Asia-Pacific
Economic Cooperation

Roadmap to Advance Dengue Prevention & Control in APEC Economies 2026 – 2030

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Health Working Group

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APEC Health Working Group

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Executive Summary

Dengue fever is escalating into an unprecedented global health and economic crisis, with a staggering 14.1 million cases reported worldwide in 2024 alone, doubling the previous year's figure and setting an alarming new record. This rapid, unchecked expansion, fueled by urbanization, globalization, and climate change, has driven dengue far beyond its traditional strongholds, threatening regions previously untouched.

The reactive "boom-and-bust" cycle of dengue response has proven costly and ineffective, failing to curb its relentless spread and draining vital resources. This is no longer solely a public health concern, and dengue poses a grave and growing threat to the economic resilience, trade, tourism, and labor productivity of every APEC economy. Whether battling recurring outbreaks in endemic economies like Indonesia and the Philippines or confronting localized spread in previously non-endemic members such as Australia and the United States, no APEC economy is immune to the escalating risk posed by dengue. Its transboundary nature and economic ramifications demand a collective, proactive, and integrated response across the region.

About the Roadmap

The **APEC Roadmap to Advance Dengue Prevention & Control 2026–2030** serves as a vital strategic guide, empowering member economies to shift from reactive measures to a proactive, coordinated, and context-specific approach. ***Recognizing the diverse realities of dengue across APEC, this Roadmap is non-prescriptive, offering a scalable, modular framework tailored to each economy's unique risk profile and capacities***. It champions long-term planning, risk reduction, and health systems strengthening to reduce dengue's public health and economic toll. Endemic economies will find guidance to fortify existing strategies and integrate novel tools such as vaccines and novel vector control methods (e.g., *Wolbachia*), while non-endemic economies are offered recommendations to strengthen their preparedness, vector surveillance strategies, and early detection systems to prevent future local transmission. The engagement of all member economies is essential to strengthen regional health security against future outbreaks to achieve a truly dengue-resilience APEC.

The Roadmap is anchored upon ten guiding principles for member economies to embed in their planning and response for dengue preventive and control actions, namely:

01	Policy and legislation are vital to support dengue interventions
02	Dengue requires a multisectoral response at the local/city level
03	Sustainable and direct funding is necessary to support long-term dengue action

04	Regional and international coordination facilitates capacity building and knowledge exchange
05	Research, development, and innovation (RDI) are essential to enhance or develop new tools
06	Effective dengue control demands consistent and integrated multi-prong interventions focused on preventive action
07	Surveillance is the cornerstone of early detection of dengue.
08	Dengue responses must be context-specific
09	Local authorities need to be aware and empowered
10	Interventions should target vulnerable populations

Aligned with global health targets, this Roadmap sets ambitious regional milestones for 2030, including **reducing preventable dengue deaths to 0%, achieving a 25% reduction in incidence, and ensuring 75% of APEC economies are capable of detecting and responding effectively to outbreaks.**

The ten guiding principles seamlessly translate into action, forming the framework (Figure 1) around which the Roadmap is organized – three interconnected focus areas (A, B, C), containing a total of **ten priorities** *(A1 - A5, B6 - B7, C8 - C10)* and **27 actions** designed to guide effective implementation across the APEC region. *(Refer to Table 1 on overview of priorities and actions)*

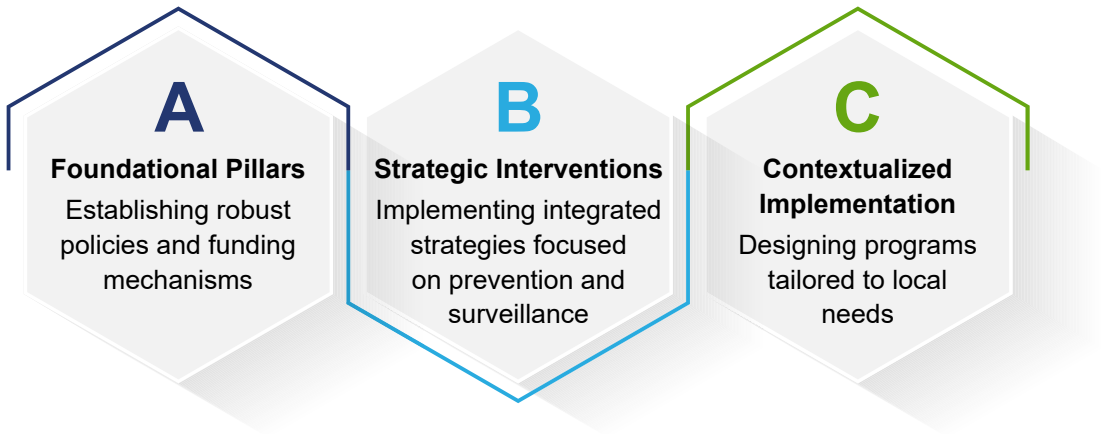

Figure 1: Overview of Focus Areas for Dengue Prevention and Control

The time for fragmented responses is over. By embracing the priorities and actions articulated within this Roadmap, APEC economies can collectively transform the fight against dengue from a reactive struggle into a concerted, impactful regional success story. This unified commitment will not only safeguard the health and well-being of our populations but also fortify the economic stability and interconnected prosperity of the entire Asia-Pacific region against this escalating threat.

Table 1: Overview of Key Actions for APEC Dengue Roadmap 2026-2030

A. FOUNDATIONAL PILLARS

A1. Robust Policy & Legislation	A2. Multisectoral Collaboration	A3. Sustainable Funding Mechanisms	A4. Regional & International Cooperation	A5. Research, Development, & Innovation
1.1. Establish policies & legislations to build and strengthen dengue action at the domestic level 1.2. Introduce robust oversight mechanisms for policy enforcement	2.1. Enhance inter-ministerial mechanisms to address dengue across its outbreak cycle 2.2. Promote multisectoral partnerships to advance dengue prevention and control efforts 2.3. Foster comprehensive capacity building for effective dengue prevention and control 2.4. Strengthen coordination of operational support, logistics, and supply chain management to support dengue action	3.1. Ensure dedicated domestic financing for dengue activities 3.2. Explore and engage external sources of funding to supplement dengue action	4.1. Advance regional collaborations, knowledge-sharing, and capacity building for dengue action 4.2. Promote regional cooperation for joint dengue control initiatives	5.1. Develop the domestic research agenda to promote the development of innovative technologies across dengue and arboviruses 5.2. Advance research and development of dengue preventive and control technologies 5.3. Drive the validation, adoption and optimized implementation of dengue innovations

B. STRATEGIC INTERVENTIONS

C. CONTEXTUALIZED IMPLEMENTATION

B6. Multi-pronged & Integrated interventions	B7. Robust Surveillance	C8. Context-specific program design	C9. Empowerment of Local Authorities & Communities	C10. Tailored approach for at-risk populations
6.1. Strengthen and embed integrated vector control (IVC) activities into public health programs. 6.2. Promote flexible and targeted dengue immunization strategies 6.3. Improve early detection & clinical management of dengue cases	7.1. Strengthen One Health coordination of passive and active surveillance across epidemiological, entomological, and laboratory systems 7.2. Strengthen active local laboratory-based surveillance and surveillance workforce capacity to anticipate and respond to outbreaks 7.3. Enhance genomic surveillance to monitor evolution of dengue virus, serotype shifts and emerging variants	8.1. Focus dengue prevention and control activities in rapidly urbanizing areas 8.2. Adapt interventions to local epidemiological profiles and sociocultural contexts	9.1. Proactively involve local authorities and communities in planning and response to dengue threat at all levels 9.2. Foster risk communication and cross-sharing of best practices with local communities 9.3. Secure policy and financial empowerment for local dengue control	10.1. Identify vulnerable communities and empower them to advance dengue response efforts 10.2. Drive inclusive dengue strategies that ensure participation from populations at-risk 10.3. Integrate gender-sensitive considerations into dengue strategies

List of Abbreviations

APEC	Asia-Pacific Economic Cooperation	**NGOs**	Non-governmental organizations
ADE	Anti-body Dependent Enhancement	**NFP**	National Focal Point
ASEAN	Association of Southeast Asian Nations	**ORAS-CONHU**	Andean Health Organization - Hipólito Unanue Agreement
BMA	Bangkok Metropolitan Administration	**PAHO**	Pan American Health Organization
CFR	Case Fatality Rate	**PoE**	Points of Entry
CVPA	Control of Vectors and Pesticides Act	**PCR**	Polymerase Chain Reaction
DENV	Dengue Virus	**RT-PCR**	Reverse Transcription Polymerase Chain Reaction
ELISA	Enzyme-linked Immunoassay	**RDI**	Research, development, and innovation
EPHA	Environmental Public Health Act	**SBCC**	Social and Behavioral Change Communication
HPV	Human papillomavirus	**SIT**	Sterile Insect Technique
IHR	International Health Regulations	**SOP**	Standard Operating Protocols
IDA	Infectious Diseases Act	**SPRP**	Global Strategic Preparedness, Readiness, and Response Plan
IAEA	International Atomic Energy Agency	**UNITEDengue**	United in Tackling Epidemic Dengue
IMS	Integrated Management Strategy for Dengue Prevention and Control	**US**	United States
LMIC	Low- and middle-income countries	**WHO**	World Health Organization

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01

Introduction

Urgency to address the growing dengue epidemic

Dengue fever is the world's fastest-spreading mosquito-transmitted disease, with global dengue cases and deaths breaking annual records since 2021.[1] Over 14.1 million cases were reported worldwide in 2024 – double the figure reported in 2023.[2] Several critical and interconnected global trends have driven the alarming rise in dengue fever across economies and regionally, including rapid unplanned urbanization, globalization, and extreme weather events.

Rapid unplanned urbanization, particularly in tropical and sub-tropical regions, is creating an abundance of breeding sites for the *Aedes* mosquitoes to thrive and spread dengue.[3] Megacities, in particular, are highly susceptible to dengue fever outbreaks often characterized by weak water and sanitation systems that result in mosquito breeding sites in homes and communities.[4] High population density in these sprawling urban centres also heightens the risk of human-mosquito contact. Dengue transmission will become more common in urban dwellings with the world projected to have 43 megacities by 2030, and global urban population expected to rise from 55% in 2018 to 68% by 2050.[5]

While dengue outbreaks often occur during rainy seasons, **increased weather volatility and climate shocks** have contributed to shifting and unpredictable patterns of dengue outbreaks.[6] Higher frequency of heavy rainfall, flooding, droughts and climate-related events create an abundance of breeding sites for *Aedes* mosquitoes.[7] Warmer temperatures and increased humidity have enabled *Aedes* mosquitoes to expand their habitats from traditionally endemic areas into non-endemic areas, including higher altitudes and more sub-tropical areas.[8] Even non-dengue endemic economies like Australia are seeing increasing expansions of the *Aedes* mosquito habitats due to climate-related changes.[9] [10] Changing weather patterns have also led to a rise in dengue cases, with one study reporting that around 20% of dengue cases in the Latin America and the Caribbean region (around 45 million infections a year) were attributable to climate change.[11] Compounded with rapid urbanization and globalization, weather volatility has driven sharp upticks of annual dengue cases in Brazil; China; India; and Indonesia between 1990 to 2019.[12] By 2050, dengue transmission in these areas is expected to expand and increase cases by 40% to 57% from current levels.[13]

Dengue transmission is cyclical, with large outbreaks occurring every 3 to 4 years.[14] Beyond these broad cycles, dengue is also a seasonal disease, with local outbreaks occurring during monsoon and drought seasons in tropical areas, and in the summer months in temperate areas. While populations in endemic areas may develop immunity against one of the four dominant dengue virus serotype (DENV-1 to DENV-4), waning immunity and the emergence of another dominant dengue serotype can drive the next cyclical outbreak.[15] Subsequent outbreaks driven by different dengue serotypes increases the risk of severe complications in previously exposed populations due to antibody-dependent enhancement (ADE).[16] Further burden is placed on healthcare services with no specific antiviral drug for dengue treatment available.[17] With rapid urbanization and increasing weather volatility, the dengue outbreak cycle will shorten and become more frequent, driving the rise in dengue outbreak worldwide.

