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ASEAN BIOLOGICAL THREATS SURVEILLANCE CENTRE

DENGUE
In the ASEAN Region
FOCUS REPORT

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ASSOCIATION OF SOUTHEAST ASIAN NATIONS

ASEAN
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Acronyms and Abbreviations

ARDS = Acute Respiratory Distress Syndrome
AKI = Acute Kidney Injury and
HUS = Haemolytic Uremic Syndrome
ALT = Alanine Transaminase
AMS = ASEAN Member States
AST = Aspartate Transferase
CFR = Case Fatality Rate
CNS = Central Nervous System
CSF = Cerebrospinal Fluid
DEET = Diethyltoluamide
DF = Dengue Fever
DHF = Dengue Haemorrhagic Fever
DSS = Dengue Shock Syndrome
DENV = Dengue Virus
EDS = Expanded Dengue Syndrome
EIDs = Emerging Infectious Diseases
ELISA = Enzyme-Linked Immunosorbent Assay
HI = Haemagglutination Inhibition
HEPR = Health Emergency Prevention, Preparedness, Response and Resilience
IgG = Immunoglobulin G
IgM = Immunoglobulin M
IVM = Integrated Vector Management
MoH = Ministry of Health
NEA = National Environment Agency
NIAID = National Institute of Allergy and Infectious Diseases
NSP = National Strategic Plan
NS1 = Non-Structural protein 1
NSAIDs = Non-Steroidal Anti-Inflammatory Drugs
RT-PCR = Reverse Transcription-Polymerase Chain Reaction
RNA = Ribonucleic Acid
SAGE = Strategic Advisory Group of Experts
SBCC = Social and Behavioural Change Communication
SEA = Southeast Asia
SEARO = South-East Asia Regional Office
SAGE = Strategic Advisory Group of Experts
SPRP = Strategic Preparedness and Response Plan
VCUs = Vector Control Units
WHO = World Health Organization
WPRO = Western Pacific Regional Office

DENGUE

Introduction

Dengue has emerged as the most prevalent and rapidly expanding vector-borne disease worldwide. Of the 3.5 billion people around the world living in dengue endemic countries and at risk of contracting dengue fever, 1.3 billion live in dengue endemic areas in 10 countries of the SEA Region. Five countries in the SEA Region including India, Indonesia, Myanmar, Sri Lanka and Thailand are among the 30 most highly endemic countries in the world (WHO, n.d). Between 2015 and 2019, the number of dengue cases in the SEA Region rose by 46%, while the number of deaths associated with the disease declined by 2%. Several factors have contributed to the expansion and distribution of dengue vectors and viruses in the region, including rapid population growth, inadequate water supply and storage practices, deficiencies in sewerage and waste management systems, increased global trade and tourism, climate change, shifts in public health policies, and the emergence of hyper-endemic conditions in urban environments. The current high burden of dengue in the SEA Region persists alongside the absence of effective therapeutic options and the lack of a comprehensive, sustainable vector control strategy (WHO, n.d).

Countries around the world, including AMS, have initiated a regional advocacy effort to combat dengue. ASEAN Dengue Day, observed annually on June 15, was officially endorsed during the 10th ASEAN Health Ministers Meeting in 2010 as a demonstration of the collective commitment to addressing the threat of dengue. This initiative highlights the importance of recognizing both the risks and opportunities related to dengue prevention and control, and encourages collaborative efforts toward the development of proactive and sustainable solutions (ASEAN, 2024).

Methods

This report employs a comprehensive literature review to investigate the global landscape of dengue, with a particular focus on the ASEAN region. Data were retrieved from established databases, including PubMed, Embase, and Scopus. Furthermore, information on diseaseincidence sourced from publications by the WHO, AMS, and other official reports as well as diagnostic criteria, preventive measures, and policy strategies, was gathered from authoritative sources and credible news outlets. This integrated approach enabled a detailed analysis of current trends, epidemiological patterns, and the major challenges associated with dengue management within the ASEAN region.

Case Definition and Clinical Features

Case Definition

Dengue is a viral infection spread by mosquitoes. It usually causes a flu-like illness but can sometimes become severe and life-threatening. This serious form is known as severe dengue (WHO, 2024a). Dengue is now the fastest-spreading mosquito-borne disease in the world and a growing global health concern (WHO, 2011a). The virus has four different serotypes, namely DENV-1, DENV-2, DENV-3, and DENV-4, which all belong to the *Flaviviridae* family and the *Flavivirus* genus.

After a mosquito bites someone infected with dengue, the virus multiplies inside the mosquito for about 12 days. Once infected, the mosquito can spread the virus to other people for the rest of its life, which usually lasts from 15 to 65 days. [39] *Aedes aegypti* females often bite several people in one feeding session to get enough blood to lay eggs, contributing to the rapid spread of the virus. These mosquitoes can also pass the virus to their offspring, a process called vertical transmission. Their eggs are especially tough and can survive in dry environments for up to a year (WHO, 2011a). Infected mosquitoes can also transmit the virus to their offspring, allowing vertical transmission. Notably, Aedes mosquito eggs can survive dry conditions for extended periods, reportedly up to one year.

Dengue case classification plays a key role in triage, clinical management, and deciding the appropriate setting for care, whether at home, in a clinic, or in a hospital. This becomes especially important during outbreaks, when a sudden rise in cases can put pressure on healthcare systems. When diagnosing dengue, cases are categorized as either probable or confirmed, as shown in Table 1 (WHO, 2009).

Table 1 Case definitions of dengue

Category	Criteria
Probable Dengue	**Acute febrile illness accompanied by at least two** of the following signs or symptoms: a. Headache b. Retro-orbital pain c. Myalgia d. Arthralgia or bone pain e. Rash f. Hemorrhagic manifestations g. Leukopenia (white blood cell count ≤ 5,000 cells/mm³) h. Thrombocytopenia (platelet count < 150,000 cells/mm³) i. Rising hematocrit (increase of 5–10%) And **at least one** of the following:

	Supportive serology on a single serum sample, defined as: a. Titre ≥ 1:1280 using haemagglutination inhibition test, b. Comparable IgG titre using ELISA), or c. Positive IgM antibody test Occurrence in the same location and time as confirmed dengue cases
Confirmed Dengue	**Probable case with at least one** of the following laboratory criteria: a. Isolation of dengue virus from serum, CSF, or autopsy samples b. Fourfold or greater increase in serum IgG (by haemagglutination inhibition test) or a rise in dengue virus–specific IgM antibodies c. Detection of dengue virus or its antigen in tissue, serum, or CSF d. Detection of dengue virus genomic sequences by RT-PCR

Dengue can cause a wide range of symptoms, and its course is often unpredictable (WHO, 2009). Most people recover from a mild illness without any complications. However, a small number may develop severe dengue, which is marked by fluid leakage from blood vessels and sometimes bleeding. In these cases, giving fluids through a vein (intravenous rehydration) is the main treatment and can keep the death rate below 1%.

Historically, symptomatic dengue virus infections were classified into three categories: undifferentiated fever, DF, and DHF, with DHF further divided into four severity grades. Grades III and IV were categorized as DSS (WHO, 1997). However, over time, studies and clinical reports found that this system was difficult to apply in real-world healthcare settings (Deen, et al, 2006; Rigau-Perez, 2006). Many patients with severe symptoms did not fit the strict criteria for DHF, which led experts to call for a new and more practical classification system. Even so, the older DF/DHF/DSS system is still used in many countries today.

Since 2009, the WHO has updated its dengue case definitions to help improve how the disease is managed and tracked. The new classification is based on how severe the illness is and includes three main categories, namely dengue without warning sign, dengue with warning sign, and severe dengue (Figure 1), with criteria for dengue and severe dengue are shown in Table 2.

Figure 1 Suggested dengue case classification and levels of severity
(source: WHO (https://iris.who.int/handle/10665/44188)

Table 2 Criteria for dengue and severe dengue

Dengue with or without warning signs	Severe dengue
Probable dengue (as aforementioned), with or without the following warning signs: 1. Abdominal pain or tenderness 2. Persistent vomiting 3. Clinical fluid accumulation 4. Mucosal bleed 5. Lethargy and restlessness 6. liver enlargement > 2 cm 7. laboratory: increase in hematocrit concurrent with rapid drop of platelet count	**Severe plasma leakage** leading to 1. Shock (DSS) 2. Fluid accumulation with respiratory distress **Severe Bleeding** as evaluated by a clinician **Severe organ involvement** 1. Liver: AST or ≥ 1,000 2. Central nervous system (CNS: impaired consciousness 3. Heart and other organs

Transmission

The primary mode of DENV transmission is through mosquito vectors. The *Aedes aegypti* mosquito, one of the main carriers of dengue, lives in cities and often breeds in containers made or left by humans, such as buckets, flower pots, and used tires. It stays close to where people live, where it mates, feeds, rests, and lays eggs. Unlike most mosquitoes, Aedes aegypti bites during the day, with peak activity in the early morning and late afternoon (Dos Santos, 2023, WHO, 2024b).The female mosquito often bites more than one person in a single feeding period (Dos Santos, 2023, WHO, 2024b). After biting someone with dengue, a mosquito needs time for the virus to grow and spread inside its body before it can infect another person. This phase is called the extrinsic incubation period and usually lasts between 8 and 12 days, depending on the environment and the type of virus (WHO, 2024a).

