Integrated Management Strategy for Dengue Prevention and Control in the Caribbean Subregion

Caribbean Subregion IMS-Dengue

PanAmerican Health Organization

World Health Organization

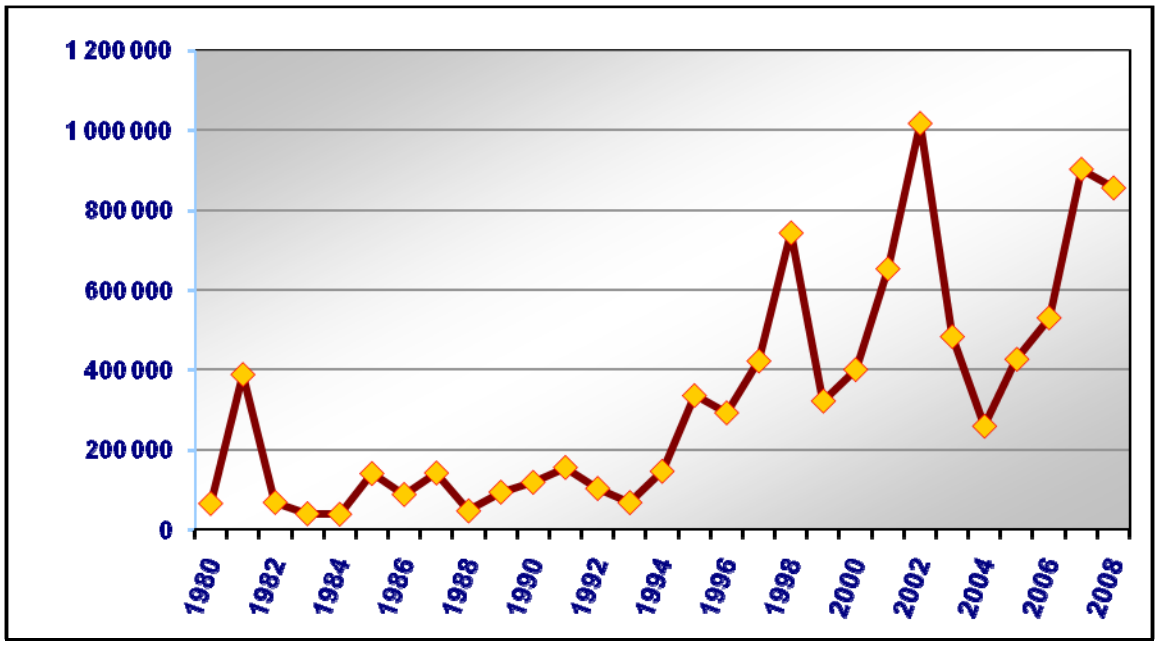
TABLE OF CONTENTS

Introduction

Dengue fever is currently the most important vector-borne viral disease causing high morbidity and mortality. Repeated epidemics of dengue and dengue hemorrhagic fever affect millions of individuals each year in tropical and subtropical areas of the world, including South America, Central America, and the Caribbean.

Following the end of the *Aedes aegypti* eradication campaign in the Americas in the 1960s for the control of Yellow Fever the efforts to control the vector were not maintained. This resulted in the reinfestation of *Aedes aegypti* free areas which permitted the introduction and spread of Dengue into the region in the 1970's (PAHO 1997). Over the last 35 years Dengue fever has spread throughout the Caribbean and Latin America with cyclical outbreaks occurring every 3 to 5 years (Figure 1). The last major outbreak occurred in both 2007 and 2008 with over 850,000 cases reported each year.

Figure 1. Evolution of dengue situation in the Americas 1980-2008



Current regional epidemiological situation

From 2000 to 2008, more than 30 countries in the Americas have reported a total of 5,587,811 cases of dengue (PAHO 2009). A total of 151,060 cases of dengue hemorrhagic fever (DHF) and 1976 deaths were reported in the same period resulting in a Case Fatality Rate (CFR) of 1.5%. Central America and the Caribbean sub-regions have countries that have presented high incidence rates and all four serotypes of dengue are currently circulating in the region (DEN-1, 2, 3, and 4).