As a result of the "boom and bust" cycles of dengue outbreaks, **many economies face difficulties in sustaining efforts required for dengue prevention and control**. During dengue outbreaks, economies invest heavily in vector control and public awareness initiatives. When cases decrease, political will, funding, and dengue control measures often decline. Between major outbreaks, economies are lulled into a false sense of security and underinvest in proactive measures such as vaccination, vector control, and surveillance systems. Despite causing significant morbidity, dengue receives insufficient funding for control measures, largely because its mortality rate is relatively low compared to other mosquito-borne diseases like malaria. Consequently, many health systems primarily react to reported cases and often implement control measures after a dengue wave has gained momentum. In Southeast Asia and Latin America, where dengue is endemic in several regions and non-endemic in some, most economies are caught in a cycle of reacting to, rather than preventing or controlling, dengue outbreaks.[18] [19]

Aim and Purpose of the Roadmap

The *Roadmap to Advance Dengue Prevention & Control in APEC Economies 2026 – 2030 (APEC Roadmap)* recommends a comprehensive range of actions, allowing each economy to tailor their resources to its unique dengue situation, including its epidemiological profile, environmental conditions, socioeconomic realities, and domestic priorities. While the ideal scenario would see the implementation of all recommended actions, the *APEC Roadmap* recognizes competing commitments and practical constraints that necessitate each APEC economy to prioritize the spectrum of dengue preventive and control actions to implement. The *APEC Roadmap* serves as a guide for APEC economies to plan their rollout of dengue prevention and control strategies and allows for a flexible and adaptable approach.

Dengue is a combatable disease that has been successfully controlled in various settings, demonstrating reduction of disease burden is an achievable goal. The *APEC Roadmap* also identifies efficiencies and synergistic overlaps with other ongoing public health programs, ensuring that investments target dengue, related arboviruses and other infectious diseases. For example, strengthening laboratory surveillance systems for dengue can enhance an economy's capacity for early detection of a multitude of other arboviruses and pathogens. The *APEC Roadmap* calls for member economies to participate actively in a coordinated, regional approach to combat the cross-border threat that dengue poses.

Alignment with Global Health Initiatives and Goals

This *APEC Roadmap* is grounded in and aligned with leading global and regional frameworks designed to address the escalating burden of dengue and other Aedes-borne diseases. These include the World Health Organization (WHO) *Global Strategic Preparedness, Readiness and Response Plan (SPRP) 2024–2030*, the Pan-American Health Organization (PAHO) *Integrated Management Strategy for Dengue Prevention and Control (IMS-Dengue)*, the WHO Global Arbovirus Initiative, and the WHO *Neglected Tropical Disease Roadmap for 2021 – 2030,* and the *Lancet* Commission on dengue and other *Aedes*-transmitted viral diseases.

02

State of Dengue in APEC Economies

Dengue burden in APEC economies and globally

Dengue incidence have surged globally with the number of annual cases approximately doubling each year since 2021.[20] Dengue is endemic in Southeast Asia, the Asia-Pacific region, and the Americas region, with close to 80% of global dengue cases reported in the Americas.[21] However, a combination of rapid urbanization, climate change, and increased global interconnectivity due to modern transportation have significantly expanding the geographical distribution and incidence of dengue transmission to tropical and sub-tropical economies.[22]

Due to its tropical and monsoon climate, Southeast Asia is traditionally a dengue hotspot, with the disease endemic throughout all APEC economies in the region.[23] Indonesia reported nearly 150,000 confirmed dengue cases in 2024, approximately three times higher than in 2023.[24] In the same period, the Philippines reported a staggering 195,000 cases and a higher case fatality rate (CFR=0.34%) than the Asia average (CFR=0.22%).[25 26] Malaysia and Viet Nam also reported high numbers of dengue cases in 2023 at approximately 167,000 and 123,133 respectively.[27 28] The high incidence of dengue cases in Southeast Asia is further compounded by the absence of effective treatment and comprehensive vector control programs.[29]

The broader Asia-Pacific region presents a more complex dengue landscape for APEC economies. Most member economies including Japan; Korea; and New Zealand continue to report imported dengue cases. Periodically, Australia; China; and Chinese Taipei experience dengue outbreaks often triggered by imported cases travelling to areas favorable for the *Aedes* vector.[30 31 32] Meanwhile, Pacific Island economies such as Papua New Guinea are dengue endemic and remain vulnerable to outbreaks due to limited detection and vector control capacity.[33]

The Americas are currently the global epicenter of dengue, presenting an ongoing public health threat. In 2024, the region accounted for over 80% of global dengue cases.[34] Dengue is endemic in Mexico and Peru with a substantial rise in outbreaks over the past few years.[35 36] In 2023, Peru recorded its highest dengue incidence at over 251,000 confirmed cases, exacerbated by a confluence of urbanization, human migration, and expansion of the *Aedes* vector habitats.[37] In the United States (US), dengue is endemic in its Caribbean and Pacific territories (e.g., Puerto Rico, US Virgin Islands, American Samoa), while limited local outbreaks occur in southern and western continental states such as Florida, Texas, and California.[38] Only Canada remains free from dengue and the *Aedes aegypti* mosquito vector.[39] Chile remains the only APEC South American economy free of autochthonous dengue transmission, although the dengue vector has spread to its northern regions.[40]

Table 2: Dengue en demicity in APEC economies

Endemic*	Partially endemic^	Non-endemic
Brunei Darussalam	China	Australia [i]
Indonesia	Hong Kong, China	Canada [iii]
Malaysia	Chinese Taipei	Chile [ii]
Mexico		Japan [ii]
Papua New Guinea		Korea [ii]
Peru		New Zealand [iii]
The Philippines		Russian Federation [iii]
Singapore		United States [i]
Thailand		
Viet Nam		

** Economies that have ongoing sustained dengue transmission, experiencing seasonal dengue outbreaks among the population.*

^ Economies that have areas with known high local dengue activity are considered partially endemic.

[I] Economies that have sporadic, localized outbreaks are reported in certain geographical areas

[II] Economies that have no known local dengue transmission reported, but the presence of Aedes vector indicates potential for dengue transmission.

[III] Economies that have no local dengue cases, or presence of the Aedes vector.

APEC economies' progress towards dengue prevention and control

APEC economies have made varied but significant action towards dengue prevention and control, adapting their strategies to domestic epidemiological contexts and availability of resources. From the development of integrated domestic plans and use of novel vector control methods to the increasing approval of dengue vaccines, these efforts demonstrate member economies' commitment to dengue reduction. However, gaps in policy and implementation across APEC economies, coupled with intensifying dengue transmission mainly driven by rapid urbanization and globalization, warrant continuous adaptation and a need to accelerate dengue prevention and control efforts.

Domestic efforts to combat dengue and arboviruses

Most APEC economies have committed to domestic plans or integrated arbovirus control programs. Among APEC economies with endemic dengue transmission, nine of ten member economies have established a domestic plan or have robust programs in place related to dengue and other arboviruses. Between 2021 to 2025, Indonesia; Malaysia; and Peru have introduced integrated domestic strategies encompassing vector control, surveillance, and public awareness campaigns tailored to local contexts.[41] [42] [43] Among non-endemic economies, Australia; China; Hong Kong, China; and Chinese Taipei have domestic dengue control and preventive strategies to curb potential dengue epidemics.[44] [45] [46] [47] Other economies such as Canada; Korea; and the US have protocols to manage imported cases of dengue and other arboviruses. While these efforts are widespread, more mature and comprehensive dengue plans are typically found in highly endemic member economies.

Surveillance and vector control

Robust surveillance and vector control programs are the cornerstone of dengue prevention efforts across APEC. All APEC economies maintain active epidemiological surveillance to track cases and outbreaks. Several dengue endemic economies (e.g., Indonesia; the Philippines; Singapore; Thailand) [48] [49] [50] [51] and non-endemic economies (e.g., Australia; China; Chinese Taipei)[52] [53] [54] have established domestic entomological surveillance programs to track and test Aedes mosquitos for dengue viruses (DENV) to monitor for serotype shifts. Vector control efforts are widespread, with member economies implementing traditional methods including source reduction, larvicide and adulticide application. Dengue-endemic economies have implemented innovative vector control strategies, most notably the World Mosquito Program's Wolbachia release in Australia; Indonesia; Malaysia; and Mexico's Wolbachia sterile male release program.[55] [56] [57] [58] [59] Similarly, Singapore has deployed its own Project Wolbachia to suppress and reduce the overall Aedes vector population.[60]

Vaccination efforts

The long-awaited arrival of dengue vaccines has fundamentally transformed the public health approach from one that relies solely on environmental and vector control to one that will be integrated with vaccines and therapeutics to clinically reduce the risk of severe infection. Within the APEC region, at least 12 of 21 APEC economies (Australia; Chile; Indonesia; Japan; Malaysia; Mexico; Peru; the Philippines; Singapore; Thailand; the United States; Viet Nam) have now approved at least one dengue vaccine. However, these economies have seen limited vaccine rollout in public immunization programs, with most economies relying on private market access or currently evaluating the vaccines for inclusion in targeted or domestic immunization plans. Deployment of dengue vaccines, particularly for populations identified to be at higher risk of infection, is an important tool in a holistic, integrated, and effective dengue prevention and control response. Continued research and development to introduce new or enhanced vaccines with improved effectiveness and coverage of serotypes will further accelerate progress in preventing dengue incidence, morbidity, and mortality.

03

Roadmap Overview

Vision of Roadmap

To achieve by 2030 an APEC region where dengue is no longer a major public health threat, driven by **collaborative policies, sustained investment,** and **innovation** in **regionally coordinated** prevention, surveillance, control and treatment measures, **tailored to local contexts**, thereby underpinning sustainable growth and well-being for all.

Objectives

To achieve this vision, the *APEC Roadmap* outlines four primary objectives to accelerate domestic and global progress towards dengue prevention and control:

01

To guide APEC economies in developing and implementing robust and multi-sectoral policies and legislation for sustainable funding and implementation of dengue prevention and control measures, tailored to their unique local contexts and epidemiological profiles, thereby accelerating progress towards the global goal of zero preventable dengue deaths by 2030.

02

To facilitate APEC economies' efforts in driving research, development, use and innovation for new tools and interventions, while strengthening and harmonizing regionally coordinated surveillance systems and best practices for effective, integrated multi-prong dengue control measures.

03

To promote and solidify APEC and broader multi-sectoral and private-public partnerships among government, industry, academia, and civil society, ensuring knowledge sharing and collaboration for the effective rollout and long-term sustainability of dengue prevention and control programs across the region, including targeted support for vulnerable populations.

04

To strengthen regional dengue cooperation through the APEC Health Working Group platform, by promoting coordinated surveillance, best practices, and joint learning for enhanced regional preparedness and collective response capabilities against dengue.

Relevance of Roadmap to APEC economies

The ***APEC Roadmap*** is relevant to all APEC economies, irrespective of their current dengue endemicity, due to the interconnected nature of global health, climate change, trade, and economic stability.

Recognizing that there is no single "silver bullet" solution to dengue, the *APEC Roadmap* serves as a flexible guide, offering a spectrum of policy and programmatic recommendations rather than a prescriptive mandate. No single economy is expected to implement all recommended actions in isolation. Instead, each APEC economy can strategically select and tailor these resources based on its unique dengue situation, including its specific epidemiological profile, environmental conditions, and socioeconomic realities within its outbreak cycle stage. This allows for a pragmatic and adaptable approach to planning dengue prevention and control strategies amidst competing funding commitments and practical constraints. It is through the implementation of these actions in a concerted and integrated manner that economies can most effectively tackle the complex challenges posed by dengue.