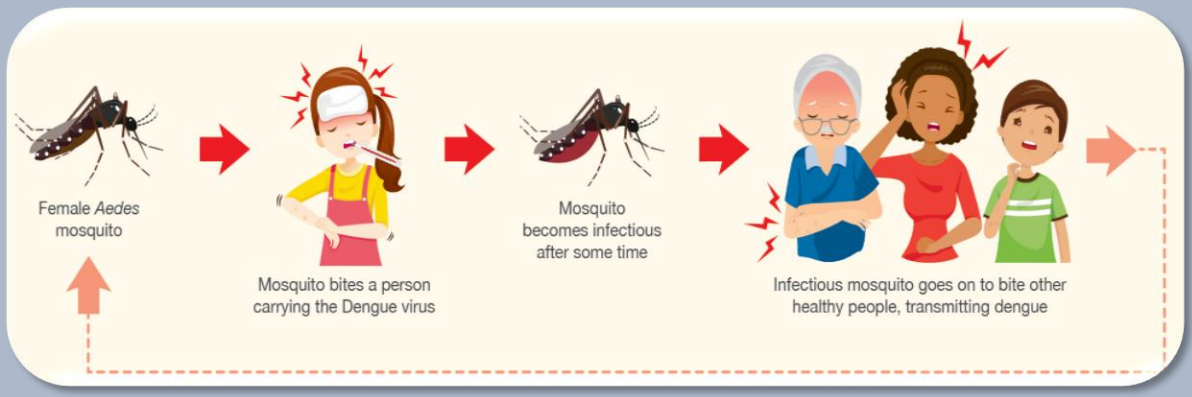


Figure 2 Dengue transmission cycle
(source: NEA (https://www.nea.gov.sg/dengue-zika/stop-dengue-now))

Maternal transmission: In addition to transmission through mosquito bites, there is potential for maternal transmission from infected pregnant women to their infants, although it is rare. The likelihood of transmission is influenced by the timing of the pregnancy. Maternal DENV infection can lead to adverse neonatal outcomes, including preterm birth, low birth weight, and fetal distress (WHO, 2024b).

Other Transmission Modes: There have been rare cases of transmission via blood products, organ donation, and transfusions. Similarly, transovarial transmission of the virus within mosquitoes has been documented (WHO, 2024b).

Risk Factors and Risk Groups

Urbanization, especially unplanned urbanization, is associated with the transmission of dengue through multiple social and environmental factors, such as population density, human mobility, access to a reliable water source, and water storage practices (WHO, 2024a).

Community risks to dengue also depend on a population's knowledge, attitude and practice towards dengue, as the exposure is closely related to behaviours such as water storage, plant keeping, and self-protection against mosquito bites. Routine vector surveillance and control activities engaging the community greatly enhances a community's resilience.

Several key risk factors are associated with the spread of dengue infections:

1. Demographic and societal changes: Rapid, unplanned urbanization has strained essential public services, particularly water supply and solid waste disposal. These conditions create favorable environments for mosquito breeding.
2. Insufficient and inadequate water distribution.
3. Insufficient waste collection and management.
4. Mosquito control infrastructure: Lack of mosquito control infrastructure.
5. Consumerism: Consumerism and introduction of non-biodegradable plastic products, paper cups, used tyres, etc. that facilitate increased breeding and passive spread of the disease to new areas (such as via the movement of incubating eggs because of the trade in used tyres).
6. Increased air travel and globalization of trade: Increased air travel and globalization of trade has significantly contributed to the introduction of all the DENV serotypes to most population centres of the world.
7. Microevolution of viruses: The use of the most powerful molecular tools has revealed that each serotype has developed many genotypes as a result of microevolution. There is increasing evidence that virulent strains are replacing the existing non-virulent strains. Introduction of Asian DENV-2 into Cuba in 1981, which coincided with the appearance of DHF, is a classic example.

Clinical Presentation

Dengue infections range from asymptomatic seroconversion to symptomatic illness. Symptomatic dengue is a systemic and dynamic disease with a wide spectrum of severity (WHO, 2012). After the incubation period, a symptomatic infection usually progresses through the following phases: febrile, critical, and recovery. Disease severity often becomes apparent around defervescence, which is the transition from the febrile phase to the afebrile phase and frequently marks the start of the critical phase, followed by the recovery phase (Figure 3).

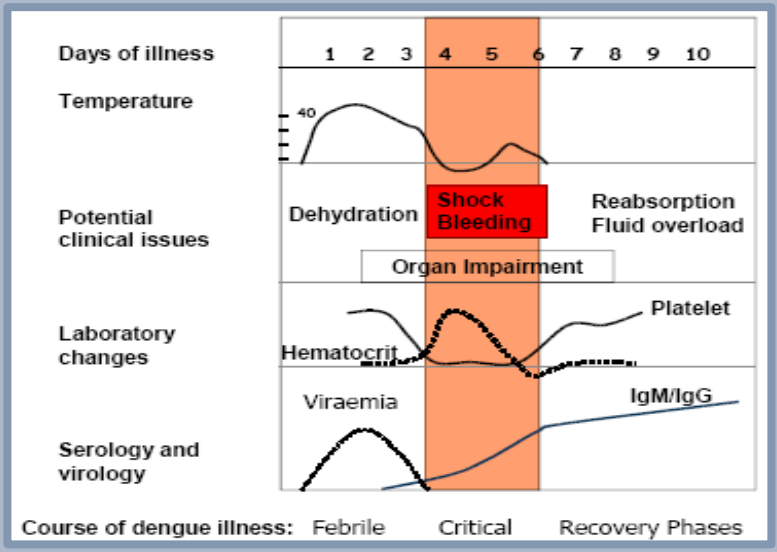


Figure 3 the course of dengue illness
Source: WHO (https://www.who.int/publications/i/item/9789241504713)

The febrile phase of dengue is characterized by a sudden high fever (around 40°C lasting 2-7 days. Approximately 6% of cases may exhibit saddleback or biphasic fever, particularly in patients with DHF and severe dengue fever (Schaefer, et al, 2024). Symptoms occur during this phase include facial flushing, skin erythema, myalgias, arthralgias, headache, sore throat, conjunctival injection, anorexia, nausea, and vomiting. Skin erythema manifests as a macular rash that blanches whepressed and appears within one to two days of fever onset and again on the last day. **The critical phase**, typically occurring between days 3 and 7 with defervescence (temperature decreasing to 37.5-38 °C or lower) and lasting 1-2 days, involves increased capillary permeability. This phase is often preceded by a rapid decline in platelet count, increased hematocrit, and potentially leukopenia, and is when warning signs emerge. Untreated, it can lead to shock, organ dysfunction, disseminated intravascular coagulation, or hemorrhage.

The recovery phase usually occurs 24 to 48 hours after the critical phase. It involves the reabsorption of extravascular fluid within 48 to 72 hours. This phase is marked by improved well-being, a return of appetite, a resolution of gastrointestinal symptoms, stabilized hemodynamics, and an increased urine output. Some patients may develop a confluent rash with small areas of normal skin. The hematocrit level may stabilize or decrease due to fluid reabsorption. The white blood cell count typically rises soon after the fever subsides, though platelet recovery takes longer.

A condition known as EDS, which involves severe organ dysfunction of the liver, kidneys, brain, and/or heart, has been increasingly reported in dengue cases, including both DHF and dengue without plasma leakage (Araiza-Garaygordobil et al, 2021, Guzman, et al, 2024, WHO, 2011a). These atypical clinical presentations are often associated with coinfections, underlying comorbidities, or complications arising from prolonged shock. Therefore, comprehensive clinical evaluation is necessary. Neurological symptoms may include febrile seizures in young children, encephalitis, aseptic meningitis, or intracranial hemorrhage. Gastrointestinal involvement may manifest as hepatitis, acute liver failure, pancreatitis, or acalculous cholecystitis. Other potential complications include myocarditis, pericarditis, ARDS, AKI, and HUS (Schaefer, et al, 2024).

Infection with a dengue virus serotype confers lifelong immunity to that specific serotype. While the four serotypes share antigenic similarities, cross-protection is limited to a few months following infection with any one of them. This short-term immunity might protect against clinical illness from a different serotype within 2-3 months of the primary infection, but long-term cross-protection does not occur (WHO, 2009). A secondary infection or subsequent infection with multiple serotypes of DENV at the same time, however, has been associated with increasing risk of severe complications (Wang, 2020, CDC, 2025).

Clinical Diagnostic

Dengue virus infection presents with a wide range of symptoms, many of which are non-specific, making clinical diagnosis alone unreliable. Therefore, early laboratory confirmation is critical, as some patients can rapidly deteriorate from mild illness to severe disease, potentially resulting in death. Timely diagnosis and prompt medical intervention are essential to improve clinical outcomes and can be life-saving.

During the febrile phase, typically before day five of illness, dengue infection can be diagnosed through several laboratory

methods: virus isolation in cell culture, detection of viral RNA using nucleic acid amplification tests (NAAT), or identification of viral antigens via ELISA or rapid diagnostic tests as presented in Table 3 (WHO, 2009).