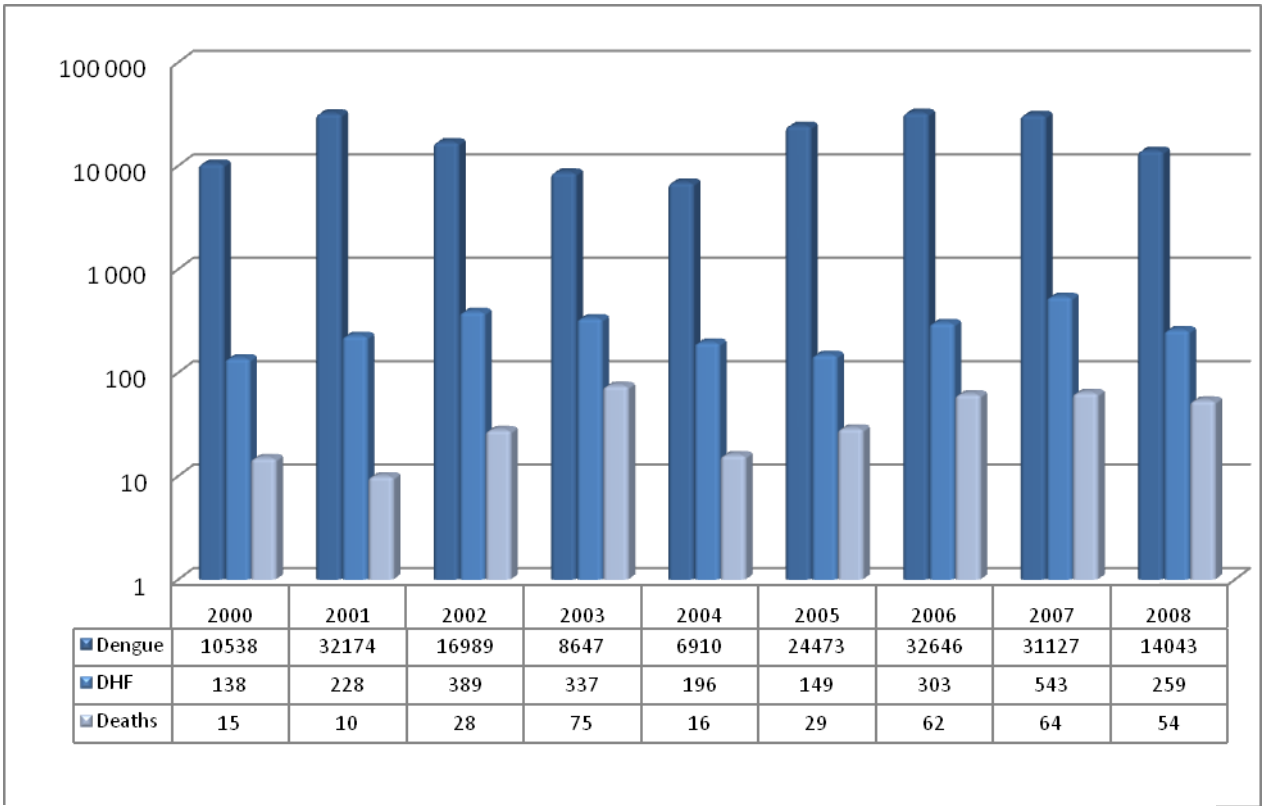
Dengue situation in the Caribbean sub-region

From 2000-2008 the Caribbean subregion reported 3.9% (193,491) of the dengue cases in the Americas including 3,685 cases of DHF and 353 deaths (Figure 2). Countries with the highest number of dengue cases in the Spanish –speaking Caribbean were Puerto Rico and the Dominican Republic. In the English, Dutch and French-speaking Caribbean countries most of the cases were from Martinique, Trinidad and Tobago and French Guiana. During that period the French Department (Martinique, Guadalupe and French Guyana reported 62,500 cases with 322 cases of DHF and 22 deaths. In the last complete year of reporting 2008, the Caribbean reported 14,043 dengue cases with 259 cases of DHF and 54 deaths.