- **For economies where dengue is endemic**, the *APEC Roadmap* serves as a framework to strengthen existing dengue prevention, control, and treatment measures, foster collaborative research, development, and implementation, and mobilize sustained investment to alleviate the significant public health burden and substantial economic costs, including healthcare expenditure and productivity losses, directly associated with recurrent dengue outbreaks.
- **For economies where dengue is non-endemic**, the *APEC Roadmap* offers recommendations for preparedness and early warning mechanisms against the increasing threat of imported cases and the potential establishment of local transmission, driven by factors such as increased global travel, and rapid urbanization. Their engagement in this collaborative initiative is essential for regional health security, safeguarding their own populations and economies from future outbreaks, preserving trade and tourism flows, and contributing to the collective knowledge and resource pool needed to achieve a truly dengue-resilient APEC.

Key Principles for a Comprehensive Dengue Response

Economies require a sustainable and comprehensive approach to proactively combat dengue threats during inter-epidemic windows and outbreaks. While there are diverse efforts locally and regionally to address the threat of dengue, the *APEC Roadmap* articulates ten guiding principles that member economies should embed in their planning and response for dengue preventive and control actions.

01	***Policy and legislation are vital to support dengue interventions***, establishing the necessary regulatory frameworks and mechanisms to drive a cohesive, enforceable, and sustainable domestic strategy for dengue action.
02	***Dengue requires a multisectoral response at the local/city level***, which fosters collaboration among government agencies, industry, academia, community organization and various stakeholders to promote collective action for an effective dengue response.
03	***Sustainable and direct funding is necessary to support long-term dengue action,*** allowing essential public health programs to operate without interruption, and invest in the development of novel dengue tools and innovations.
04	***Regional and international coordination facilitates capacity building and knowledge exchange.*** APEC collaborations are vital for harmonizing policies, sharing best practices for dengue prevention and control, and promoting cross-economy initiatives to combat dengue at both local and regional levels.
05	***Research, development, and innovation (RDI) are essential to enhance or develop new tools*** for vector control, vaccinations, surveillance, diagnostics, and antiviral treatments to combat the dengue epidemic as well as operational and implementation research for the successful uptake of these interventions.
06	***Effective dengue control demands consistent and integrated multi-prong interventions focused on preventive action***, holistically deploying measures across the entire prevention and control continuum to systematically address all facets of the dengue transmission throughout the outbreak cycle.

07	***Surveillance is the cornerstone for early detection of dengue***, providing crucial data for timely interventions, monitoring efficacy of those interventions and preparing health systems for outbreaks. Strengthening and harmonizing surveillance systems across economies is critical for effective prevention and control, enabling a comprehensive, real-time overview of dengue activity and efficient resource allocation.
08	***Dengue responses must be context-specific*** due to the highly localized nature of outbreaks, varying epidemiological profiles and socioeconomic conditions. Each economy requires a unique repertoire of tailored measures to address their local dengue situation.
09	***Local authorities need to be aware and empowered*** to carry out dengue control measures. They require policy support, resources, and capacity building to coordinate and implement dengue measures.
10	***Interventions should target vulnerable populations*** who face a heightened risk of dengue due to socioeconomic and environmental factors. Local authorities must tailor strategies to address their distinct needs to ensure equitable health outcomes.

Milestones

In alignment with WHO's *Neglected Tropical Disease Roadmap 2021 – 2030* goals,[61] the *APEC Roadmap 2026 – 2030* sets out to accelerate APEC progress to the following targets for dengue prevention and control:

The reduction of preventable dengue deaths to 0% by 2030.

This target reflects a shared global aspiration to eliminate preventable deaths from dengue and should serve as a unifying goal for economies and partners. While achieving zero mortality may be more challenging in dengue-endemic settings with recurring outbreaks and constrained health system capacity economies are encouraged to ***strive toward progressive reductions*** *in dengue fatality, in line with their epidemiological context and health system capabilities. For example, economies are encouraged to set interim domestic targets—such as maintaining a case fatality rate below 0.5%—as appropriate and relevant.*

A **25% reduction in dengue incidence and disease burden by 2030.**

At least **75% of APEC economies** are able to detect and respond to dengue outbreaks to prevent further spread.

APEC economies should establish its baseline and monitor their progress towards these targets to advance dengue reduction domestically and as a region. Under APEC and other international guidance, Economies can create a dashboard of regional and domestic indicators that track progress towards building effective prevention and response capabilities, reducing the burden of dengue, and improving health outcomes. Most member economies have surveillance and monitoring systems in place to acquire baseline data, although data collection practices may need to be strengthened for some Economies. APEC can play a crucial role to harmonize these practices and agree on common indicators for member economies to strive towards collectively.

To operationalize these milestones, the *APEC Roadmap* proposes the following actions to be carried out in three phases:

Phase 1: 2025 – 2026

1. APEC economies should assess and determine their 2025 baseline for dengue epidemiological burden, and capacity to respond to dengue outbreaks.
2. APEC can convene expert workshops for economies to share their best practices and provide in-economy consultation and training to help implement laboratory-based surveillance and implement new and existing control interventions for dengue control. These sessions can also serve the foundation to co-develop standardized indicators for member economies to monitor their yearly progress towards the 2030 targets and implementation of control activities
3. Economies should also aim to strengthen their framework for dengue action, by introducing a domestic dengue strategy, or mainstreaming dengue into their public health systems.

Phase 2: 2027 – 2028

1. Economies can focus on harmonizing their surveillance systems to enable data sharing across APEC, and standardizing use of laboratory diagnostic tests and reagents across economies.
2. APEC-led capacity-building workshops can be organized to foster routine exchange of insights between economies.
3. The APEC Secretariat or other designated entities can disseminate surveys to member economies, gathering data to assess the current status of their dengue situation and implementation of prevention and control measures. The information gathered can be drafted as a Progress Report to inform APEC's progress towards meeting the *APEC Roadmap's* goals.
4. APEC can facilitate discussions to promote public-private partnerships for dengue control activities and explore mechanisms for joint outbreak response to dengue threats.

Phase 3: 2029 - 2030

1. Economies should continue to strengthen their domestic preventive and control activities as they approach 2030.
2. In 2030, economies can conduct a formal assessment of their progress towards dengue prevention and control targets, with insights consolidated and presented at APEC-level fora.

04

Articulating the Roadmap

Navigating the Roadmap: Thematic Areas, Strategic Priorities and Key Actions

To systematically guide APEC economies towards a dengue-resilient future, the **APEC Roadmap** is structured across three interconnected focus areas. This framework is deeply aligned with the ten guiding principles detailed in Section 3, ensuring a comprehensive and coherent approach:

A **Foundational Pillars**

This thematic area establishes the essential enabling environment for effective dengue control, encompassing policy frameworks, multi-sectoral collaboration, sustainable financing, regional coordination, and robust research, development, and innovation

B **Strategic Interventions**

This thematic area outlines the critical, integrated, and multi-pronged actions focused on surveillance, prevention, control and treatment measures, designed to systematically address dengue transmission.

C **Contextualized Implementation**

This thematic area emphasizes the necessity for tailored, local responses, particularly empowering regional, district and community-level stakeholders and ensuring interventions are equitably designed for vulnerable populations.

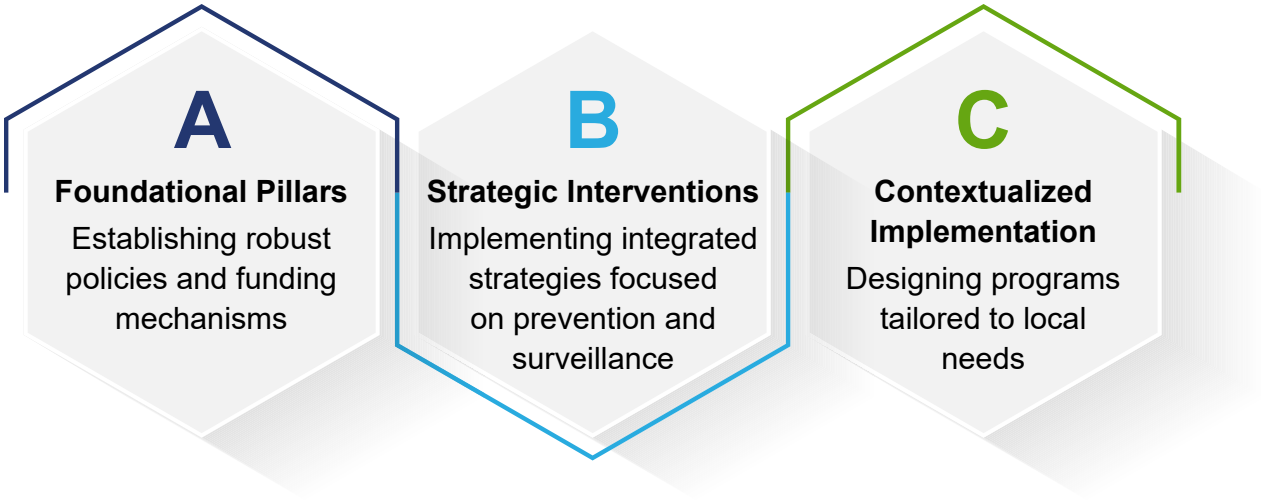

Figure 2: Overview of Focus Areas for Dengue Prevention and Control

Within each of these focus areas, the *APEC Roadmap* further elaborates on specific strategic **Priorities**, each supported by a set of concrete **Key Actions** to drive progress across the region.

Focus Area A: Foundation Pillars

Foundational pillars outline the essential enablers and broader policy and socio-economic environment necessary for member economies to build their dengue action plans and implement prevention and control activities. Policy and legislation creates regulatory frameworks for a cohesive and sustainable domestic strategy, with a multisectoral response equally important to harness the collective capabilities across all stakeholders to systematically tackle dengue outbreaks. Sustainable and direct funding of dengue efforts ensure continuity of public health programs, in contrast to the often inconsistent and reactive funding for emerging dengue outbreaks. At the APEC level, harmonizing policies and capacity building can help strengthen all member economies' dengue management capacity collectively. Finally, continuous research, development, and innovation (RDI) is essential to drive the development of dengue prevention and control tools.

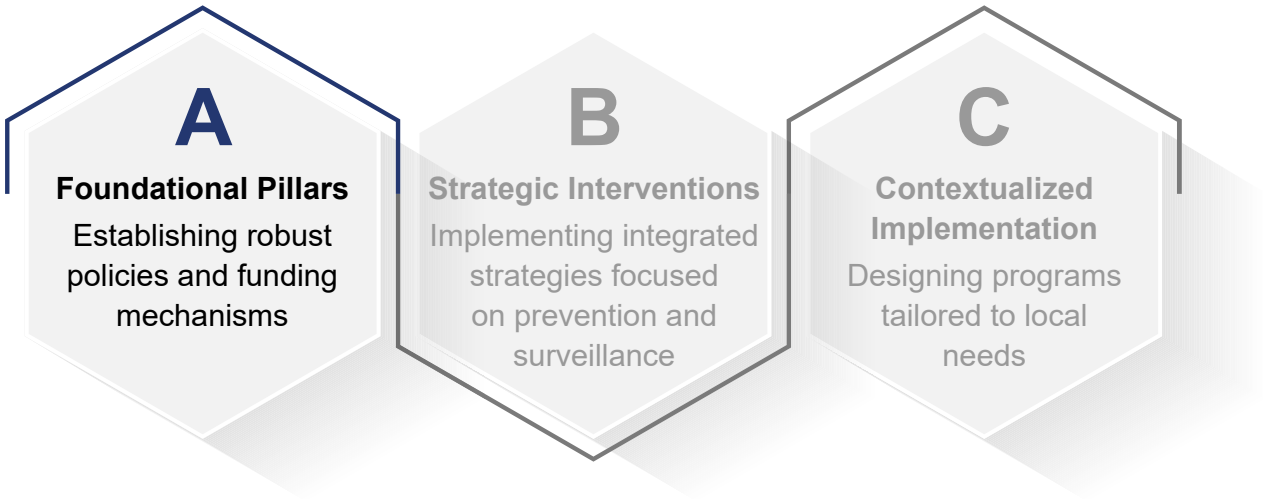

Figure 3: Foundation Pillars (A) establishes the enabling environment for dengue interventions

Priorities

- **A1: Robust Policy & Legislation**
- **A2: Multisectoral Collaboration**
- **A3: Sustainable Funding Mechanisms**
- **A4: Regional & International Cooperation**
- **A5: Research, Development and Innovation**

A1. Robust Policy & Legislation

Policy and legislation are vital to support dengue interventions. Policies and legislation provide the essential regulatory frameworks and mechanisms to facilitate the implementation of comprehensive dengue measures across various sectors and agencies. For instance, Singapore's highly integrated approach to prevent and control dengue is a testament to robust legislation, underpinned by three key legislations: the Infectious Disease Act (IDA) for epidemiological investigation and management, the Control of Vectors and Pesticides Act (CVPA) for vector control; and the Environmental Public Health Act (EPHA) for environmental sanitation and related issues.[62] Ultimately, strong policy and legislation weaves diverse efforts into a cohesive, enforceable, and sustainable domestic strategy for combating dengue.

