A Retrospective Analysis of Dengue Virus cases in Brunei Darussalam: January 2021 – June 2025

RES-200

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Background

The incidence of dengue has risen significantly worldwide over the past few decades, making it one of the most important mosquito-borne viral diseases. Dengue is caused by a single-stranded RNA virus of the genus *Flavivirus* (family *Flaviviridae*), comprising four distinct serotypes: DENV-1, DENV-2, DENV-3, and DENV-4. Globally, dengue imposes a significant public health and economic burden, particularly in tropical and subtropical regions where the *Aedes aegypti* and *Aedes albopictus* mosquitoes are widely distributed.

In Brunei Darussalam, dengue remains endemic with periodic outbreaks. Monitoring circulating serotypes is vital, as changes in predominance may influence transmission and outbreak potential. This study retrospectively analysed infection trends and the predominant DENV serotype in Brunei from January 2021 to June 2025 providing insights to guide surveillance strategies and inform public health interventions.

Methods

A total of 2,544 specimens from patients with suspected dengue were received by the National Virology Reference Laboratory (NVRL) from public hospitals and health clinics across Brunei between January 2021 and June 2025. Dengue rapid diagnostic test (RDT), based on in-vitro immunochromatography, were used to detect NS1 antigen and IgG/IgM antibodies. A total of 350 specimens tested positive for NS1 and/or IgG/IgM were selected for serotyping using reverse transcription polymerase chain reaction (RT-PCR).

Discussion

Of the 2,544 specimens tested, 483 were RDT-positive (Table 1). A decline in reported cases from 2021 to 2023 (Figure 1) likely reflects the impact of COVID-19 restrictions and possible underreporting, while a resurgence in 2024 suggests restoration of routine surveillance.

By age, cases were highest in individuals >60 years (37%) (Table 2), contrasting with Malaysia (peak in young adults) [1] and Thailand (children and young adults) [2]. Singapore has similarly reported rising cases among older adults [3]. The predominance in older adults in Brunei may reflect greater symptom severity leading to healthcare-seeking, alongside under-reporting in younger populations.

Infections were more prevalent in males (Figure 2), consistent with regional studies linking higher male incidence to occupational exposure and outdoor activity [1–3].

Geographically, most dengue cases originated from Brunei-Muara District (71%) (Figure 3), likely reflecting its dense population, role as the national economic hub, and the presence of the only international airport, which together increase mobility and transmission risk.

RT-PCR detected DENV RNA in 91 of 350 specimens (Table 3; Figure 4). From 2023, DENV-2 emerged as the predominant serotype in Brunei, similar to trends in Singapore, the Philippines, and Bangladesh [4–6], while Thailand continues to report co-circulation of multiple serotypes [2]. This underscores the need for ongoing serotype monitoring and regional surveillance to detect introductions and changing transmission dynamics.

Result

	NS1	IgM	IgG	IgM & IgG	NS1 & IgM	NS1 & IgG	NS1, IgM & IgG
2021	1	8	60	31	0	1	2
2022	7	8	40	9	3	0	3
2023	8	2	23	6	5	3	8
2024	20	9	78	34	8	13	32
2025	8	4	33	14	4	4	4

Table 1. Serology of Dengue positive specimens, according to detection of NS1 antigen and/or antibodies to DENV

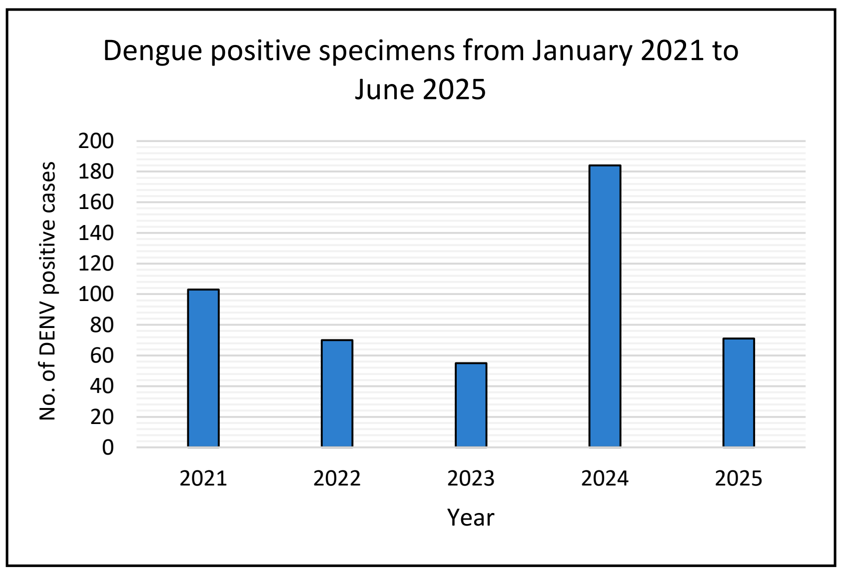

Figure 1. Diagram shows total number of positive DENV specimens detected by RDT from 2021 to 2025. There were 103 cases in 2021, 70 cases in 2022, 55 cases in 2023, 184 cases in 2024 and 71 cases in 2025

	[0 - 10]	[11 - 20]	[21 - 30]	[31 - 40]	[41 - 50]	[51 - 60]	>60
2021	1	1	12	17	14	13	45
2022	0	6	7	17	10	12	18
2023	0	1	5	7	14	11	17
2024	6	6	17	20	24	35	76
2025	1	6	7	11	9	14	23
Total	8	20	48	72	71	85	179

Table 2. Age-specific distribution of DENV positive cases.