Table 3 Summary of operating characteristics and comparative costs of dengue diagnostic methods

Diagnostic Methods	Diagnosis of Acute Infection	Time to Result	Specimen	Time of Collection After Onset of Symptoms	Facilities
Viral isolation and serotype identification	Confirmed	1 - 2 weeks	Whole blood, serum, tissues	1 - 5 days	Mosquito or cell culture facilities, BSL-2/BSL-3⁰ laboratory, fluorescence microscope or molecular biology equipment
Nucleic acid detection	Confirmed	1 or 2 days	Tissues, whole blood, serum, plasma	1 - 5 days	BSL-2 laboratory, equipment for molecular biology
IgG (paired sera) by ELISA, HI or neutralization test	Confirmed	7 days or more	Serum, plasma, whole blood	Acute sera, 1 - 5 days; convalescent after 15 days	ELISA facilities BSL-2 laboratory for neutralization assay
IgM ELISA	Probable	1 - 2 days	Serum, plasma, whole blood	After 5 days	ELISA facilities
IgM rapid test		30 minutes			No additional supplies
Antigen detection	Not yet determined	1 day	Serum	1 - 6 days	ELISA facilities
	Confirmed	> 1 day	Tissue for immuno-chemistry	NA	Facilities for histology

Virus isolation requires specialized laboratory infrastructure and technical expertise (WHO, 2009). To preserve viral viability, maintaining a cold chain during blood sample transport is essential. Culturing and identifying dengue viruses typically takes several days. In contrast, nucleic acid detection methods offer higher sensitivity and specificity and can detect viral RNA within 24–48 hours. However, these techniques require expensive equipment, rigorous quality control, and skilled personnel.

NS1 antigen detection kits provide results within a few hours and are suitable for laboratories with limited resources (WHO,

2009). Additionally, rapid dengue antigen tests can be used in field settings to deliver results in under an hour. However, these tests are currently non-type-specific, relatively costly, and still under evaluation for diagnostic accuracy and cost-effectiveness in different settings. After five days, dengue viruses and their associated antigens typically become undetectable in the bloodstream. This coincides with the emergence of specific antibodies. In some cases, NS1 antigen may still be detectable for a few days after fever subsides.

Compared to virological tests, serological assays are more widely available in dengue-endemic areas and are easier to manage logistically, as immunoglobulins remain stable at tropical room temperatures. Serological testing also allows more flexibility in sample collection than virus isolation or RNA detection. Antibody responses can be assessed by comparing samples from the acute phase with those collected weeks or months later. However, in secondary infections, dengue-specific IgM responses may be low or absent, reducing the sensitivity of IgM ELISA tests. While rapid diagnostic tests can deliver results within an hour, their accuracy varies, and many commercial kits have not been fully validated by reference laboratories. A fourfold or greater rise in antibody titers, detected by IgG ELISA or HI tests in paired serum samples, confirms acute or recent flavivirus infection. However, relying on convalescent-phase samples collected at discharge provides only retrospective confirmation, making them less useful for immediate diagnosis or clinical management.

Epidemiology

Global Situation

The earliest recorded outbreak of dengue or a similar illness occurred in the French West Indies in 1635. Subsequent cases were documented in Batavia (now Jakarta, Indonesia) and Cairo, Egypt, in 1779. An epidemic struck Philadelphia in 1780, followed by outbreaks across the Caribbean and the southern United States in the 1820s (Gubler, et al, 1998). Since the 1950s, cases have increased thirty-fold, with approximately 40% of the global population now living in at-risk areas and an estimated 400 million infections annually (WHO, 2024a, Phillips, 2008, PAHO, 2017).

The global incidence of dengue rose from 26.45 million cases in 1990 to 58.96 million in 2021, with dengue-related deaths increasing from 14,315 to 29,075, and DALYs from 1.25 to 2.08 million (Zhang, et al., 2025). Transmission typically follows a cyclical pattern, with large outbreaks every 3–4 years (WHO, 2023).

During the course of the COVID-19 pandemic, the prevalence of dengue transmission varied significantly across different regions. In 2023, dengue reached a historic high with over 6.5 million reported cases and more than 7,300 deaths across all six WHO regions. The Americas accounted for nearly 80% of global cases, with more than 4 million reported. Autochthonous cases were also recorded in the WHO European Region (WHO, 2024a). By 2024, WHO recorded 14.4 million dengue cases globally, with over 7.6 million confirmed, 52,441 classified as severe, and 11,070 deaths (WHO, 2025) (Figure 4).

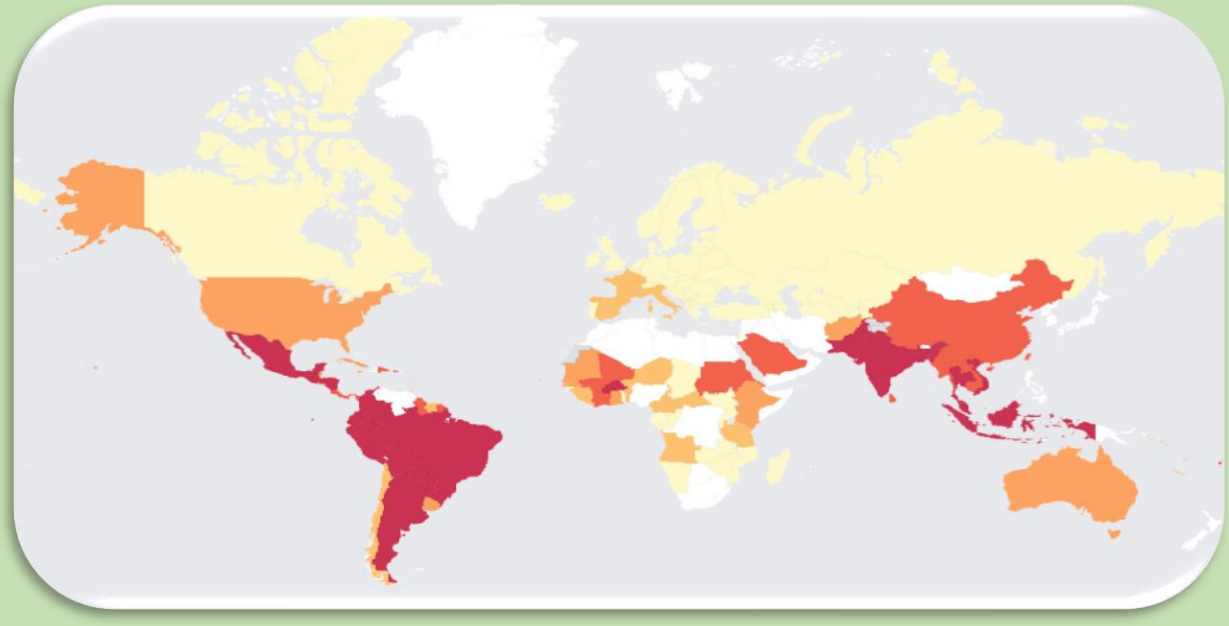


Figure 4 Global dengue situation, 2024
(Source: WHO Global Dengue Surveillance (https://worldhealthorg.shinyapps.io/dengue_global/))

Several factors are driving the increased spread of dengue, including the expanding distribution of *Aedes aegypti* and *Aedes albopictus*, especially in non-endemic countries (WHO, 2023). Climate change and the 2023 El Niño event have further exacerbated conditions through rising temperatures, heavy rainfall, and high humidity. On top of that, fragile health systems in the midst of the COVID-19 pandemic, political and financial instabilities in countries facing complex humanitarian crises. High population mobility adds to the challenge. In many affected countries, weak surveillance has led to delayed detection and response, contributing to more severe outcomes. Underreporting remains a major concern, as most cases are asymptomatic or mild, and many febrile illnesses are misdiagnosed as dengue (WHO, 2024a).

Burden of Dengue in the ASEAN Region

Dengue remains a significant public health challenge across the ASEAN region, with high endemicity reported in countries such as Cambodia, Lao PDR, the Philippines, Viet Nam, Indonesia, Thailand, and Myanmar (WHO, n.d., WHO, (n.d.-a)). The Western Pacific and South-East Asia regions together account for over half of the global dengue burden. WHO regional offices (WPRO and SEARO) conduct both indicator- and event-based surveillance to monitor trends, detect unusual patterns, assess risks, and support timely responses. Between 2015 and 2019, dengue cases in the SEAR rose by 46%, from 451,442 to 658,301, although dengue-related deaths declined slightly by 2% (WHO, n.d.).

Brunei Darussalam

The number of dengue cases in Brunei Darussalam varies over years. In 2013, the WHO Western Pacific Region recorded 2,025 cases from the country (Togami et al, 2023) According to the ASEAN e-Health Bulletin, the country reported 436 dengue cases in 2014 and 84 cases in 2016 (ASEAN, 2017).

Cambodia

Figure 5 shows the number of dengue cases in Cambodia from 2017 to 2024 (WHO, n.d). The trend shows significant fluctuations in dengue cases over the eight-year period. There were 3,195 reported cases in 2017, peaking at 18,983 in 2019. This was followed by a decline to 11,977 cases in 2020, then a dramatic drop to 1,523 cases in 2021—the lowest number of cases during this period. However, cases surged again, reaching 12,591 in 2022 and peaking at 35,390 in 2023. In 2024, the number of cases fell sharply to 18,983.

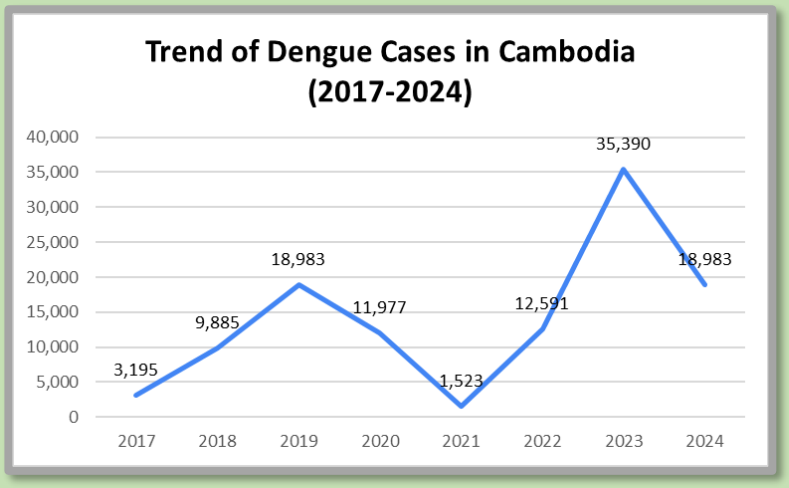


Figure 5 Trend of reported cases of dengue in Cambodia, 2017-2024 (Source: WHO)

Indonesia

From 2015 to 2024, the trend of dengue cases in Indonesia revealed considerable year-to-year variability, with several notable peaks and declines (Figure 6). The number of cases increased from 129,579 in 2015 to 204,172 in 2016 (WHO, 2025). However, there was a sharp drop in subsequent years, with 68,364 cases in 2017 and 65,591 cases in 2018. Cases rebounded to 138,131 in 2019, then gradually declined to 73,518 in 2021. The upward trend resumed in 2022 with 143,266 cases, followed by a slight decrease to 114,720 cases in 2023. In 2024, there was a dramatic spike to 257,271 cases, the highest number in a decade.