As a result of the effect of dengue on the population and the tourist based economy the Caribbean countries have identified dengue as one of the major public health problems affecting the sub-region. Despite vector control efforts favorable conditions for dengue transmission remain including accelerated and uncontrolled urbanization, inadequate water distribution, poor sanitation and increased population movement and use of non-reusable containers. Dengue is hyper endemic in the Caribbean

sub-region with outbreaks occurring during the rainy season. Dengue will likely continue to be re-introduced into many countries as the population of *Aedes aegypti* are at high levels. Prospects for reversing the recent trend of increased epidemic activity and geographic expansion of dengue are not promising without strengthening and intensifying dengue prevention and control activities.

Figure 2. Dengue and Dengue Hemorrhagic fever Caribbean sub region 2000- 2008

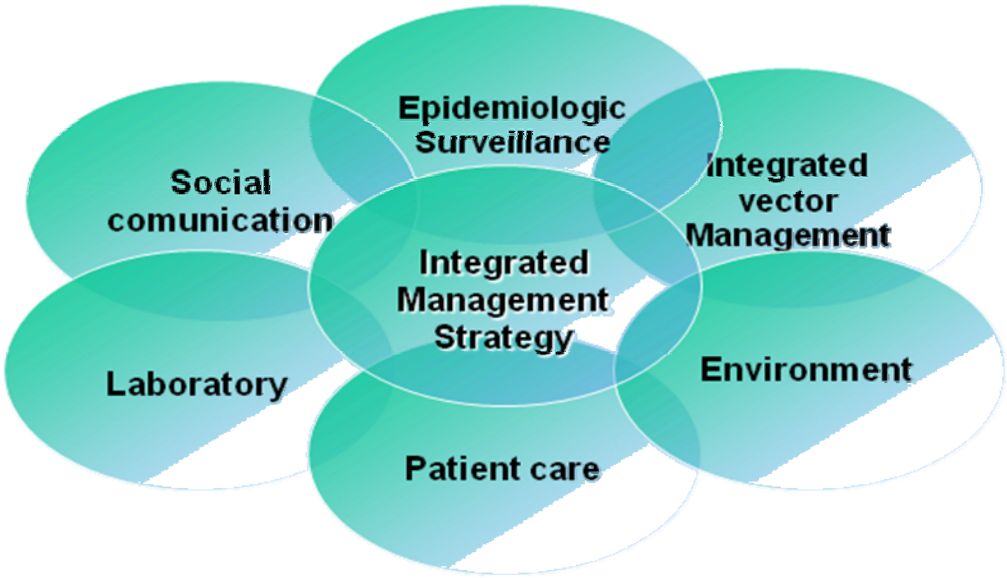


	2000	2001	2002	2003	2004	2005	2006	2007	2008
Dengue	10538	32174	16989	8647	6910	24473	32646	31127	14043
DHF	138	228	389	337	196	149	303	543	259
Deaths	15	10	28	75	16	29	62	64	54

Integrated Management Strategy for Dengue Prevention and Control in The Caribbean

As part of PAHO/WHO's efforts to support countries facing the current dengue situation, the Integrated Management Strategy for Dengue Prevention and Control (IMS-Dengue) was developed. During the 43th Directive Council in September 2001, the Panamerican Health Organization/World Health Organization (PAHO/WHO) approved the Resolution CD43.R4. This resolution presented the "New Generation of Programs for Dengue Prevention and Control". In September 2003, the 44th PAHO/WHO Directive Council approved the adoption of the Integrated Management Strategy for dengue prevention and control (IMS-dengue)which is a working strategy designed by the countries with the support of an International Dengue experts team. The IMS-Dengue aims to promote the integration of six key components for dengue prevention and control at the national, sub-regional and regional levels. These include (Figure 3) social communication (with emphasis on the application of the planning methodology *Communication for Behavioral Impact* (COMBI)), epidemiological surveillance, laboratory diagnosis, environment management, clinical case management, and Integrated Vector Management.

Figure 3. Integrated Management Strategy for dengue prevention and control (IMS-dengue)



IMS-Dengue uses Integrated Vector Management, a Comprehensive Response to Vector borne Diseases methodology (Resolution CD48/13 approved 48th Directing Council of PAHO,2008) as the guiding principal for vector control. Integrated Vector Management IVM is defined as a rational decision making process for the optimal use of resources for vector control in the 2008 WHO Position Statement. The cost effectiveness of vector-control measures is central to IVM.