Overview of Key Actions

1.1. Establish policies & legislations to build and strengthen dengue action at the domestic level

1.1.1. Strengthen legislation and policy development for dengue prevention & control

1.1.2. Prioritize dengue action by embedding it into broader public health frameworks and core functions

1.2. Introduce oversight mechanisms for policy enforcement

1.2.1. Establish multistakeholder reporting and reviews to oversee implementation of dengue policies and regulations

ACTION 1.1

Establish policies & legislation to build and strengthen dengue action at the domestic level

Sub-Actions

1.1.1. Strengthen legislation and policy development for dengue prevention & control

a. Develop legal frameworks and policies for dengue prevention and control that promotes evidence-based programming through a comprehensive dengue strategy, develops mechanisms and guidelines for intra-ministerial cooperation across relevant ministries and agencies, and allocates budget and other resources as needed, for dengue prevention and control.

b. Establish policies and protocols specifying the responsibilities and technical coordination required for each level of government to conduct dengue prevention and control in their jurisdiction.

c. Conduct reviews and periodic updates of dengue policies and plans to reflect changes in epidemiology, socioeconomic conditions, and technological advances in dengue measures (e.g., vaccines, vector control, diagnostics, surveillance).

d. Where not already in place, introduce or enhance legislation to elevate dengue as a notifiable disease, requiring clinics, diagnostic laboratories, and healthcare facilities to notify public health authorities of suspected, probable, and laboratory confirmed cases.

1.1.2. Prioritize dengue action by embedding it into broader public health frameworks and core functions

a. Promote mainstreaming for dengue and other arboviruses into ongoing public health, urban planning, and environmental programs to allow joint delivery of interventions common to several diseases, thereby enabling sustained, long-term prevention during non-emergency periods and facilitating rapid, coordinated multi-sectoral mobilization in emergency situations.

b. Build dengue policies upon existing regulations and mechanisms for infectious diseases, vector control, and One Health frameworks, incorporating further specific dengue provisions to reinforce action as necessary, ensuring robust legal and procedural continuity for routine activities and allowing for swift activation of established powers and inter-sectoral agreements during outbreaks.

c. Develop sustained approaches in dengue-endemic economies by including dengue as a priority hazard in domestic risk assessments, and multi-hazard preparedness plans in line with WHO International Health Regulations (IHR) 2005, which serves to guide continuous system strengthening and resource allocation for non-emergency periods, and provides a clear blueprint for immediate, coordinated response activation in an emergency.

d. Integrate dengue outbreak-related risks into domestic health emergency planning which includes considerations for: urban planning to address rapid urbanization may create new mosquito breeding sites; increased weather volatility influencing dengue outbreak patterns and hotspots; and populations-at-risk of dengue, allowing for targeted, proactive preventive measures and community resilience building during routine periods, and enabling highly specific, localized interventions for identified vulnerabilities during an emergency..

ACTION 1.2

Introduce oversight mechanisms for policy enforcement

Sub-Action

1.2.1. Establish multistakeholder reporting and reviews to oversee implementation of dengue policies and regulations

a. Establish a multi-sectoral and inter-ministerial system to conduct periodic reviews on progress of dengue policy implementation and draft annual progress reports

b. Appoint an independent multi-stakeholder steering committee, legislative or regulatory body to review progress reports on the implementation of dengue policy and regulations.

c. Develop integrated data-driven reporting to track dengue policy implementation and responsiveness.

A2. Multisectoral Collaboration

Dengue requires a multisectoral response. Collaboration should focus on local programs across government agencies, business, community and non-government organizations, and other stakeholders are crucial to carry out inter-disciplinary public health measures including vector control, surveillance, and public education campaigns. In Thailand, the Bangkok Metropolitan Administration (BMA) has partnered industry partners to run the *Dengue-Zero School Project*, teaching students to carry out source reduction and vector control measures at home and in their respective communities.[63] Upon detection of local transmission, Chinese Taipei deploys dengue response teams to provide technical support and coordinate implementation of dengue prevention and control measures with local authorities and community stakeholders.[64] [65] APEC economies including China; Indonesia; Malaysia; the Philippines; and Singapore are collaborating with IAEA to research and pilot sterile insect technique (SIT), sterilizing *Aedes* male mosquitos and prevent them from reproducing viable offsprings.[66] [67] These multisectoral efforts help to promote synergies across each stakeholders to contribute to dengue reduction efforts.

Overview of Key Actions

2.1. Enhance inter-ministerial mechanisms to address dengue across its outbreak cycles

2.1.1. Strengthen domestic-level coordination mechanisms with clearly defined roles, responsibilities, and standard operating protocols (SOP) for dengue prevention and control

2.2. Promote multisectoral partnerships to advance sustainable dengue prevention and control efforts

2.2.1. Build multisectoral partnerships between academia, civil society organizations, private sector companies and government agencies to combat dengue

2.3. Foster comprehensive capacity building for effective dengue prevention and control

2.3.1. Enhance multi-disciplinary training programs for all key stakeholders in dengue prevention and control

2.4. Strengthen coordination of operational support, logistics, and supply chain management to support dengue action

2.4.1. Operationalize multi-sectoral coordination in distribution networks

2.4.2. Develop streamlined procurement processes to expedite procurement of dengue supplies from industry

2.4.3. Establish strategic stockpiling of critical supplies for healthcare providers situated in high-risk areas

2.4.4. Integrate digital tools to optimize supply chain management

ACTION 2.1

Enhance inter-ministerial mechanisms to address dengue across its outbreak cycle

Sub-Actions

2.1.1. Strengthen domestic-level coordination mechanisms with clearly defined roles, responsibilities, and standard operating protocols (SOP) for dengue prevention and control.

a. Ensure representation from health, environment, education, and urban planning ministries in domestic intersectoral dengue coordination platforms, designating the Ministry of Health—or its equivalent in each economy—as the lead coordinating authority.

b. Advance SOPs for activation, coordination, and decision-making across relevant government agencies that account for all stages of the dengue outbreak cycle.

c. Improve coordination readiness and accountability through regular simulation exercises and after-action reviews.

ACTION 2.2

Promote multisectoral partnerships to advance sustainable dengue prevention and control efforts

Sub-Actions

2.2.1. Build multisectoral partnerships between academia, civil society organizations, private sector companies and government agencies to combat dengue

a. Promote frameworks that clarify roles, foster collaboration, and establish coordination mechanisms for multi-institutional cooperation in dengue prevention and control.

b. Engage academic institutions for research, training, and technical expertise in vector control, diagnostics, and outbreak analytics.

c. Partner with civil society organizations to mobilize community action through public awareness campaigns and capacity building programs for dengue prevention and control measures including vector management and local community surveillance.

d. Collaborate with the education sector and schools to incorporate dengue prevention and control measures into the school curricula.

e. Build partnerships with life sciences' industry, academic and research institutions to transcend traditional operational boundaries and accelerate the development of new technologies and methodologies for dengue prevention and control (e.g., Wolbachia-infected mosquitoes, vaccines).

ACTION 2.3

Foster comprehensive capacity building for effective dengue prevention and control

Sub-Actions

2.3.1. Enhance multi-disciplinary training programs for all key stakeholders in dengue prevention and control

a. Provide comprehensive and specialized training for healthcare professionals on diagnosis, case definitions and classifications, and patient management protocols.

b. Develop training modules for entomologists, public health workers, community volunteers and other relevant stakeholders for implementing integrated vector management and conducting case reporting.

c. Organize and conduct joint training sessions to build capacity for multisectoral planning and implementation of dengue prevention and control activities.

ACTION 2.4

Strengthen coordination of operational support, logistics, and supply chain management to support dengue action

Sub-Actions

2.4.1. Operationalize multi-sectoral coordination in distribution networks

a. Coordinate across government, civil society organizations and development partners to ensure timely delivery of medical supplies, diagnostic kits, and vector control tools to affect areas.

b. Arrange reliable transportation for rapid deployment of supplies in geographically isolated and remote areas during dengue outbreaks.

2.4.2. Develop streamlined procurement processes to expedite procurement of dengue supplies from industry

a. Tailor regulatory frameworks to allow for emergency procurement of high-priority items including insecticides, larvicides, bed nets, vaccines, and medical supplies.

b. Facilitate advance purchase agreements with suppliers and manufacturers to ensure steady supply of diagnostic test kits, vaccines, antivirals, and other countermeasures, as necessary, during dengue outbreaks.

2.4.3. Establish strategic stockpiling of critical supplies for healthcare providers situated in high-risk areas

a. Establish guidelines for hospitals and primary care providers to stockpile critical supplies for fast-response capability in dengue outbreaks.

2.4.4. Integrate digital tools to optimize supply chain management

a. Deploy digital monitoring platforms to conduct real-time tracking and predict demand of medical supplies and vector control products, based on outbreak trends.

A3. Sustainable Funding Mechanisms

Dengue efforts require sustainable and direct funding. Beyond emergency funding for dengue outbreak response, dedicated and sustained funding is required to support continuous surveillance, vaccinations, vector control measures, and other preventive and control efforts. While multilateral and philanthropic funding can help supplement dengue financing in lower resource settings, the primary source of funding should come from domestic economy budget allocations. Economic research supporting the investment case for dengue action is imperative, notably those that highlight the impact of the dengue burden on population health, workforce productivity, and community burden.

Overview of Key Actions

3.1. Ensure dedicated domestic financing for dengue activities

3.1.1. Secure long-term financing and resources to support domestic, regional and local dengue preparedness, implementation, and coordination.

3.1.2. Allocate funding for dengue research, development and innovation (RDI).

3.2. Explore and engage external sources of funding to supplement dengue action

3.2.1. Mobilize diverse funding sources including direct financial support and in-kind contributions from public, private, domestic, and international actors.

ACTION 3.1

Ensure dedicated domestic financing for dengue activities

Sub-Actions

3.1.1. Secure long-term financing and resources to support domestic, regional and local dengue preparedness, implementation, and coordination.

a. Ensure that the domestic budget allocates dedicated funding for prevention and control activities for dengue and other Aedes-borne diseases at the economy-wide, regional, and local government levels (e.g. districts, communities)

b. Develop the investment case for dengue action, leveraging local evidence on its societal and economic impact (at both economy and household levels), and evaluating the effectiveness and contextual appropriateness of interventions to ensure resource allocation prioritizes impactful, evidence-based measures rather than solely cost-effectiveness or visibility.

c. Coordinate funding from government departments for dengue prevention and control activities based on their roles and responsibilities.

3.1.2. Allocate funding for dengue research, development and innovation (RDI).

a. Promote resource mobilization beyond existing dengue initiatives to fund development and scaling of emerging dengue technologies such as *Wolbachia* mosquito programs, vaccinations, and novel rapid diagnostic tools.