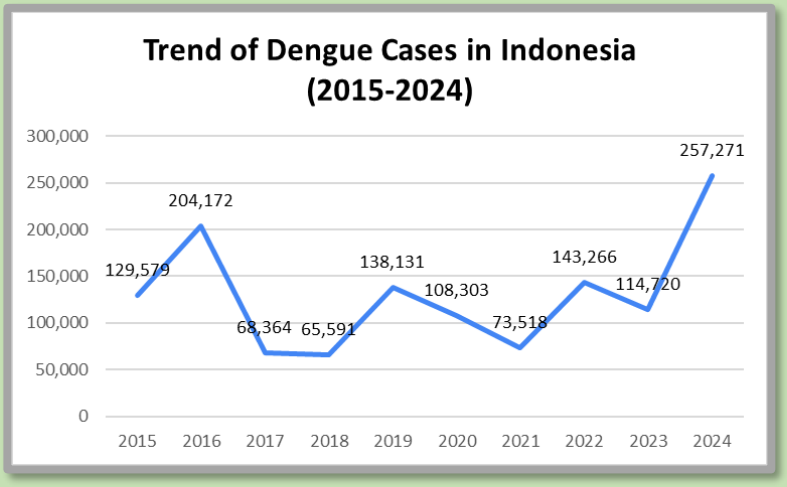


Figure 6 Trend of reported cases of dengue in Indonesia, 2015-2024 (Source: WHO)

Lao People's Democratic Republic

Figure 7 illustrates the number of dengue cases in Lao PDR from 2015 to 2024 (WHO, n.d). The graph illustrates notable fluctuations in dengue cases over the past decade. There were 1,952 reported cases in 2015, which gradually increased to 11,039 cases in 2017. After decreasing to 6,204 cases in 2018, cases peaked at 38,753 in 2019. There was then a continuous decline to 7,554 cases in 2020 and 1,328 cases in 2021, the lowest number of cases during this period. However, cases surged again, reaching 29,138 in 2022 and peaking at 31,997 in 2023. In 2024, the number of cases fell sharply to 19,486.

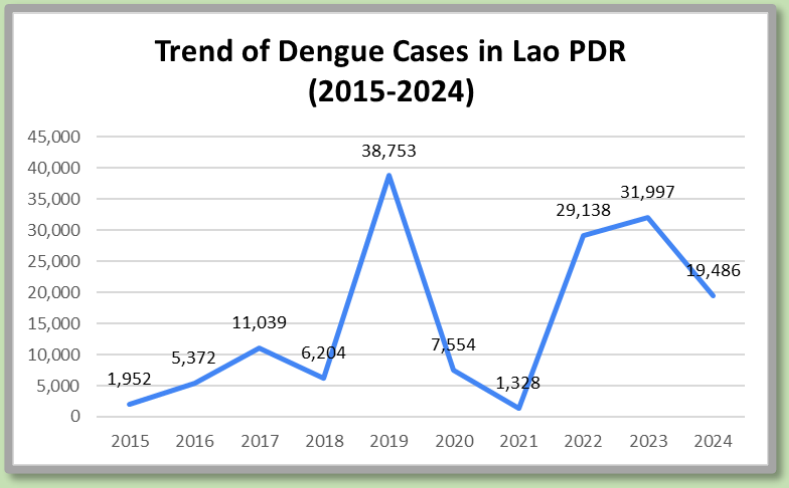


Figure 7 Trend of reported cases of dengue in Lao PDR, 2017-2024 (Source: WHO)

Malaysia

From 2015 to 2024, the number of dengue cases in Malaysia showed significant variability from year to year, with several notable peaks and declines (Figure 8). The number of cases increased from 107,597 in 2015 to 119,796 in 2016 (Ministry of Health Malaysia, n.d). Cases then dropped continuously in subsequent years, reaching 80,210 in 2019. However, the number of cases rebounded to 129,578 in 2019, which was the highest number throughout the period. This was followed by a gradual decline, reaching 26,300 cases in 2022, the lowest in the past decade. Despite this, cases continued to rise, reaching 123,133 in 2024.

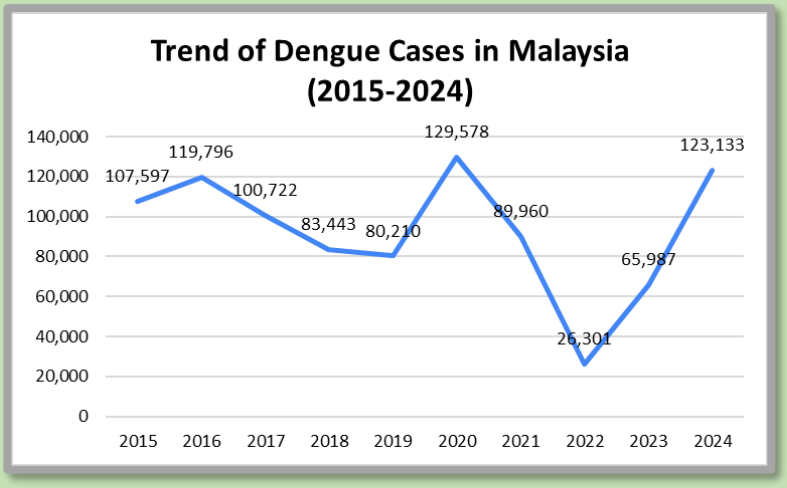


Figure 8 Trend of reported cases of Dengue in Malaysia, 2015-2024 (Source: Ministry of Health Malaysia)

Myanmar

In 2024, Myanmar recorded a total of 6,388 dengue cases (WHO, 2025). The country recorded 208 cases in January, which decreased to 176 in March, the lowest number of cases throughout the year (Figure 9). However, cases continued to rise, reaching 574 in June and peaking at over one thousand in July and August (1,236 and 1,239, respectively). After that, cases gradually decreased, reaching 257 in December.

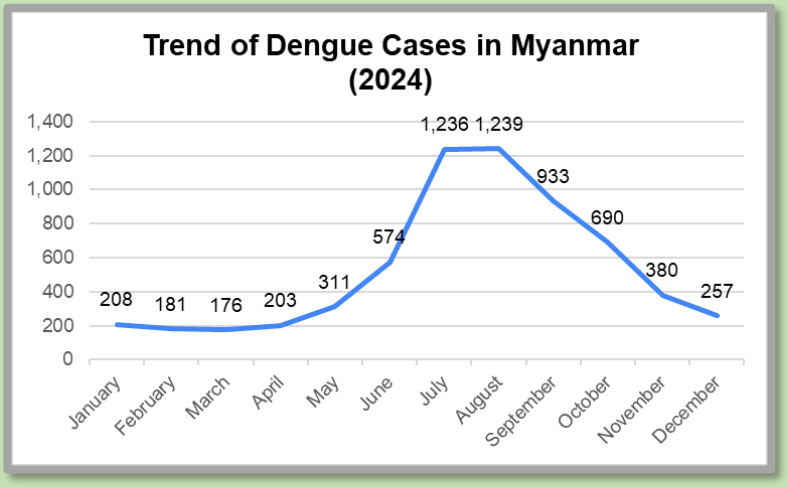


Figure 9 Trend of reported cases of dengue in Myanmar, 2024 (Source: WHO)

Philippines

Figure 10 illustrates the number of dengue cases in the Philippines from 2015 to 2023 (WHO, n.d). The country recorded 169,435 cases in 2015, increasing to 176,411 the following year. After decreasing to 117,659 cases in 2017, the number of cases continuously increased, peaking at 437,563 in 2019. Cases sharply declined to 83,155 in 2020 and reached 79,872 in 2021, which was the lowest number of cases during this period. However, a surge in cases was observed again, with numbers reaching 216,927 in 2022 before declining to 195,603 in 2023.