In 2007, the Panamerican Sanitary Conference approved the Resolution CSP27.R15, in order to strength the preparation, implementation and systematic evaluation process of the Nationals IMS-dengue across the region.

The IMS-dengue had been approved by different subregional bodies in Central and South America (Council of MInistries of Health in Central America (COMISCA), Health Sector Committee in Central America and Dominican Republic (RESSCAD), Central American Network for Emergent and Re-emergent disease (RECACER), Mercado Común del Sur (MERCOSUR) and the Latin American Parliament (PARLATINO)). To date,

17 countries and 3 sub-regions (Central America, MERCOSUR and the Andean sub-regions) are in the process of implementing the IMS-Dengue.

The adoption of this strategy in the Caribbean countries will strengthening national dengue prevention and control programmes, the integration of the health sector with other sectors using a multidisciplinary and inter-programmatic approach and the implementation of a Contingency Plan to prevent and control dengue outbreaks and epidemics.

Preparedness plan for dengue outbreak control and response

Recent outbreaks have shown that current response mechanisms are inefficient and health systems would be overwhelmed in large epidemics. Lack of clinical, vector control and laboratory supplies, shortages in trained clinical, paramedical and vector control personnel and inadequate communication strategies to reach the community in an effective way are some of the main issues to be targeted during dengue outbreaks.

To complement IMS-Dengue there is a strong need to develop a subregional Contingency Plan to respond to dengue outbreak and epidemics. This plan would streamline inter-country dengue surveillance and strengthen trans-national linkages and information exchange. The National disaster and emergency preparedness plans will complement this subregional contingency plan, for timely control of dengue outbreaks.

INTEGRATED MANAGEMENT STRATEGY FOR DENGUE PREVENTION AND CONTROL (IMS-Dengue) OF THE CARIBBEAN SUBREGION

GOAL: Reduce the social, economic and health impacts caused by dengue in the Caribbean Subregion.

Purpose	Indicators	Verification Sources	Assumptions / risks
1. Reduce morbidity (40%) and mortality (50%) due to dengue by effective **subregional** coordination of the five components of the IMS in the next 5 years (2010 -2014).	1.a. Incidence rates of dengue fever, DHF and DSS	Weekly epidemiological reports from each country to CAREC (including non-CARICOM members)	Caribbean Subregion IMS-Dengue Coordinating Team will be formed and functional. Funding will be obtained to support staff and activities.
	1.b. Case fatality rate of severe dengue cases	Ministry of Health	
	1.c. Number of days of hospitalization due to dengue	Ministry of Education, Ministry of Labor and Economy, Social Security	
	1.d. Number of days absent from work/school	PAHO Regional Dengue Office	
	1.e. Number of countries that have implemented the five components of the IMS	Weekly epidemiological reports from each country to CAREC (including non-CARICOM members)	
2. Reduce morbidity (40%) and mortality (50%) due to dengue by strengthening integrated dengue surveillance and response mechanisms at **national levels** by effective implementation of the IMS, within the context of IHR, in the next 5 years (2010-2014).	2.a. Incidence rates of dengue fever, DHF and DSS	Ministry of Health	
	2.b. Case fatality rate of severe dengue cases		
	2.c. Number of days absent from work/school	Ministry of Education, Ministry of Labor and Economy, Social	

		Security	
	2.d. Number of days of hospitalization due to dengue	Ministry of Health	
	2.e. Coordination of routine meetings between all public health partners	Minutes of meetings	
	2.f. Efficiency of dengue surveillance systems (e.g., time between case detected and reported to vector control and response, and timely reporting between public health partners, among others)	Quarterly/Annual entomological reports from each country, weekly/monthly/annual epidemiological report from CAREC.	