ACTION 3.2

Explore and engage external sources of funding to supplement dengue action

Sub-Actions

3.2.1. Mobilize diverse funding sources including direct financial support and in-kind contributions from public, private, domestic, and international actors.

a. Explore diverse financing models, to enhance traditional financing sources or develop innovative mechanisms (e.g., international financing mechanisms, public-private partnerships, ear-marked taxes, outcomes-based financing) to fund dengue activities and infrastructure, by aligning financial to specific needs.

b. Develop frameworks that outline research priorities and incentives for developing and implementing dengue innovations to attract industry and philanthropic investment.

A4. Regional & International Cooperation

Regional and international coordination facilitates capacity building and knowledge exchange. Collaborations across economies are crucial for harmonizing dengue prevention and control policies and programs, facilitating the sharing of best practices, and promoting cross-economy dengue initiatives. For example, the UNited In Tackling Epidemic Dengue (UNITEDengue) network, founded by public health agencies from the dengue-endemic Southeast Asian economies including Indonesia; Malaysia; and Singapore, actively promotes cross border case and virological dengue surveillance, alongside regional capacity-building efforts for dengue control.[68] Promoting these collective approaches are effective in promoting efficiencies to combat dengue locally and regionally.

Overview of Key Actions

4.1. Advance regional collaborations, knowledge-sharing, and capacity building for dengue action

- 4.1.1. Strengthen cooperation mechanisms that facilitate knowledge sharing, resource coordination, and joint response capabilities across APEC economies
- 4.1.2. Strengthen regional and global partnerships for dengue prevention and control
- 4.1.3. Promote regional or international meetings for routine learning exchanges for practitioners

4.2. Promote regional cooperation for joint dengue control initiatives

- 4.2.1. Facilitate regional collaboration and transparency by enabling secure, real-time sharing of surveillance data
- 4.2.2. Tighten border health security and dengue preparedness at points-of-entry (PoE)

ACTION 4.1

Advance regional collaborations, knowledge-sharing, and capacity building for dengue action

Sub-Actions

4.1.1. Strengthen cooperation mechanisms that facilitate knowledge sharing, resource coordination, and joint response capabilities across APEC economies

a. Facilitate rapid communication, peer-to-peer learning, and the exchange of protocols and best practices through the regional network of focal points, designated via the National IHR Focal Point (NFP) mechanism.

b. Strengthen common outbreak alert thresholds and regional coordination protocols for travel, trade, and cross-border dengue risk mitigation.

c. Convene regular simulation exercises based on cyclic dengue outbreak cycles to assess joint response capabilities and identify operational gaps.

d. Draw on learnings from past dengue outbreaks to emphasize context-specific response planning, address prior challenges, and improve future joint responses.

4.1.2. Strengthen regional and global partnerships for dengue prevention and control

a. Leverage partnerships with global and regional organizations, such as but not limited to WHO, PAHO, Association of Southeast Asian Nations (ASEAN), World Bank, Asian Development Bank to align strategies, coordinate technical assistance, and mobilize financing for domestic dengue prevention and control efforts.

b. Foster engagement with subregional cooperation platforms, such as the *Andean Health Organization - Hipólito Unanue Agreement* (ORAS-CONHU) and the *Amazon Health Initiative*, to enhance operational coordination for transboundary dengue prevention and vector control activities.

c. Encourage public-private partnership product development consortia, and regional innovation hubs to accelerate research and development pipeline for dengue prevention, diagnostics, and treatment.

d. Encourage support for integrated initiatives that combine international expertise with local implementation.

4.1.3. Promote regional or international meetings for routine learning exchanges for practitioners

a. Elevate dengue action as a priority in the relevant APEC fora (i.e., Emergency Preparedness Working Group, Health Working Group), and embed it into broader APEC initiatives on health security and climate to enhance cross-economy knowledge exchange of insights.

b. Prioritize inclusion of frontline implementers and cross-sectoral stakeholders in such learning exchanges (urban planners, disaster risk management experts, surveillance experts, etc.) to bridge technical-policy gaps.

ACTION 4.2

Promote regional cooperation for joint dengue control initiatives

Sub-Actions

4.2.1. Facilitate regional collaboration and transparency by enabling secure, real-time sharing of surveillance data

a. Harmonize surveillance methods across APEC economies—ensuring alignment between syndromic, event-based, indicator-based, entomological, and laboratory surveillance systems—to support integrated, cross-comparable monitoring and response.

b. Promote standardized case definitions for dengue and reporting templates, common alert protocols for enhancing cross-border coordination.

c. Enhance real-time exchange of arbovirus surveillance data, entomological trends, and outbreak alerts.

d. Promote the utilization of established global and regional platforms, such as the WHO Global Dengue Dashboard, for visualizing trends, supporting shared risk assessment with other economies, and integrating data on other arboviruses.

4.2.2. Tighten border health security and dengue preparedness at points-of-entry (PoE)

a. Provide adequate information for visiting or returning travelers from endemic areas on prevention and protection measures symptom recognition, access to health care services, and the importance of travel vaccinations where applicable.

b. Review PoE protocols to ensure adequate safety protocols in line with actual risk, while also avoiding overly complex or burdensome measures.

c. Consider promoting linkages between surveillance at points of entry (PoE) and the domestic public health surveillance system for travelers and vectors, in geographical areas of high-risk.

d. Explore integrating PoE authorities into domestic dengue surveillance and response systems by clarifying institutional roles and enabling coordinated action, thereby enabling swift, coordinated action against potential outbreaks.

A5. Research, Development & Innovation

Research, Development, and Innovation (RDI) drives the development and enhancement of dengue interventions including improved vector control methods (e.g., *Wolbachia*, sterile insect technique), vaccines, rapid and laboratory diagnostic tests, and therapeutics. For example, there is a lack of antiviral treatments for dengue, increasing the risk of severe dengue cases with healthcare providers are only able to provide symptomatic relief. Thus, adequate investment by governments, industry, academia, and multilateral institutions are key to fostering RDI.

Overview of Key Actions

5.1. Develop the domestic research agenda to promote the development of innovative technologies across dengue and arboviruses

5.1.1. Align research and development efforts for dengue with broader arbovirus research agendas.

5.2. Advance research and development of dengue preventive and control technologies

5.2.1. Encourage research and development of innovative technologies for vector control

5.2.2. Conduct pilots to expand vaccination to vulnerable, school-aged, or general populations.

5.2.3. Research and develop potential diagnostic technologies to improve case detection and management

5.2.4. Develop technologies that enhance genomic surveillance and epidemiological investigations

5.2.5. Conduct implementation research for better integration of effective dengue interventions in community settings

5.3. Drive the validation, adoption and optimized implementation of dengue innovations

5.3.1. Conduct implementation research for better integration of effective dengue interventions in community settings

5.3.2. Develop strategies and provide support for the scalable adoption and sustained use of validated interventions in diverse local contexts.

5.3.3. Incorporate economic evaluations, including cost-effectiveness analysis (CEA) and budget impact analysis (BIA), to inform policy decisions on new dengue interventions

ACTION 5.1

Develop domestic research agenda to promote the development of innovative technologies across dengue and arboviruses

Sub-Actions

5.1.1. Align research and development efforts for dengue with broader arbovirus research agendas.

a. Promote research on diagnostics, vaccines, and vector control technologies that can be applied to multiple arboviruses (i.e., dengue, Zika, chikungunya, yellow fever) to achieve broader public health benefits.

b. Explore and integrate innovative surveillance methods, such as environmental surveillance (e.g., wastewater monitoring for viral presence in communities or mosquito excreta analysis for early detection) and the use of digital platforms (e.g., mobile applications for citizen reporting, social media monitoring for early signals, or advanced data analytics for predictive modeling), for enhanced arbovirus detection and control.

c. Share research findings and best practices across different arbovirus control programs to foster cross learning and translation into practice, targeting both technical experts and policymakers to ensure insights lead to actionable policy.

d. Develop joint research initiatives that examine and identify strategies to integrate arboviruses-related interventions for overall community outbreak prevention.

ACTION 5.2

Advance research and development of dengue preventive and control technologies

Sub-Actions

5.2.1. Encourage research and development of innovative technologies for vector control

a. Facilitate evidence-based pilot studies of new technologies for vector control including *Wolbachia*-infected mosquito release programs, sterile insect techniques (SIT), and digital monitoring platforms with real-time data dashboards.

b. Further develop the base of evidence to substantiate the effectiveness of current and novel vector control strategies.

c. Support comprehensive evaluation frameworks for these technologies, assessing their efficacy, safety, cost-effectiveness, societal and environmental impact, and community acceptance in diverse operational settings.

d. Promote public-private partnerships and international collaborations to accelerate the research, development, and scaling-up of promising vector control innovations.

5.2.2. Conduct pilots to expand vaccination to vulnerable, school-aged, or general populations.

a. Promote clinical trials for vaccination in other populations-at-risk to extend immunization efforts, including pregnant women, individuals with specific comorbidities, and healthcare workers, while ensuring robust ethical oversight.

b. Investigate and address specific safety, efficacy, and ethical considerations for vaccinating diverse vulnerable groups, such as those with varying immune statuses or underlying health conditions.

c. Develop and pilot integrated delivery strategies for dengue vaccination within existing public health programs and community healthcare settings to ensure equitable access for identified vulnerable populations.

d. Conduct operational and behavioral research to understand and overcome barriers to vaccine uptake, including addressing vaccine hesitancy and improving community engagement among these groups.

5.2.3. Research and develop potential diagnostic technologies to improve case detection and management

a. Devise new diagnostic tools (e.g., biomarkers) that can detect early signs of severe dengue cases for treatment escalation, while simultaneously improving the accessibility of existing point-of-care diagnostics in communities and leveraging existing laboratory networks and inter-lab communication.

b. Improve quality assurance for point-of-care rapid diagnostic tests for dengue to enhance its reliability and improve clinicians' decision-making for timely and appropriate treatment.

c. Develop polymerase chain reaction (PCR) tests for early detection of dengue and prompt clinical management.

d. Consider incorporating early diagnostic testing services in different healthcare facilities.

5.2.4. Develop technologies that enhance genomic surveillance and epidemiological investigations

a. Develop portable sequencing devices and testing kits that allow for rapid analysis of dengue serotypes at the point-of-care.

b. Research into integrated bioinformatic platforms that can link genomic analysis of dengue viral serotypes with epidemiological characteristics to determine risk of dengue transmission.

5.2.5. Conduct implementation research for better integration of effective dengue interventions in community settings

a. Pilot community models for integrated delivery of novel dengue interventions, which can be coordinated and delivered through existing community infrastructures and conditions.

b. Conduct behavioral research studies in communities to understand their knowledge, attitude, perceptions and practices related to dengue transmission and preventive measures.

c. Develop and test social and behavioral change strategies that are culturally sensitive and context-specific to implement dengue prevention and control measures.

ACTION 5.3

Drive the validation, adoption and optimized implementation of dengue innovations

Sub-Actions

5.3.1. Conduct implementation research for better integration of effective dengue interventions in community settings

a. Define and standardize protocols for the clinical, operational, and public health validation of new dengue tools and interventions in diverse settings.

b. Streamline regulatory approval processes within APEC economies for timely market access and deployment of validated dengue technologies.

c. Develop clear guidelines and technical support packages to facilitate the integration of new tools and interventions into existing domestic dengue control programs and healthcare systems.

5.3.2. Develop strategies and provide support for the scalable adoption and sustained use of validated interventions in diverse local contexts.

a. Conduct comprehensive stakeholder engagement and communication campaigns to build trust, address concerns, and promote the acceptance and uptake of new interventions among communities and healthcare providers.

b. Address barriers to adoption, including affordability, accessibility, and logistical challenges, through targeted interventions and policy adjustments.

c. Mobilize sustainable financing mechanisms and foster public-private partnerships to ensure the long-term availability and affordability of validated dengue tools and interventions.

d. Establish robust monitoring and evaluation frameworks to track the effectiveness, impact, and sustained use of adopted interventions.

