conduct outreach activities in the vicinity to heighten vigilance and raise awareness of Zika prevention measures.

A total of 30 mosquito breeding habitats were detected and destroyed. 73% of the mosquito breeding habitats were detected in residential premises and 27% were found in outdoor areas. Common mosquito breeding habitats detected in the cluster area included flower pot plates, domestic containers (e.g. pail and plastic bowl) and ground puddles. Overall the mosquito breeding detected comprised of 62% *Aedes aegypti*, 28% *Aedes albopictus*, 7% *Culex quinquefasciatus* and 3% mixed breeding consisting of *Aedes aegypti* and *Aedes albopictus*.