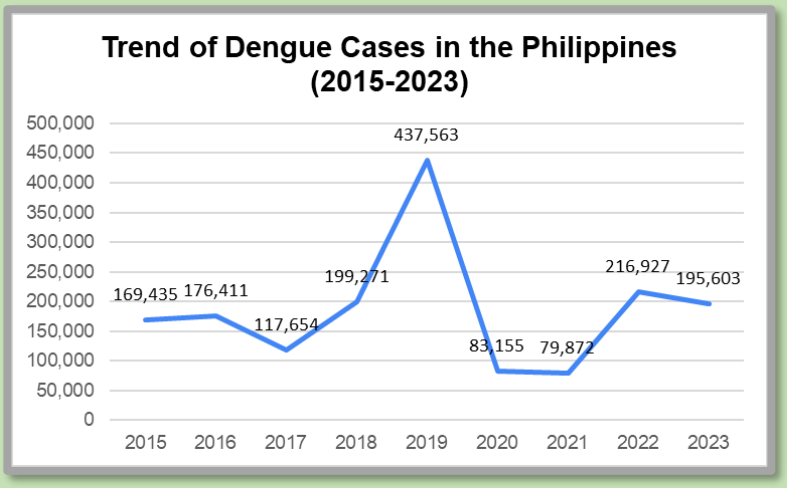


Figure 10 Trend of reported cases of dengue in the Philippines, 2015-2023 (Source: WHO)

Singapore

From 2015 to 2024, dengue cases in Singapore fluctuated significantly, with notable peaks and dips (Figure 11). Cases rose from 11,294 in 2015 to 12,115 in 2016, then declined to 2,767 in 2017 and slightly increased to 3,285 in 2018 (Ministry of Health Singapore, n.d). A sharp surge followed, peaking at 35,315 in 2020, the highest during the period. The number then dropped to 5,258 in 2021, rebounded to 32,137 in 2022, and declined again to 9,949 in 2023. In 2024, cases increased to 13,655.

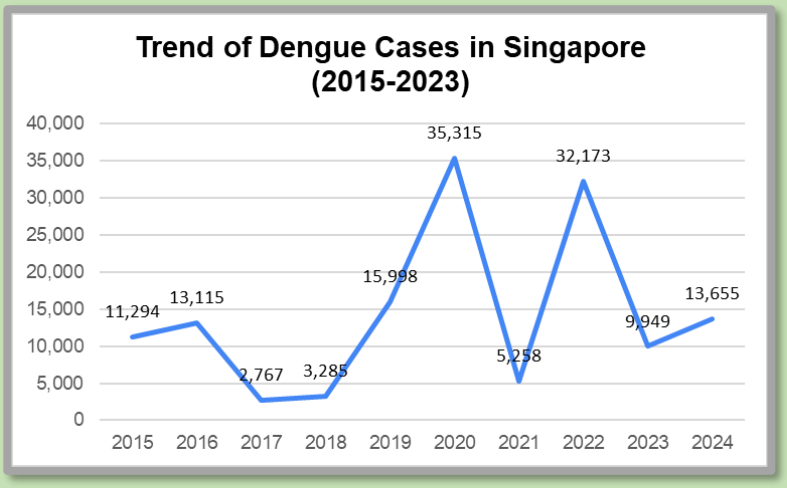
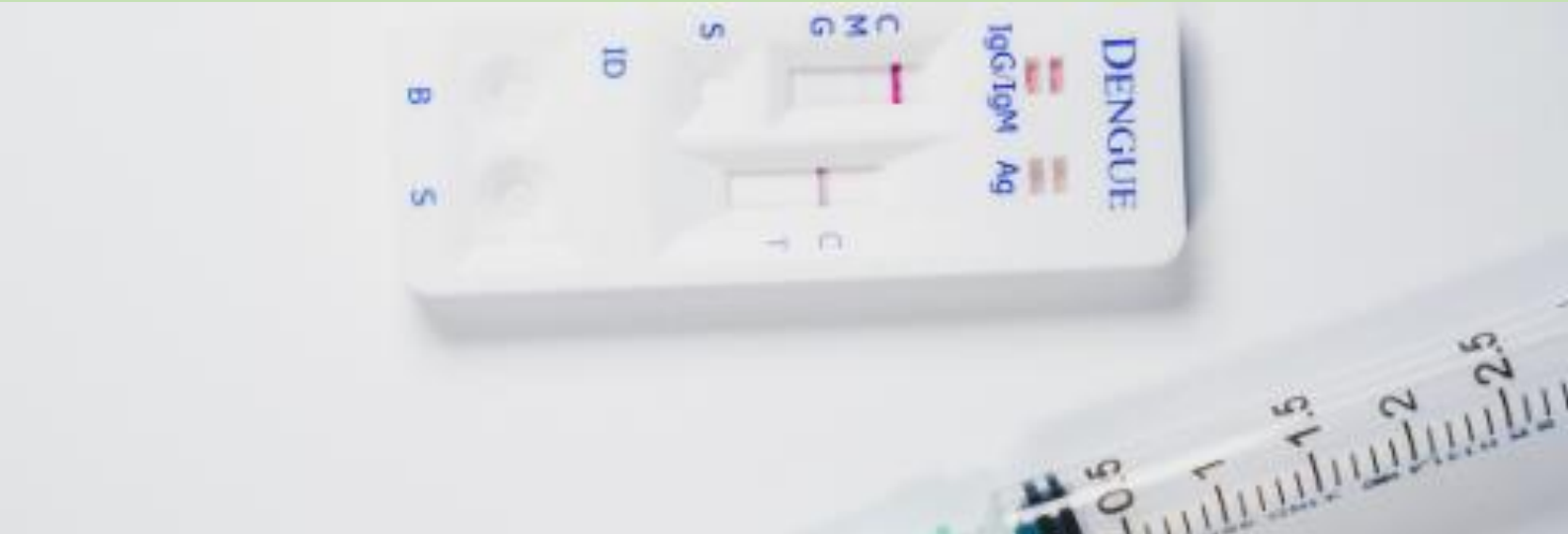


Figure 11 Trend of reported cases of Dengue in Singapore, 2015-2024 (Source: Ministry of Health Singapore)

Thailand

Figure 12 illustrates the number of dengue cases in Thailand from 2017 to 2023 (WHO, 2025). Cases rose from 186,776 in 2017 to 195,576 in 2018, then declined to 126,474 in 2019. A sharp increase followed, peaking at 459,620 in 2021. Cases dropped sharply to 124,532 in 2022 and further to 91,195 in 2023, the lowest in this period. However, 2024 saw a surge, with 255,168 cases reported.



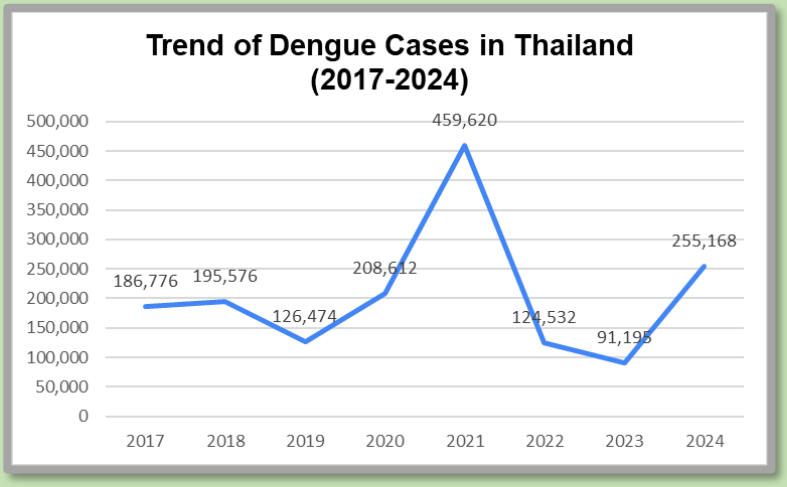


Figure 12 Trend of reported cases of dengue in Thailand, 2017-2024 (Source: WHO)

Viet Nam

Figure 13 illustrates the trend of dengue cases in Vietnam from 2015 to 2024 (WHO, n.d). Over this ten-year period, the number of cases fluctuated significantly. Starting at 79,912 cases in 2015, the numbers steadily increased, reaching 183,287 in 2017. This was followed by a decline in 2018 to 113,850 cases. There was a sharp rise in 2019, peaking at 320,702 cases, followed by a decline in 2020, reaching a decade low of 70,944 cases in 2021. The most dramatic surge occurred in 2022, with a record high of 367,729 cases. The numbers dropped significantly to 166,619 in 2023 and further declined to 138,342 in 2024.

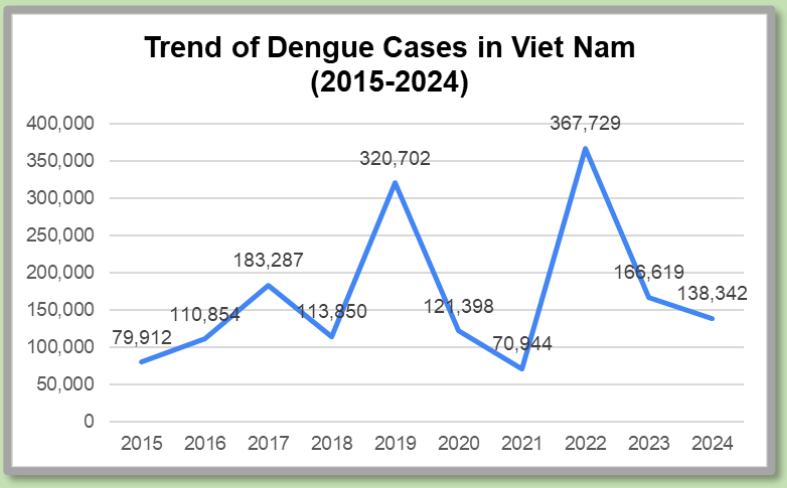


Figure 13 Trend of reported cases of dengue in Viet Nam, 2015-2024 (Source: WHO)

Case Management and Prevention

Case Management

There is currently no specific antiviral treatment for dengue. Instead, treatment focuses on supporting the patient and relieving symptoms (WHO, 2024b). Most cases can be treated at home with rest, drinking plenty of fluids, and taking acetaminophen for fever and pain. Aspirin and NSAIDs like ibuprofen are not recommended because they can cause bleeding (WHO, 2024a). Severe cases require prompt hospitalization to prevent complications and reduce mortality. With timely diagnosis and appropriate care, case-fatality rates can be kept below 1%.