5.3.3. Incorporate economic evaluations, including cost-effectiveness analysis (CEA) and budget impact analysis (BIA), to inform policy decisions on new dengue interventions

a. Conduct CEA to assess the value-for-money of vaccines, vector control tools, diagnostics, and other technologies,

b. Perform BIA to estimate the short- and medium-term affordability of scaling up these interventions

c. Integrate economic evidence into decision-making frameworks to guide prioritization and sustainable financing

d. Strengthen domestic and regional capacity to generate, interpret, and apply economic evidence in dengue control policies.

Focus Area B: Strategic Interventions

Strategic interventions across the continuum of dengue prevention and control measures offer APEC economies several tools to combat dengue. However, they need to be implemented in a multi-pronged and integrated manner to systematically address different stages of the dengue outbreak cycle. Due to practical resource constraints and competing needs, many economies will have to structure and prioritize interventions. A critical component of these measures is robust surveillance, serving as the cornerstone for early detection of outbreaks, and providing critical time for health systems to prepare for and respond to impending outbreaks. However, current gaps in surveillance across dengue-endemic regions often lead to underreporting and inconsistent case reporting, obscuring the true burden of dengue in economies.

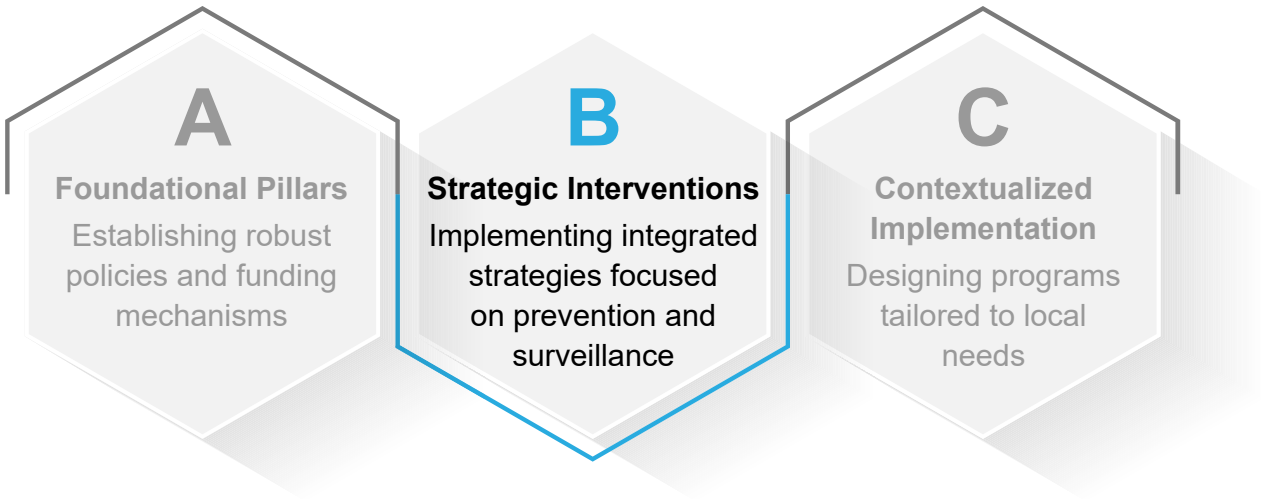

Figure 4: Strategic Interventions outlines integrated and multi-prong actions to systematically address dengue

Priorities

B6: Multi-prong & integrated interventions, focused on prevention

B7: Robust Surveillance

B6. Multi-prong & integrated interventions, focused on prevention

Effective dengue control demands consistent and integrated multi-prong interventions focused on preventive action. Due to the complexity of dengue, tackling dengue outbreaks requires the holistic deployment of measures across the prevention and control continuum, including risk communication, integrated vector management, vaccination, surveillance, early detection, and treatment, to systematically and synergistically address multiple facets of dengue transmission across the dengue outbreak cycle. Many economies adopt a reactive approach to dengue, implementing stringent vector control measures only when first cases have been reported and transmission is rising in affected communities. Proactive prevention measures such as maintaining robust sentinel surveillance, vaccination, and elimination of mosquito breeding sites can curb the impact of the next dengue epidemic. Effective preventive strategies require dedicated investment and cross-sectoral policy implementation to ensure their continuity across "boom and bust" dengue outbreak cycles.

Overview of Key Actions

6.1. Strengthen and embed integrated vector control (IVC) activities into public health programs.

- 6.1.1. Integrate vector control activities into environmental health and urban renewal programs
- 6.1.2. Harmonize dengue prevention efforts with concurrent public health and primary healthcare outreach programs
- 6.1.3. Explore and implement innovative biological vector control strategies, such as Wolbachia

6.2. Promote flexible and targeted dengue immunization strategies

- 6.2.1. Consider routine dengue immunization in areas with high transmission settings
- 6.2.2. Optimize delivery platforms and programs for dengue vaccination
- 6.2.3. Enhance vaccine rollouts with robust and locally tailored communication strategies
- 6.2.4. Establish post-vaccination monitoring and reporting mechanisms to evaluate real world safety and effectiveness

6.3. Improve early detection & clinical management of dengue cases

- 6.3.1. Strengthen healthcare professional training for early dengue recognition and management
- 6.3.2. Implement standardized triage and referral protocols for effective patient flow
- 6.3.3. Develop comprehensive and differentiated patient care protocols for levels of care

ACTION 6.1

Strengthen and embed integrated vector control (IVC) activities into public health programs.

Sub-Actions

6.1.1. Integrate vector control activities into environmental health and urban renewal programs

a. Promote source reduction, including proper solid waste management, water storage practices, eliminating stored water, as a core component of community-led environmental sanitation initiatives.

b. Strengthen inter-sectoral collaboration with urban planning departments and local authorities to integrate mosquito breeding site elimination activities into routine public works, drainage maintenance, and urban development projects.

c. Enhance community engagement and education by linking household-level vector control inspections with broader household sanitation and hygiene promotion campaigns, empowering communities to actively participate in prevention.

6.1.2. Harmonize dengue prevention efforts with concurrent public health and primary healthcare outreach programs

a. Integrate dengue prevention and risk assessment for populations at higher risk (e.g., older adults, immunocompromised individuals, pregnant women) into routine primary healthcare visits and other relevant public health outreach programs.

b. Facilitate the distribution of personal protective measures (e.g., mosquito repellents, insecticide-treated bed nets for infants) through primary healthcare and community clinics in high-risk areas, especially in high-risk areas, alongside clear guidance on their correct use.

6.1.3. Explore and implement innovative biological vector control strategies, such as Wolbachia

a. Facilitate evidence-based pilot studies and scaled implementation of *Wolbachia*-infected mosquito release programs in suitable high-risk or endemic areas, assessing their effectiveness in reducing dengue transmission.

b. Develop comprehensive strategies for community engagement and public acceptance prior to and during the deployment of *Wolbachia* and other novel biological control methods.

c. Establish robust monitoring and evaluation frameworks for Wolbachia programs, including measuring Wolbachia introgression rates, impact on wild mosquito populations, and effects on dengue incidence.

d. Support research into the long-term effectiveness, scalability, and cost-efficiency of *Wolbachia* technology, as well as its potential integration with other vector control interventions.

ACTION 6.2

Promote flexible and targeted dengue immunization strategies

Sub-Actions

6.2.1. Consider routine dengue immunization in areas with high transmission settings

a. Prioritize the identification and vaccination of populations facing a higher risk of dengue including older adults, patients with comorbidities, and women – particularly those experiencing higher rates of infection and/or hospitalization, based on documented economy-specific data.

b. Establish locally relevant epidemiological and seroprevalence thresholds, where possible, and an assessment of environmental or socioeconomic risk to guide routine vaccination programs in high-transmission areas.

c. Issue evidence-based travel advisories to individuals traveling to endemic regions, providing clear recommendations on dengue prevention methods, including vaccination where available, recognizing their role in the interconnected trade and tourism within APEC economies.

6.2.2. Optimize delivery platforms and programs for dengue vaccination

a. Explore the advantages of integrating dengue vaccination with existing immunization programs, such as co-administration with other routine vaccines (e.g., Hepatitis A, HPV) within school-based immunization programs targeting children and adolescents at risk, adhering to the latest technical guidance for efficient delivery.

b. Consider offering dengue vaccination at primary care and community clinics to sub-groups of the population facing higher risk of severe dengue, including older adults and patients living with chronic diseases.

c. Assess the feasibility and benefits of leveraging other existing public health campaigns or primary healthcare services to maximize the reach and efficiency of dengue vaccine delivery.

6.2.3. Enhance vaccine rollouts with robust and locally tailored communication strategies

a. Implement comprehensive and culturally sensitive communication strategies to build and strengthen vaccine confidence, actively addressing misinformation and fostering community trust.

6.2.4. Establish post-vaccination monitoring and reporting mechanisms to evaluate real world safety and effectiveness

a. Strengthen and standardize post-vaccination monitoring systems to rigorously evaluate vaccine effectiveness, coverage rates, and long-term safety in diverse real-world settings.

b. Establish transparent reporting mechanisms for vaccine performance and any adverse events, ensuring public confidence and continuous program improvement.

ACTION 6.3

Improve early detection & clinical management of dengue cases

Sub-Actions

6.3.1. Strengthen healthcare professional training for early dengue recognition and management

a. Integrate the early recognition and differential diagnosis of dengue and other arboviruses into both pre-professional and continuous medical education curricula for all relevant healthcare professionals.

b. Conduct regular, practical training programs for healthcare professionals across all levels of care—from primary health centers to clinics and hospitals—to enhance their ability to recognize, accurately report, and provide appropriate clinical interventions (e.g., fluid management, symptomatic relief) for suspected dengue cases.

c. Develop and disseminate user-friendly clinical guidelines and decision-making tools to aid healthcare workers in timely and accurate dengue diagnosis and management.

6.3.2. Implement standardized triage and referral protocols for effective patient flow

a. Establish clear, evidence-based clinical protocols for triaging dengue patients at primary and community care levels, ensuring proper differentiation between mild cases suitable for home management and those requiring urgent critical care or hospitalization.

b. Extend training and integrate private healthcare providers (including general practitioners and private hospitals) into domestic dengue triage, referral, and early warning systems to foster a cohesive and responsive whole-of-health system.

c. Develop and maintain communication channels between different levels of care to facilitate seamless patient transfers and information exchange.

6.3.3. Develop comprehensive and differentiated patient care protocols for levels of care

a. Regularly update and disseminate evidence-based clinical guidelines for dengue management across all levels of healthcare facilities, ensuring consistent and high-quality care delivery.

b. Develop and integrate specific clinical management protocols tailored to vulnerable populations at higher risk of complications, including pregnant women, elderly patients, the pediatric population, and individuals with comorbidities (e.g., immunocompromised patients).

c. Promote the use of appropriate diagnostic tests at various healthcare levels to support early and accurate case confirmation, complementing clinical assessment.

d. Encourage systematic data collection from clinical settings to inform epidemiological investigations and enhance real-time understanding of disease burden and characteristics.

B7. Robust Surveillance

Surveillance is the cornerstone for early detection of dengue. Robust surveillance systems provide essential data needed to assess dengue, enable timely and targeted preventive and control actions and preparing the health system for emerging outbreaks. Crucially, early detection buys public health officials and healthcare providers vital time to secure supplies and bolster their capacity for outbreak management. Gaps in surveillance across dengue-endemic economies, however, have resulted in underreporting of cases.[69] Moreover, case definition and reporting practices varies widely, with some economies reporting only hospitalized cases while others report probable cases from other economies, obscuring the true burden of dengue outbreaks.[70] Strengthening surveillance systems – epidemiological, entomological and viral – and harmonizing case definitions across APEC economies are critical to enhance early prevention and control responses during inter-outbreak windows and dengue outbreaks. At the local level, community-based networks for surveillance are vital for early detection of dengue cases and facilitate rapid vector control measures to curb the impact of potential outbreaks.[71] Connecting these active community surveillance networks to centralized systems is critical to establishing a comprehensive, real-time overview of dengue activity. This enables the identification of regional trends and allow allocation of resources to areas with higher burden.