I. MANAGEMENT

Results	Indicators	Verification Sources	Assumptions / risks
Caribbean Subregion IMS-Dengue Network established including all the components of the IMS, with active participation of the countries in the Caribbean Subregion.	Number of countries reporting weekly the epidemiological and laboratory data to the network of the Caribbean Subregion IMS dengue coordinating team. Number of dengue outbreaks detected and reported according to the IHR and timely intervened. Number of common activities conducted by the countries of the Caribbean Subregion. Number of countries who are using the information-sharing tools of the Caribbean sub region. Number of countries reporting quarterly the entomological data to the network of the Caribbean sub region IMS dengue coordinating team.	Surveillance records Health situation bulletins Epidemiological reports Outbreak investigation reports PAHO country representative reports to the IMS dengue coordinating team Reports of the IMS dengue coordinating team Reports of the IMS dengue coordinating team Entomological reports	Political commitment Surveillance system established and operating Functional communication system Human and financial resources. Supportive legislation A representative number of established reporting sites report weekly to the national level in each country of the Caribbean Subregion Institutional instability Climatic conditions
Results	**Activities**		
R1. Caribbean Subregion IMS-Dengue Network established including all the components of the IMS, with active participation of the countries in	R1A1. Build a Caribbean Subregion IMS-Dengue Coordinating Team. R1A2. Assessment of capacities and needs. R1A3. Establish mechanisms for collaboration between countries in technical assistance,		

the Caribbean Subregion.	procedures, sharing information in the Caribbean sub region. R1A4. Monitor and evaluate the performance of the strategy						
Activities	**Task**	**Execution period***			**Responsible**	**Cost** US$**	**Comments**
		S	**M**	**L**			
R1A1. Build a Caribbean Subregion IMS-Dengue Coordinating Team.	1. Define the terms of reference for the Caribbean Subregion IMS-Dengue Coordinating Team.	X			CPC/CAREC/Member States	**	
R1A2. Assessment of Subregional capacities and needs.	1. Review the existing collaborative mechanisms in the Subregion.	X			Caribbean Subregion IMS-Dengue Coordinating Team		
	2. Identify the needs and gaps.	X			Caribbean Subregion IMS-Dengue Coordinating Team		
	3. Prepare summary report and circulate for input from networks members	X			Caribbean Subregion IMS-Dengue Coordinating Team		
R1A3. Establish mechanisms for collaboration between countries in technical assistance, procedures, trainings and sharing information in the Caribbean sub region.	1. Identify a focal point in the multidisciplinary team of each country in the sub region.	X			Country network members		
	2. Define the procedures and mechanisms for interaction between countries.	X			Caribbean Subregion IMS-Dengue Coordinating Team		e.g., Web site, Skype, Elluminate conferences, share space.

	3. Implement annual coordination meetings of the multidisciplinary team of each network country member.	X	X	X	Caribbean Subregion IMS-Dengue Coordinating Team		
	4. Develop Subregional Standard Operating Procedures for facilitate collaboration and coordination in the following areas: • Epidemiology • Entomology • Communication • Laboratory • Clinical case management	X	X	X			
R1A4. Monitor and evaluate the performance of the strategy.	1. Develop and implement an evaluation tool.	X	X		Caribbean Subregion IMS-Dengue Coordinating Team		
	2. Produce periodic and final reports.	X	X	X	Caribbean Subregion IMS-Dengue Coordinating Team		

II. EPIDEMIOLOGICAL SURVEILLANCE

Results	Indicators	Verification Sources	Assumptions / risks
R1. Dengue epidemiological surveillance system for timely alert and opportune response to outbreaks implemented in the countries of the Caribbean subregion.	Number of countries reporting weekly to the surveillance system to the Caribbean sub region. % of sites reporting weekly to the national level in each country of the Caribbean sub region. Number of dengue outbreaks detected and reported, according to the IHR, and timely intervened.	Surveillance records Health situation bulletins Epidemiological reports Outbreak investigation reports	Political commitment Surveillance system established and operating Functional communication system Human and financial resources Supportive legislation Institutional instability Climatic conditions

Results	Activities
R1. Dengue epidemiological surveillance system for timely alert and opportune response to outbreaks implemented in all the English, French and Dutch speaking countries of the Caribbean sub region.	R1A1. Establish functional multidisciplinary surveillance teams at the national levels. R1A2. Assessment of capacities and needs. R1A3. Standardize common criteria for risk stratification for all countries in the Caribbean sub region. R1A4. Incorporate the contingency plans for outbreaks and epidemic events in the national emergency plans in the countries of the Caribbean sub region.