Recommendations for Clinical Management

Cases of suspected, probable and confirmed dengue should be notified early so that appropriate public-health measures can be initiated. Laboratory confirmation is not necessary before notification, but it should be obtained. In non-endemic countries, usually only confirmed cases will be notified. Depending on the clinical manifestations and other circumstances, patients may either be sent home (Group A); be referred for in-hospital management (Group B); or require emergency treatment and urgent referral (Group C) (Figure 4).

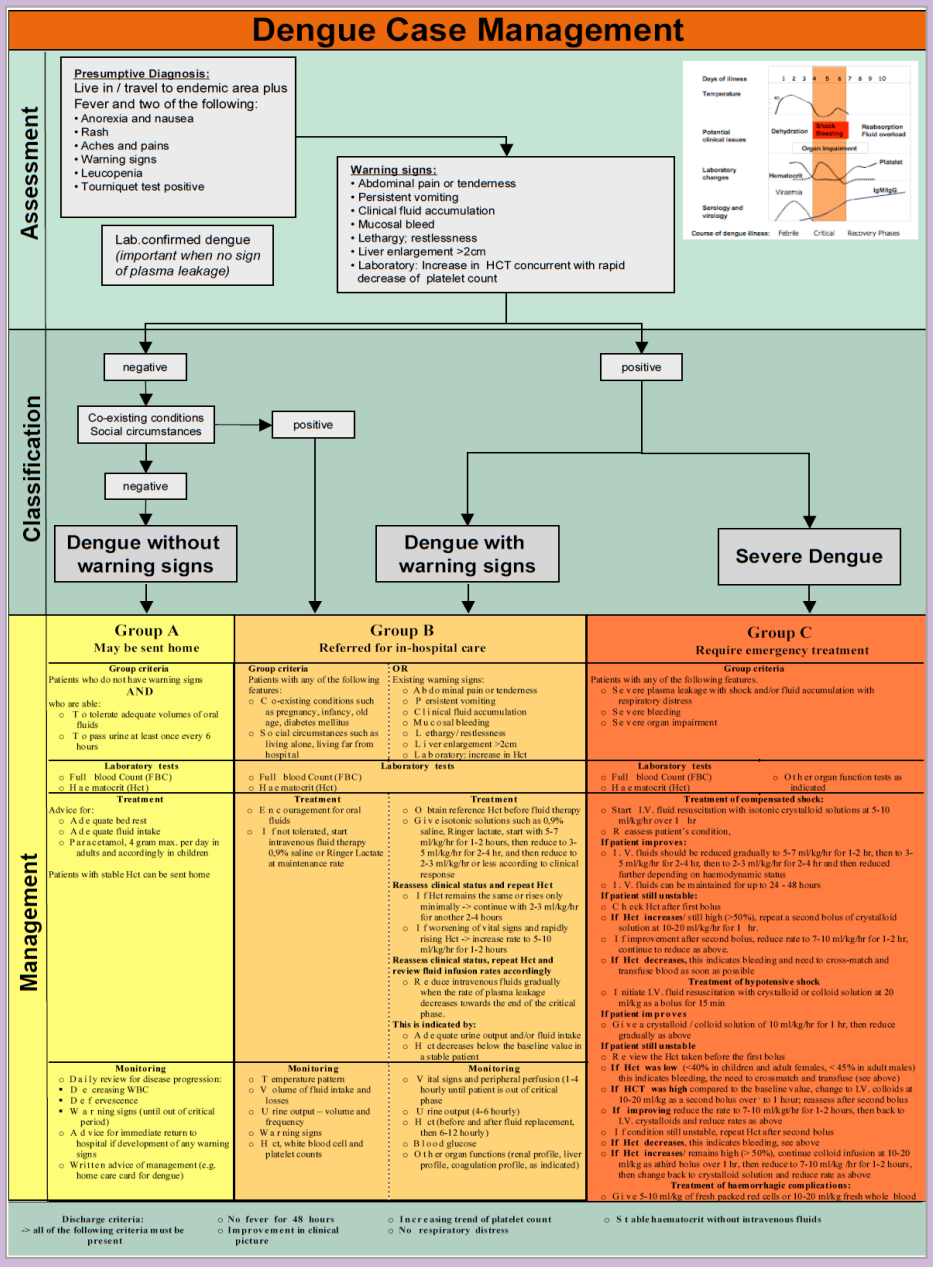


Figure 14 Dengue Case Management
(Source: WHO (https://www.who.int/publications/i/item/9789241504713))

Outpatient Management for Group A Dengue Patients

Group A includes patients without warning signs, coexisting conditions, or social risks. During the febrile phase (lasting 2–7 days), daily evaluation is essential to monitor for warning signs, dehydration, and defervescence, which may indicate progression to the critical phase. Patients and families should be advised on the following (WHO, 2012):

1. **Fever Control**: Give paracetamol for high fever if the patient is uncomfortable. The recommended dose is 10 mg/kg/dose, not more than 3–4 times in 24 hours in children and not more than 3 g/day in adults). Sponge with tepid water if the patient still has a high fever. Do not give acetylsalicylic acid

(aspirin), ibuprofen or other NSAIDs or intramuscular injections, as these aggravate gastritis or bleeding.

2. **Prevent Dehydration:** Ensure adequate fluid intake (oral rehydration solutions, water, soups, juice). Monitor for signs of dehydration, including reduced urination, dry mouth or tongue, absence of tears (in children), sunken eyes, lethargy, or agitation. Aim for urination at least 4–6 times per day. In outpatient settings, daily records of oral fluid intake and urine output are recommended for monitoring.
3. **Recognize Warning Signs:** Advise caregivers to seek immediate hospital care if any of the following occur: no improvement or worsening of symptoms around the time fever subsides, severe abdominal pain, persistent vomiting, cold extremities, lethargy, irritability, or restlessness, bleeding (e.g. black stools, coffee-ground vomitus), shortness of breath, and no urination for more than 4–6 hours.
4. **Prevent Dengue Spread at Home:** All household members should sleep under mosquito nets and use EPA-registered insect repellent. Remove mosquito breeding sites by scrubbing water containers and covering or emptying standing water.

Inpatient Management for Group B Dengue Patients

Group B includes patients with dengue warning signs, comorbidities (e.g. pregnancy, infancy, elderly, obesity, diabetes, hypertension, heart failure, renal failure, haemolytic disorders like sickle-cell disease, autoimmune diseases), or social risks (e.g. living alone or far from a health facility without reliable transport). Management begins by assessing for warning signs and ability to tolerate oral intake (WHO, 2012).

1. Patients with warning signs

   If the patient tolerates oral fluids, encourage intake and monitor. If not, administer isotonic solutions (0.9% saline, Ringer's lactate, or Hartmann's), starting at 5–7 ml/kg/hour for 1–2 hours, then tapered based on clinical response. Haematocrit should be checked before fluid initiation and monitored regularly to guide infusion rates. Continuous monitoring of vital signs, haematocrit, urine output, and organ function is essential until the critical phase has passed.

2. Patients with comorbid conditions but no warning signs

   For dengue patients with comorbid conditions but no warning signs, the focus of management is on adequate

hydration, preferably through oral fluids. If oral intake is insufficient, intravenous fluids should be administered at maintenance rates adjusted based on ideal body weight, particularly for overweight individuals. Patients should be closely monitored for temperature patterns, fluid balance, urine output, warning signs, hematocrit, and blood counts. Additional tests (e.g., liver and renal function) should be performed as clinically indicated.

Inpatient Management for Group C Dengue Patients

Figure 15 Blood transfusions

Patients with severe dengue, characterized by severe plasma leakage leading to shock or respiratory distress, severe bleeding, or severe organ impairment, require emergency treatment and urgent referral to hospitals with blood transfusion capability. Immediate intravenous fluid resuscitation with isotonic crystalloids constitutes the basis of effective management. In cases of hypotensive shock, the utilization of colloids is recommended. Ideally, hematocrit levels should be assessed prior to and following resuscitation. The process of resuscitation involves the administration of large fluid boluses, typically ranging from 10 to 20 milliliters per kilogram of body weight, under closely monitored conditions.

The administration of blood transfusions is reserved for cases of confirmed or suspected severe bleeding accompanied by hypotension. The primary objectives of this treatment are to restore effective circulation, as indicated by the normalization of heart rate, blood pressure, and capillary refill time, which should be less than two seconds, and to improve end-organ perfusion, as demonstrated by enhanced mental status, urine output of at least 0.5 milliliters per kilogram of body weight per hour, and a reduction in acidosis.

Prevention

Figure 16 Spraying insect repellent

Effective dengue prevention primarily relies on robust vector control strategies and individual protective behaviors. Key vector control strategies include (WHO, 2024b):

1. Elimination of mosquito breeding sites
2. Use of insecticides or insecticide-treated materials
3. Proper waste management
4. Space spraying of insecticides during outbreaks as an emergency intervention

Protective Behaviours

Community and individual behavior change is essential to control mosquito populations and reduce dengue transmission. Key actions within and around households include (WHO, 2024b):

1. Regular cleaning of flower vases to eliminate eggs and larvae.
2. Covering water storage containers to prevent mosquito access.
3. Removing or recycling used tyres, which often collect rainwater.
4. Cleaning water-holding containers weekly to disrupt mosquito breeding.
5. Eliminating standing water in and around the home and garden.

Figure 17 Household container

However, integrated vector control strategies should:

1. Involve inter-sectoral collaboration to eliminate potential mosquito habitats.
2. Promote safe water storage and environmental management practices.