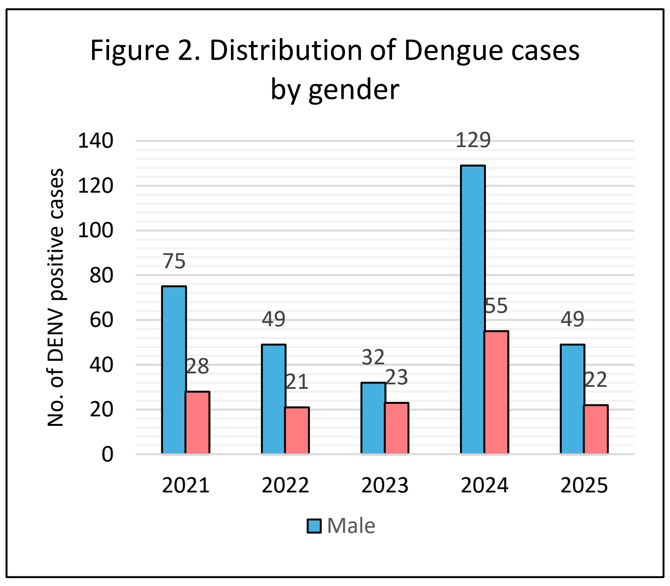
Figure 2. Distribution of Dengue cases by gender

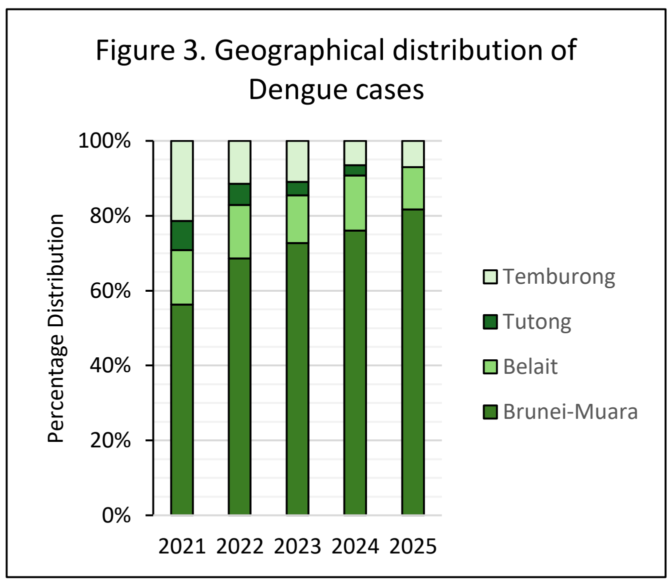
Figure 3. Geographical distribution of Dengue cases

	DENV 1			DENV 2			DENV 3			DENV 4		
	2023	**2024**	**2025**	**2023**	**2024**	**2025**	**2023**	**2024**	**2024**	**2023**	**2024**	**2025**
NS1	2	0	0	4	5	6	1	0	0	0	0	0
IgG	0	0	1	1	8	5	0	3	0	0	0	1
IgM	0	1	0	0	0	0	0	0	0	0	0	0
IgG & IgM	0	0	0	1	5	2	0	1	0	0	1	0
NS1 & IgG	0	0	0	1	4	2	0	0	0	0	0	0
NS1 & IgM	1	2	0	2	2	1	0	1	0	0	0	0
NS1, IgG & IgM	0	2	0	3	10	0	0	6	0	1	5	0
Total	3	5	1	12	34	16	1	11	0	1	6	1

Table 3. Detection of DENV serotype from specimens positive for DENV NS1 or/and IgG/IgM antibodies.

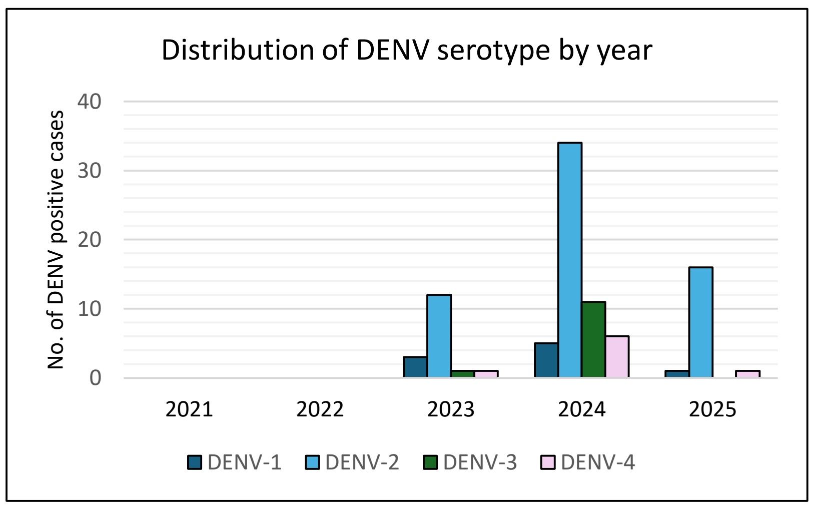

Figure 4. Distribution of DENV serotype by year.
Out of 483 DENV-positive specimens detected by RDT, 350 were tested using RT-PCR for serotyping. Of these, 91 specimens collected from 2023 onwards were successfully serotyped, while no specimens from 2021 and 2022 yielded detectable result, likely due to the lack of NS1-positive cases during those years.

References

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