Overview of Key Actions

7.1. Strengthen One Health coordination of passive and active surveillance across epidemiological, entomological, and laboratory systems

- 7.1.1. Integrate passive dengue reporting by healthcare providers into disease surveillance network
- 7.1.2. Advance active community-based and entomological surveillance in high risk and susceptible areas
- 7.1.3. Build comprehensive systems that integrates epidemiological, entomological, laboratory, and climate-linked data to improve year-round monitoring of cyclic dengue outbreaks

7.2. Strengthen active local laboratory-based surveillance and surveillance workforce capacity to anticipate and respond to outbreaks

- 7.2.1. Ensure equitable access to laboratory diagnostics by scaling domestic and regional lab networks, in alignment with WHO-approved tools and algorithms
- 7.2.2. Support capacity-building and system performance monitoring through harmonized indicators, training, and evaluation mechanisms

7.3. Enhance genomic surveillance to monitor evolution of dengue virus, serotype shifts and emerging variants

- 7.3.1. Conduct active viral surveillance to establish community prevalence of emerging dengue virus serotypes

ACTION 7.1

Strengthen One Health coordination of passive and active surveillance across epidemiological, entomological, and laboratory systems

Sub-Actions

7.1.1. Integrate passive dengue reporting by healthcare providers into disease surveillance network

a. Standardize dengue case definitions and notification systems across healthcare providers, ensuring consistent and reliable data collection.

b. Consider introducing or strengthening mandatory reporting of dengue cases by public and private healthcare providers to local and domestic public health authorities for robust epidemiological investigation and follow-up with control measures.

c. Leverage and enhance existing domestic notifiable disease reporting systems to include dengue cases, ensuring efficient data flow and integration.

d. Develop digital tools and platforms to simplify and streamline dengue case reporting for healthcare providers, reducing administrative burden and improving data timeliness.

7.1.2. Advance active community-based and entomological surveillance in high risk and susceptible areas

a. Establish and maintain sentinel surveillance sites to monitor *Aedes* mosquito density, larval indices, insecticide resistance, and to actively report dengue virus circulation in mosquitos to assess community risk.

b. Conduct targeted capacity-building activities through comprehensive training programs and workshops for community health workers and volunteers to enhance community-based vector surveillance and control.

c. Utilize entomological findings to guide spatially targeted vector control and community mobilization strategies, ensuring resources are deployed where they can have the most impact.

d. Explore innovative active surveillance methods, such as environmental sampling (e.g., ovitraps, adult mosquito traps) and digital citizen science initiatives, to complement traditional approaches

7.1.3. Build comprehensive systems that integrate epidemiological, entomological, laboratory, and climate-linked data to improve year-round monitoring of cyclic dengue outbreaks

a. Expand and integrate syndromic, event-based, and indicator-based surveillance to enable timely detection of febrile diseases including dengue and co-circulating arboviruses with similar symptoms at multiple levels.

b. Strengthen interoperable links between human health, vector data, and environmental risk factors to enable real-time risk mapping and response planning, utilizing common data platforms and analytics tools for multiple infectious diseases to identify co-circulation patterns and risk factors for dengue alongside other infectious diseases.

c. Embed dengue-specific triggers and thresholds into domestic alert systems and emergency response protocols to ensure rapid and coordinated public health action during outbreaks.

d. Integrate serotype and insecticide resistance monitoring into domestic surveillance dashboards for real-time visualization and actionable insights, informing clinical management and vector control strategies.

e. Promote cross-border data sharing and collaboration between neighboring APEC economies, particularly in high-risk or shared ecological zones, to facilitate regional understanding of dengue spread.

ACTION 7.2

Strengthen active local laboratory-based surveillance and surveillance workforce capacity to anticipate and respond to outbreaks

Sub-Actions

7.2.1. Ensure equitable access to laboratory diagnostics by scaling domestic and regional lab networks, in alignment with evidence-based tools and algorithms

a. Enhance strategic investments into local and sub-local laboratory networks to expand their capacity for dengue diagnostics, including RT-PCR, ELISA, and other serological testing, ensuring equitable access to timely and accurate results across the economy.

b. Strengthen regional laboratory referral and confirmatory testing pathways, establishing clear links to local reference laboratories and WHO collaborating centers to support specialized testing.

c. Promote regional laboratory-led quality assurance programs to ensure and optimize diagnostic tests utilized and performed in domestic laboratories.

d. Support training programs in diagnostic algorithms, quality control, biosafety, and the efficient integration of laboratory data into domestic surveillance systems for all relevant lab personnel.

e. Explore the adoption of portable and rapid diagnostic technologies suitable for remote or resource-limited settings, accelerating diagnosis at the point of care.

7.2.2. Support capacity-building and system performance monitoring through harmonized indicators, training, and evaluation mechanisms

a. Support workforce development through joint epidemiology and entomology training programs, structured knowledge exchanges, and essential digital literacy modules for all surveillance personnel.

b. Leverage digital innovations and data-sharing platforms for performance monitoring for structured knowledge exchanges, and essential digital literacy modules for all surveillance personnel.

c. Facilitate periodic external evaluations or peer reviews of domestic surveillance systems to identify strengths and weaknesses, promote accountability, and foster mutual learning among APEC economies.

d. Develop and implement standardized quality assurance programs for all surveillance activities, from data collection to analysis and reporting.

ACTION 7.3

Enhance genomic surveillance to monitor evolution of dengue virus, serotype shifts and emerging variants

Sub-Actions

7.3.1. Conduct active viral surveillance to establish community prevalence of emerging dengue virus serotypes

a. Establish domestic laboratory capacity for routine collection and full-length genomic sequencing of viral subsets during epidemiological investigations to actively track circulating dengue viruses and other related arboviruses in *Aedes* vectors, identify hot spots, and predict potential outbreaks.

b. Promote full-length genomic sequencing of dengue viruses for enhanced comparability of data across regions and economies, contributing to a broader understanding of viral evolution and spread.

c. Conduct periodic serosurveys in key populations to establish community prevalence of emerging dengue virus serotypes, assess population immunity levels, and identify susceptible cohorts.

d. Strengthen bioinformatic capacities for the analysis, interpretation, and visualization of genomic data, ensuring that molecular insights are translated into actionable public health information.

e. Foster regional and international collaboration for sharing genomic data and analysis, enabling a more comprehensive understanding of dengue virus movement and evolution across APEC.

Focus Area C: Contextualized Implementation

The varying epidemiological profile and socioeconomic conditions across APEC demand that economies need to tailor dengue response according to their local contexts, over a one-size-fits-all approach. Local authorities must be aware and empowered to lead these efforts; they require strong policy support, adequate resources, and targeted capacity building to effectively coordinate and implement dengue control measures within their communities. Furthermore, interventions must target vulnerable populations who are at higher risk or bear higher dengue burden than the general population. Local dengue action needs to be designed to address these distinct needs and reduce the dengue burden equitably across all populations.

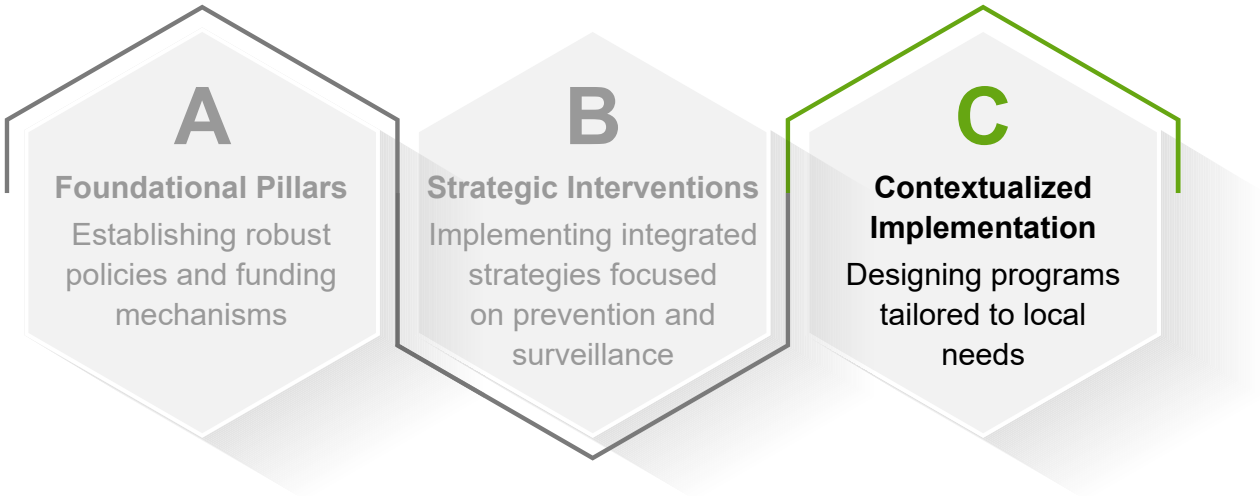

Figure 5: Contextualized Implementation adapts dengue interventions according to local community needs

Priorities

	C8: Context-specific Program Design
	C9: Empowerment of Local Authorities & Communities
	C10: Vulnerable Populations

C8. Context-specific Program Design

Dengue responses must be context-specific. Dengue outbreaks are highly localized phenomena. Dengue-endemic economies including Indonesia; Malaysia; and Singapore require robust integrated domestic-wide strategies encompassing vector control, surveillance, and public awareness campaigns.[72] [73] [74] In contrast, Australia, which experiences dengue outbreaks in specific areas, primarily in North and Central Queensland[75], requires a more geographically targeted dengue control strategy. Similarly, Chile is free of local dengue transmission but is at increasing risk with the *Aedes* mosquito spreading into the northern and central regions.[76] Peru presents a diverse range of settings with dengue outbreaks, ranging from rural Amazonian regions and densely populated metropolitan cities, where uniform dengue measures such as integrated vector management may be ineffective.[77] Depending on their epidemiological profile, geographical and sociocultural conditions, each economy requires a different repertoire of appropriate dengue preventive and control measures tailored to their dengue context.

Overview of Key Actions

8.1. Focus dengue prevention and control activities in rapidly urbanizing areas

8.1.1. Targeted dengue measures for rapidly urbanized dwellings and megacities

8.2. Adapt interventions to local epidemiological profiles and sociocultural contexts

8.2.1. Differentiate responses based on disease epidemiology and local burden

8.2.2. Adapt strategies to sociocultural norms and community behaviors

ACTION 8.1

Focus dengue prevention and control activities in rapidly urbanizing areas

Sub-Actions

8.1.1. Targeted dengue measures in highly urbanized areas of tropical and subtropical megacities

a. Identify and map high-risk urban zones, including informal settlements and construction clusters, based on entomological data, sanitation conditions, and housing density, to prioritize targeted vector control and health communication efforts.

b. Partner strategically with municipal authorities and urban stakeholders (e.g. city planners, developers) to embed dengue prevention into urban infrastructure policies, such as, construction and design standards, drainage planning, thereby reducing mosquito breeding in the built environment.

c. Issue practical guidelines and promote the adoption of housing and building modifications that reduce improperly stored water and improve drainage systems (e.g. roof and gutter design, water storage practices).

d. Promote participatory urban governance models that engage communities, local health departments, and urban planners in co-designing tailored dengue mitigation strategies responsive to geographical area-specific conditions and needs.

e. Address dengue risks in transient urban populations, such as construction workers or migrant communities, by integrating specific preventive measures and health information into occupational health and social support programs.

ACTION 8.2

Adapt interventions to local epidemiological profiles and sociocultural contexts

Sub-Actions

8.2.1. Differentiate responses based on disease epidemiology and local burden

a. Tailor dengue prevention and response strategies based on specific regional climate zones (e.g. tropical, subtropical, temperate), ecological profile, and local seasonal patterns that affect *Aedes* mosquito density and virus transmission.

b. Develop stratified intervention plans that differentiate approaches between areas with sustained local transmission, those at risk of imported cases, and those with sporadic or emerging local outbreaks.

c. Tailor intervention intensity and resource allocation based on the specific circulating dengue virus serotypes, local population immunity levels, and documented risk of severe disease outcomes.

d. Conduct rapidly needs assessments and epidemiological investigations at the onset of outbreaks to quickly understand the local context and inform immediate, targeted response strategies.