Aedes sp. mosquitoes are primarily daytime feeders, insecticide-treated bed nets have limited effectiveness. It is therefore recommended to avoid outdoor activities during peak mosquito biting hours, typically early morning and late afternoon, to further reduce the risk of dengue virus transmission. Personal protective measures include:

1. Wearing long-sleeved shirts and trousers to reduce skin exposure.
2. Using insect repellents containing DEET to prevent bites.
3. Limiting outdoor activity during peak mosquito biting times (early morning and late afternoon).
4. Recognizing that insecticide-treated bed nets have limited effectiveness against *Aedes* mosquitoes due to their daytime biting behavior.

Vaccines

In May 2024, WHO released an updated position paper reflecting the recommendations of the SAGE on Immunization (WHO, 2024c). The 2024 update highlights TAK-003 and outlines its recommended use. WHO endorses TAK-003 for children aged 6–16 years in areas with high dengue transmission. Dengue vaccination should be implemented as part of a comprehensive disease control strategy that includes sustained vector control, effective clinical management, and active community engagement. Currently, two dengue vaccines have received licensure, namely CYD-TDV (Dengvaxia, developed by Sanofi) and TAK-003 (Qdenga, developed by Takeda). Both are live-attenuated tetravalent vaccines; however, they differ in terms of chimeric design, genomic backbone, as well as their respective efficacy and safety profiles. In addition, a third tetravalent live-attenuated dengue vaccine, developed by the Laboratory of Infectious Diseases at the U.S. NIAID, is presently in the advanced stages of clinical development.

1. CYD-TDV

CYD-TDV is a tetravalent live-attenuated dengue vaccine composed of recombinant viruses for all four DENV serotypes, using an attenuated yellow fever 17D virus backbone with substituted prM and E genes. It is administered in a three-dose schedule at six-month intervals and approved for individuals aged 9–45 or 9–60 years in dengue-endemic regions, depending on national regulations. Clinical trials have shown it to be effective and safe in seropositive individuals but associated with an increased risk of severe dengue in those who are seronegative. To mitigate this risk, pre-vaccination screening is recommended to identify individuals with prior dengue infection. In settings where screening is not feasible, vaccination is advised only in areas with high seroprevalence (≥80% by age 9) (WHO, 2024c).

2. TAK-003

TAK-003 is a live-attenuated dengue vaccine based on a DENV2 strain (TDV-2), which serves as the genomic backbone (WHO, 2024c). The other three vaccine strains (TDV-1, TDV-3, and TDV-4) were created by replacing the E and prM genes of TDV-2 with those from wild-type DENV1, DENV3, and DENV4, respectively. It is administered in two subcutaneous doses three months apart and is approved in various countries with differing age indications. WHO recommends its use in children aged 6–16 years in areas with high dengue transmission, ideally initiating vaccination 1–2 years before the age-specific peak in dengue hospitalizations. Subnational, targeted introduction may be appropriate in regions with heterogeneous transmission intensity. However, WHO does not recommend its use in children under 6 years or in areas with low to moderate transmission due to lower efficacy and limited data on DENV-3 and DENV-4 protection in seronegative individuals.

Control Measures Strategy

Control Measures in Global

Dengue remains a major public health challenge across all six WHO regions, with incidence rates rising sharply in recent decades. The spread of dengue is exacerbated by increasing global mobility, unplanned urbanization, and the effects of climate change, which promote mosquito breeding and facilitate the transmission of *Aedes*-borne arboviruses. In response, WHO has developed a SPRP, offering a comprehensive framework to reduce the impact of dengue and related diseases. The plan was formulated in collaboration with WHO's emergency and neglected tropical diseases programmes, drawing on the latest global risk assessments and lessons learned from the COVID-19 pandemic and past outbreaks of dengue, chikungunya, and Zika (WHO, 2024d).

The primary goal of this SPRP is to reduce the burden of disease and mortality caused by dengue and other Aedes-borne viruses worldwide. Its strategic objective is to accelerate global efforts in preventing and controlling outbreaks through coordinated, multisectoral action. Specific objectives include strengthening international collaboration and coordination, enhancing the capacity of countries to detect, report, and respond to outbreaks, and supporting the implementation of effective vaccination programs and integrated vector management strategies. This integrated approach emphasizes the importance of coordinated actions across public health, vector control, healthcare delivery, community involvement, and research. In terms of global health security architecture, the SPRP aligns with the WHO Framework for Health Emergency Prevention, Preparedness, Response, and Resilience (HEPR), launched in 2023. This framework marks a strategic shift toward an ecosystem-based approach to managing health emergencies, emphasizing integrated prevention, preparedness, and response efforts. The plan is structured around 11 interconnected pillars (Table 3) (WHO, 2024d).

Table 3. Alignment of the pillars of the global SPRP 2024–2025 for dengue and other arboviruses with the core components of the proposed global health architecture

Core components of the WHO global architecture for HEPR	Pillars of the global SPRP for dengue and other arboviruses
C1. Emergency coordination	**Pillar 1.** Leadership and coordination, prevention of sexual misconduct culture bottle)
C2. Collaborative surveillance	**Pillar 3.** Surveillance, epidemiological and entomological investigation **Pillar 5.** Laboratory surveillance and diagnostics
C3. Community protection	**Pillar 2.** Risk communication, community engagement and infodemic management **Pillar 4.** Travel, trade, and points of entry surveillance and control **Pillar 6.** Integrated vector management and WASH & IPC
C4. Safe and scalable care	**Pillar 7.** Clinical management and therapeutics **Pillar 9.** Essential health systems and services
C5. Access to countermeasures	**Pillar 8.** Operational support and logistics **Pillar 10.** Vaccination **Pillar 11.** Research, innovation and evidence

Aligned with the WHO's 2023 HEPR Framework, this plan adopts an ecosystem-based approach that strengthens collaborative surveillance, community protection, scalable healthcare, access to countermeasures, and emergency coordination. Through sustained commitment and a multidisciplinary strategy, the global health community can work together to confront the complex challenges of dengue and protect public health.

Regional Control Measures

Dengue fever has become the most prevalent and rapidly expanding vector-borne illness globally. The WHO South-East Asia Region bears over half of the global dengue disease burden, with all four dengue virus serotypes co-circulating, rendering many countries in the Region hyperendemic. Despite advances in case management that have led to a sustained decline in case fatality rates, now consistently below 0.5%, the Region continues to experience frequent large-scale outbreaks. In 2022, over 650,000 dengue cases and more than 2,000 associated deaths were reported across Member States.

To address the evolving epidemiological landscape, the WHO Regional Office reactivated the Regional Technical Advisory Group on Dengue and other

Arboviruses in 2021. This group serves to provide regular assessments of the dengue situation and guide both WHO and national governments in developing evidence-based strategies. As part of this effort, a new Regional Strategic Plan for dengue prevention and control was initiated in 2023.

Under the 2024–2030 Regional Strategic Framework for Neglected Tropical Diseases (NTDs), several strategic priorities have been outlined for Member States to enhance dengue control (WHO, 2024e). Therefore, Strategic priorities were developed, for both member states and WHO and partners.

Strategic priorities for Member States

1. Ensure uninterrupted supply of and universal access to RDT and vector control supplies throughout the health system.
2. Establish and strengthen collaborative surveillance with the epidemiological bureau, health emergency programmes, laboratories, entomological team and the private sector.
3. Strengthen case management capacity at all levels of the health system.
4. Strengthen SBCC and health education at all levels as part of the arboviral disease control programme for sustained prevention of Aedes mosquito breeding.
5. Strengthen laboratory capacity and the network for confirmatory diagnosis and serotyping of arboviral diseases.
6. Engage urban planning and public works departments to shape infrastructure for preventing mosquito breeding, and an adequate drainage system and waste management.

Strategic priorities for WHO and partners

1. Establish and operationalize the mechanism of regular data reporting from countries to WHO and visualize them in the regional dashboard.
2. Mobilize resources and support countries in capacity-building and implementation of the strategic priorities.
3. Update case management guidelines and develop operational toolkits.
4. Develop guidance on collaborative surveillance for arboviral disease, vector surveillance and SBCC.
5. Enhance integrated vector management across the Region.
6. Strengthen a regional laboratory network for arboviral diseases.
7. Facilitate cross-border collaboration for exchange of experiences and lessons learnt.
8. Facilitate intersectoral collaboration with other relevant programmes/ ministries for sustainable prevention and control of arboviral diseases.

Control Measures in ASEAN Member States

ASEAN, comprising ten Member States, launched the ASEAN Community in 2015 to strengthen regional cooperation across political-security, economic, and socio-cultural pillars. Public health, under the socio-cultural pillar, became a key priority, particularly in addressing emerging infectious diseases (EIDs) such as dengue. In response, the ASEAN Expert Group on Communicable Diseases developed the ASEAN Medium Term Plan on EIDs (2011–2015), with dengue identified as a priority. Strengthening this effort, ASEAN partnered with the WHO through a 2009–2013 Memorandum of Understanding to enhance regional health cooperation, align strategies with global standards, and support national programmes with WHO's technical expertise (WHO, 2011b).

A key outcome of the ASEAN-WHO collaboration was the joint effort to launch ASEAN Dengue Day, observed annually on 15 June. This regional advocacy initiative aimed at increasing public awareness of dengue, mobilizing resources for its prevention and control, and reaffirming ASEAN's commitment to addressing the disease (ASEAN, 2017). The initiative was endorsed at the 10th ASEAN Health Ministers Meeting in Singapore in 2010, with the first observance launched in Jakarta, Indonesia, in 2011. Since its inception, ASEAN Dengue Day has been commemorated through various synchronized activities at the regional, national, and sub-national levels across ASEAN Member States, with support from the WHO, along with international and local partners. These efforts reflect the recognition of dengue as a significant public health threat with far-reaching socio-economic implications for the region.

Given the multifactorial nature of dengue transmission, a multisectoral approach is essential. ASEAN, in collaboration with WHO and other stakeholders at all levels, continues to advocate for a "United Fight Against Dengue." Following the regional launch in 2011, a series of regional conferences and observances were hosted by ASEAN Member States: Myanmar (2012), Viet Nam (2013), the Philippines (2014), Lao PDR (2015), and Thailand (2016). These events brought together representatives from ASEAN governments, the ASEAN Secretariat, development partners, private sector entities, civil society organizations, and community groups, fostering regional solidarity and coordinated action in dengue prevention and control (ASEAN, 2017).

Brunei Darussalam

In Brunei Darussalam, vector-borne disease control—including dengue—is carried out through coordinated efforts between the MoH, the Environmental Health Division, and District Health Offices (ASEAN, 2017). Guided by the principles of Integrated Vector Management (IVM), the national strategy emphasizes multisectoral coordination, community engagement, and evidence-based interventions.

In responding to vector-borne diseases including dengue incidences in Brunei Darussalam, several activities to prevent and reduce the spread of vector borne diseases have been implemented (Prime Minister's Office Brunei Darussalam, 2016). These include the following:

1. Implement vector borne diseases control consisting of various strategic plans and organized programs for the vigilance, elimination, control and prevention of diseases;
2. Application of an IVM and to get more effective, cost effective, ecologically sound and sustainable vector control; and
3. Combatting vector-borne diseases through Malaria Vigilance Programme; Entomology Programme, Vector Control Programme which entails mosquito, virus and human surveillance' public education and awareness; law enforcement and research.

The Ministry of Health also collaborates with the WHO to strengthen public health resilience against vector-borne diseases and the impacts of climate change.

Cambodia

The dengue strategy in Cambodia aims to reduce the incidence and mortality of dengue fever through an integrated approach that strengthens prevention, control, and community resilience. The main approach combines health education, risk communication, and community engagement to raise awareness and promote behavior change. The implementation strategy involves coordination between the Ministry of Health, local authorities, schools, and health centers, using tools like the 4P framework (purpose, process, product, and presentation) to guide communication. Key activities include public education campaigns, training health workers and community volunteers, promoting environmental management to eliminate mosquito breeding sites, and using media and mobile platforms to disseminate timely and accurate information during outbreaks (Ministry of Health Cambodia, 2020).

Indonesia

In order to achieve zero dengue deaths by 2030, the Indonesian Ministry of Health has developed the National Dengue Control Strategy 2021-2025 (Ministry of Health Indonesia, 2021). The national strategy consists of six strategies, namely:

1. Enhancing effective, safe, and continuous vector management
2. Improving access and quality of dengue case management
3. Strengthening comprehensive dengue surveillance and responsive outbreak management
4. Increasing sustainable community engagement
5. Strengthening government commitment, policy and program management, and partnership
6. Improving assessment, invention, innovation, and research as the basis of evidence-based policy and program management

Lao People's Democratic Republic

Laos PDR's dengue strategy incorporates multiple integrated approaches (WMP, 2025). Vector control is achieved through the release of *Wolbachia*-infected mosquitoes to reduce disease transmission. Youth education is promoted in schools to build early awareness of mosquito-borne diseases. Climate-resilient planning addresses rising risks from floods and droughts, which create breeding grounds for mosquitoes. Lastly, community engagement includes empowering local volunteers and educating families to host mosquito containers and maintain clean environments. These combined efforts aim to strengthen the public health system and reduce the national dengue burden.

Malaysia

To ensure the continuity of the dengue control program, the Ministry of Health Malaysia has developed The National Dengue Prevention and Control Strategic Plan 2022-2026 (Ministry of Health Malaysia, 2022). The Strategic Plan contains 22 strategies, 41 initiatives and 54 indicators with three (3) main cores, and two supporting elements.

Main cores of dengue strategic plan

1. Strengthening the Dengue Surveillance System
2. Ensuring Access to Dengue Detection, Diagnosis and Treatment

3. Strengthening Efforts Towards Dengue Prevention and Control

Supporting elements of dengue strategic plans

1. Supporting Element 1: Strengthening the health system and catalytic factors
2. Supporting Element 2: Strengthening dengue-related research and innovation

Myanmar

In 2016, the Ministry of Health and Sports The Union of the Republic of Myanmar Developed a NSP for Dengue Prevention and Control 2016 - 2020. The NSP has a vision to minimize the health, economic, and social impact of the disease by reversing the rising trend of dengue. Guided by this vision, the program aims to reduce the overall burden of dengue and dengue hemorrhagic fever. To achieve this goal, the program has set clear and measurable objectives: to reduce dengue morbidity by at least 25% by 2020 and 50% by 2025, compared to the 2015 baseline; to reduce dengue mortality by at least 50% by 2020 and 90% by 2025; and to maintain a CFR of less than 1%. These targets reflect a strong commitment to improving public health outcomes and strengthening the response to dengue at all levels. The following are seven strategic interventions of the national strategic plan (Ministry of Health and Sports The Union of the Republic of Myanmar, 2016) :

1. Increase capacity of the National Programme to strengthen dengue surveillance;
2. Strengthen the capacity of the National Programme to implement effective integrated vector management;
3. Increase the capacity of clinicians, nurses, BHS, laboratory technicians and laboratories to diagnose, treat and refer dengue patients;
4. Increase capacity to predict, detect early and respond to outbreaks in a timely manner
5. Promote collaboration among affected communities, national health and non-health departments and other stakeholders to implement communication for behavioral impact (COMBI) for dengue;
6. Promote and conduct dengue researches to address programmatic issues and gaps that require new or improved tools for effective dengue prevention and control;
7. Strengthen dengue programme management and promote inter-sectoral collaboration for effective Dengue prevention and control.

Philippines

The National Dengue Prevention and Control Program of the Philippines envisions "a dengue-free Philippines", with a mission to ensure healthy lives and promote well-being for all at all ages (Department of Health Republic of the Philippines, 2016). Its overarching goal is to reduce the burden of dengue disease nationwide. The program has set clear objectives and indicators: first, to reduce dengue morbidity by at least 25% by 2022; second, to reduce dengue mortality by at least 50% by 2022; and third, to maintain a CFR below 1% annually.

The program consists of six core components: (1) Surveillance, (2) Case Management and Diagnosis; (3) Integrated Vector Management (IVM); (4) Outbreak Response; (5) Health Promotion and Advocacy; and (6) Research. These efforts are reinforced by the Enhanced 4S Strategy, namely (1) search and destroy, (2) seek early consultation, (3) self-protection measures, and (4) say yes to fogging only during outbreaks.

Singapore

Singapore's dengue strategy focuses on integrated surveillance and control, aligned with WHO recommendations (NEA, 2025). The key approach is source reduction, detecting and eliminating Aedes mosquito breeding sites. Preventive risk-based inspections target high-risk areas even without reported cases, helping to suppress mosquito populations and prevent transmission. The NEA collaborates with agencies like PUB, NParks, and Town Councils to maintain control measures in affected zones. Strategies include monitoring mosquito populations with Gravitraps, intensive search-and-destroy operations, targeted larvicide use, and judicious insecticidal fogging during outbreaks. Community engagement is reinforced through communication, mobilisation, and legislation under the Control of Vectors and Pesticides Act.

NEA continues to innovate with tools like Project Wolbachia (NEA, 2024). As of October 2024, the project expanded to five new sites, increasing coverage from 480,000 to 580,000 households after field trials showed a 75% drop in dengue cases and an 80–90% reduction in Aedes aegypti populations.

Thailand

Under the Vector-borne Disease Management Strategy (2023–2032), Thailand aims to address the ongoing public health challenges posed by diseases including dengue. reduce the health burden from diseases like dengue amid environmental changes, urbanization, and increased mobility. By 2032, the strategy envisions a comprehensive national system for surveillance, prevention, and control aligned with global standards and the Sustainable Development Goals (SDGs). Its core objectives include reducing morbidity and mortality from vector-borne diseases, fulfilling Thailand's international commitments, and strengthening global health security (DDC Thailand, 2022). The strategy is built upon five strategic pillars:

1. Developing effective policies and programs;
2. Enhancing surveillance systems and emergency preparedness;
3. Strengthening infrastructure and operational capacity at local and regional levels;
4. Fostering active engagement from communities and stakeholders; and
5. Investing in workforce development, particularly in epidemiology and entomology.

Implementation is supported by a five-year action plan (2023–2027), legal frameworks like the Communicable Disease Act (B.E. 2558), and initiatives such as the formation of VCUs and Centers of Excellence. Ultimately, the strategy emphasizes intersectoral collaboration and localized ownership to ensure effective and sustainable vector-borne disease management across the country (DDC Thailand, 2022).

Viet Nam

Viet Nam's dengue prevention and control strategy aligns with the Western Pacific Region's Dengue Action Plan adopted in 2016, focusing on reducing the disease's impact on communities and health systems (WHO, 2019). Guided by the 2014 National Guidelines for Dengue Surveillance and Control, the country emphasizes integrated surveillance, timely response, and strong community engagement. Viet Nam has also actively participated in ASEAN Dengue Day for ten consecutive years, reinforcing public awareness and regional collaboration. With WHO support, Viet Nam continues to enhance its efforts to minimize the scale, frequency, and consequences of dengue outbreaks.

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