8.2.2. Adapt strategies to sociocultural norms and community behaviors

a. Conduct behavioral and social science research to understand local knowledge, attitudes, perceptions, and practices related to dengue transmission and preventive measures.

b. Co-design and test culturally sensitive and context-specific social and behavioral change communication (SBCC) strategies that effectively engage communities and encourage the adoption of dengue prevention and control measures.

c. Leverage existing community networks, local leaders, and traditional communication channels to disseminate information and mobilize participation in dengue control efforts.

C9. Empowerment of Local Authorities & Communities

Local authorities need to be aware and empowered. Local public health authorities and their communities are positioned at the frontlines of dengue preventive and control efforts. Building their capacity is paramount for effective localized responses. Local authorities need to be supported by policies granting them the mandate to coordinate and implement dengue measures. This includes capacity building for local health workers, environmental officers, and community leaders on surveillance, vector control measures, and public awareness.

Overview of Key Actions

9.1. Proactively involve local authorities and communities in planning and response to dengue threat at all levels

- 9.1.1. Engage local stakeholders in the dengue prevention and control planning activities
- 9.1.2. Empower local communities to carry out dengue prevention and control activities
- 9.1.3. Institutionalize operational assessments and mid-response reviews at the local level

9.2. Foster risk communication and cross-sharing of best practices with local communities

- 9.2.1. Encourage active community participation through persuasive and intercultural communication strategies
- 9.2.2. Facilitate knowledge exchange and best practice sharing among communities

9.3. Secure policy and financial empowerment for local dengue control

- 9.3.1. Strengthen policy frameworks to decentralize authority and resources
- 9.3.2. Enhance access to technology and expertise for local implementers

ACTION 9.1

Proactively involve local authorities and communities in planning and response to dengue threat at all levels

Sub-Actions

9.1.1. Engage local stakeholders in the dengue prevention and control planning activities

a. Facilitate the formulation of city- and community-wide dengue prevention and control plans by local public health authorities, developed in close collaboration with community stakeholders, to ensure integrated dengue management throughout the entire outbreak cycle.

b. Involve local community leaders, residents and urban planners in critical environmental management efforts such as water source and waste management initiatives, ensuring proper drainage, coverage of water storage containers, and safe sewage disposal.

c. Ensure that vector-control initiatives are tailored to specific local contexts, incorporating both proven traditional methods and innovative technologies to effectively reduce mosquito populations where they pose the greatest threat.

d. Develop robust local contingency plans for the rapid deployment of additional healthcare workers and trained community volunteers to conduct widespread vector control measures and support case management during dengue outbreaks.

9.1.2. Empower local communities to lead dengue prevention and control activities

a. Engage civil service organizations and local community leaders in dengue control activities, including structured simulation exercises for dengue outbreaks to build and test community response capacity at the city or community level.

b. Promote sustained capacity building for local representatives, household heads and community volunteers to conduct year-round community surveillance (e.g., active case finding, vector breeding site checks) and implement localized vector control activities, including source reduction (e.g., proper waste disposal, covering water storage containers) and adult mosquito reduction (e.g., targeted spraying and fogging where appropriate).

c. Support and incentivize community members and households in high-risk areas to implement and sustain interventions, fostering local ownership through appropriate mechanisms such as recognition, stipends, or integration into broader community development plans.

d. Develop and deploy accessible community-based risk stratification tools (e.g. color-coded alert flags, text-based systems) to effectively communicate outbreak risk levels and guide timely local action.

9.1.3. Institutionalize operational assessments and learning reviews at the local level

a. Pre-design and implement standardized assessment templates, involving subnational actors, local governments, and civil society partners to ensure that operational reviews and mid-response evaluations accurately reflect local realities and inform domestic adaptation strategies for continuous improvement.

b. Establish regular feedback mechanisms between communities, local authorities, and domestic health bodies to integrate lessons learned from localized responses into overarching dengue policies and guidelines.

ACTION 9.2

Foster risk communication and cross-sharing of best practices with local communities

Sub-Actions

9.2.1. Encourage active community participation through persuasive and intercultural communication strategies

a. Leverage on the knowledge of trusted community leaders and civil society organizations to co-develop and disseminate culturally appropriate, clear, and actionable messaging, and implement community-based advocacy programs that build trust, address misinformation, and ensure the long-term sustainability of dengue interventions.

b. Target key decision-makers, health professionals, and the general public through comprehensive, multi-channel communication campaigns to secure sustained political commitment, public support, and behavioral adoption for integrated dengue management initiatives.

c. Engage local governments, civil society organizations, and community leaders in co-design risk communication, strategies along with preparedness and response activities, ensuring these efforts are relevant, trusted, and reflect local realities and communication preferences.

9.2.2. Facilitate knowledge exchange and best practice sharing among communities

a. Systematically collect and document best practices and lessons learned from successful community-based dengue prevention activities to strengthen local action and promote cross-economy or cross-regional learning within APEC.

b. Ensure that collected community practices are stratified by key determinants such as vector presence, population density, access to services, and specific environmental risk factors, to provide granular and actionable insights for targeted replication.

c. Establish platforms and forums (e.g., workshops, digital repositories, peer-to-peer exchanges) for local authorities and community leaders to share experiences, challenges, and innovative solutions in dengue control.

ACTION 9.3

Secure policy and financial empowerment for local dengue control

9.3.1. Strengthen policy frameworks to decentralize authority and resources

a. Advocate for and establish clear domestic policies and legislative frameworks that explicitly grant local authorities the mandate, autonomy, and responsibilities to coordinate and implement dengue prevention and control measures.

b. Explore and implement mechanisms for direct financial allocation or decentralized budgeting that ensure adequate and predictable resources reach the local level for sustained dengue control activities.

c. Develop standardized guidelines and tools for local authorities to conduct their own needs assessments, resource mapping, and program planning for dengue control.

9.3.2. Enhance access to technology and expertise for local implementers

a. Facilitate the transfer and adoption of appropriate, user-friendly technologies for local vector surveillance, data collection, and communication, ensuring they are accessible and sustainable for community-level use.

b. Establish a network of technical experts and mentors at the local or sub-local level to provide ongoing support and guidance to local authorities and community programs on dengue control best practices.

C10. Targeted approach to At-risk populations

Target vulnerable populations for specific interventions. Sub-populations such as children, older adults, immunocompromised individuals, and communities in informal settlements face heightened dengue risk due to unique socioeconomic and environmental factors. Therefore, local authorities should ensure that dengue strategies and campaigns are designed to address their distinct needs and achieve equitable health outcomes. In the Philippines; Thailand; and Viet Nam, community health workers conduct house visits to residents living in low-income urban and peri-urban areas to educate residents on identifying and removing breeding sites.[78] [79] [80]

Overview of Key Actions

10.1. Identify populations-at-risk and empower them to advance dengue response efforts

10.1.1. Implement targeted preventive & control activities for communities with higher dengue risk.

10.1.2. Mitigate socioeconomic factors contributing to vulnerability

10.2. Drive inclusive dengue strategies that ensure participation from populations at-risk

10.2.1. Promote inclusive coordination with a focus on underserved populations

10.3. Integrate gender-sensitive considerations into dengue strategies

10.3.1. Recognize and address dengue's gendered impact by embedding gender-sensitive considerations in dengue strategies

ACTION 10.1

Identify populations-at-risk and empower them to advance dengue response efforts

Sub-Actions

10.1.1. Implement targeted preventive & control activities for communities with higher dengue risk

a. Leverage community health workers and volunteers to conduct routine, targeted outreach (e.g. door-to-door visits) in high-risk areas such as densely populated urban settings, informal settlements, and residences with identified sanitation or water management challenges, focusing on education for identifying and removing mosquito breeding sites.

b. Provide essential resources and protective equipment (i.e., mosquito nets, spatial repellant emanators, larvicides) directly to residents in high-risk areas to enable their active participation in preventive and vector control activities

c. Ensure that domestic and sub-domestic dengue explicitly incorporate targets and tailored strategies for the protection of identified at-risk populations, recognizing their specific vulnerabilities.

d. Develop and disseminate tailored educational materials that are culturally appropriate and accessible (e.g., multilingual, visual aids) for diverse vulnerable groups.

10.1.2. Mitigate socioeconomic factors contributing to vulnerability

a. Incorporate gender-disaggregated data and analysis in dengue risk assessments, epidemiological investigations, and intervention planning to inform resource allocation and communication strategies and targeted support

b. Advocate for and support improvements in basic infrastructure in informal settlements and high-risk areas, including access to safe water, sanitation, and adequate housing, to sustainably reduce mosquito breeding sites and human exposure.

ACTION 10.2

Drive inclusive dengue strategies that ensure participation from populations at-risk

Sub-Actions

10.2.1. Promote inclusive coordination with a focus on underserved populations

a. Ensure representation and meaningful participation from vulnerable groups (e.g., migrants, informal workers, indigenous communities, and rural or peri-urban residents) in domestic and local dengue coordination bodies and committees established within their territorial scope.

b. Design coordination structures and service delivery models to proactively account for and dismantle barriers faced by underserved communities, including those related to health access, language, cultural norms, digital literacy and legal status.

ACTION 10.3

Integrate gender-sensitive considerations into dengue strategies

Sub-Actions

10.3.1. Recognize and address dengue's gendered impact by embedding gender-sensitive considerations in dengue strategies

a. Incorporate gender-disaggregated data and analysis in dengue risk assessments, epidemiological investigations, and intervention planning to inform resource allocation and communication strategies and targeted support

b. Acknowledge and specifically address the disproportionate burden on women who often serve as primary caregivers during illness, and the higher exposure risk faced by women in specific informal sectors (e.g., market vendors, teachers, domestic workers).

c. Ensure maternal health services and antenatal care are fully integrated into emergency preparedness and response planning, recognizing the specific and severe risks dengue poses during pregnancy (e.g. higher likelihood of hospitalization and complications for both mother and fetus).

d. Promote the active involvement of all household members, including men and children, in sustained household-level vector control and prevention practices.

05

Conclusion

The *APEC Roadmap* sets forth a bold yet pragmatic vision for an Asia-Pacific region where dengue is no longer a recurring public health crisis. It reflects the collective will of APEC economies to transition from reactive, fragmented efforts to a more coordinated, sustained, and preventive approach. By anchoring the roadmap in core principles—policy and legislative support, multisectoral coordination, sustainable financing, regional collaboration, innovation, and equity—it provides a flexible framework that can be tailored to diverse domestic contexts and outbreak stages.

This roadmap is not a prescriptive plan but a shared platform for action. It empowers economies to choose context-appropriate strategies, mobilize communities, and invest in scalable and sustainable solutions, especially for the most vulnerable. It also underscores the importance of harmonized surveillance, adaptive local responses, and innovation to future-proof dengue prevention and control.

To turn this vision into reality, APEC economies must take deliberate steps forward.

01 **First, they should strive to meet the roadmap's shared milestones**—striving towards preventive reductions in dengue mortality, while aspiring for the **reduction of preventable dengue deaths to 0%** and reducing disease burden by at least 25% by 2030 by investing in prevention, early detection, and targeted interventions.

Second, economies must unlock innovation through a multisectoral lens, bringing together public sector (health, environment, urban planning, and technology departments) and private sector to co-develop solutions that are fit for the future. 02

03 **Third, regional coordination should be deepened to enable joint outbreak response**, real-time data sharing, and pooled technical resources—hallmarks of APEC's collaborative ethos.

Finally, all actions must be grounded in local realities, ensuring that interventions are tailored to each economy's unique epidemiological, environmental, and social contexts. 04

Through the *APEC Roadmap*, APEC economies have the opportunity to lead by example—charting a path toward a dengue-resilient future that protects lives, strengthens systems, and reinforces the foundations for sustainable growth.

06

Appendices

Appendix I

Acknowledgements

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Appendix II

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