Activities	Task	Execution period*			Responsible	Cost** US$	Comments
		S	M	L			
R1A1. Establish functional multidisciplinary dengue surveillance teams at the national levels.	1. Define the terms of reference for the multidisciplinary dengue surveillance teams.	X			Caribbean Subregion IMS-Dengue Coordinating Team		Each country identify the appropriate group

R1A2. Assessment of capacities and needs.	1. Review information collected during the assessments of IHR core capacities conducted by each country.	X			National IMS-Dengue team.	**	
	2. Develop and implement an assessment tool.	X			Caribbean Subregion IMS-Dengue Coordinating Team	**	If needed
	3. Prepare a report summarizing capacities and needs.	X			Caribbean Subregion IMS-Dengue Coordinating Team		
	4. Prepare a plan to address the needs.	X			Caribbean Subregion IMS-Dengue Coordinating Team		
R1A3. Standardize common criteria for risk stratification for all countries in the Caribbean sub region.	1. Identify the key dengue risk indicators.	X			Caribbean Subregion IMS-Dengue Coordinating Team	**	
	2. Collect the last 3 years of data of the countries.	X			Caribbean Subregion IMS-Dengue Coordinating Team		
	3. Establish the base lines for each country of the sub region.	X			Caribbean Subregion IMS-Dengue Coordinating Team		Depends of the availability of the country data.
	4. Standardize some common criteria for risk stratification		X		Caribbean Subregion IMS-Dengue Coordinating Team		
	5. Define the activities in the 5 components of IMS for each level of risk.		X		Caribbean Subregion IMS-Dengue Coordinating Team		

R1A4. Incorporate the contingency plans for dengue in the national emergency plans in the countries of the Caribbean sub region.	See contingency plan	X	X	X	Ministries of Health.		

*Execution period: S = short (1 year), M= medium (2-3 years), L = long-term (4-5 years)

III. ENTOMOLOGY

Results	Indicators	Verification Sources	Assumptions / risks
R1. Integrated Vector Management (physical, biological, chemical, intersectoral collaboration and community participation) for dengue prevention implemented to reduce vector populations in network Member Countries in the Caribbean Subregion.	1. Number of training courses in IVM completed 2. Number of countries that have implemented IVM approach 3. *Aedes* entomological indices (Breteau index, House index, Container index and pupal index as a point in time index where applicable)	1. IVM Training Manual 2. Entomological Surveys/reports 3. Minutes of Annual meetings 4. Standard Operating Procedures documents	Intra and intersectoral commitment for developing actions to reduce breeding sites Community participation Availability of personnel, inputs and equipment in quantity and quality. Effective and evaluated interventions

Results	Activities
R1. Integrated Vector Management (physical, biological, chemical, intersectoral collaboration and community participation) for dengue prevention implemented to reduce vector populations in network Member Countries in the Caribbean Subregion.	R1A1. Develop training manuals for IVM (physical, biological, chemical, intersectoral collaboration and community participation). R1A2. Conduct Training courses appropriate to each level. R1A3. Incorporate an IVM Network (linked by webpage, internet) with in the Caribbean Subregion IMS dengue coordinating team. R1A4. Strengthen entomological surveillance and control. R1A5. Promote regional cooperation among country members to consider environmental problems linked with dengue. R1A6. Monitoring and evaluation of the implementation of IVM.

Activities	Task	Execution period*			Responsible	Cost** US$	Comments
R1A1. Develop training manuals for IVM (physical, biological, chemical, intersectoral collaboration and community participation).	1. Adapt existing IVM manuals to the Subregion.	X			CAREC/UWI/ Caribbean Subregion IMS-Dengue Coordinating Team		
	2. Incorporate into IVM manual the Caribbean Subregion social communications framework.	X			CAREC/UWI/ Caribbean Subregion IMS-Dengue Coordinating Team		
	3. Publish and disseminate manuals.	X			CAREC/UWI/ Caribbean Subregion IMS-Dengue Coordinating Team		
R1A2. Conduct Training courses appropriate to each level.	1. Develop a MOU with UWI St. Augustine to administer the IVM courses, including trainer of trainers	X			CAREC/PAHO/UWI		
	2. Conduct annual training courses at the country level in all aspects of vector control (trainer of trainers): entomological surveillance, GIS/GPS applied to entomology, equipment calibration, pesticide safety, etc.	X	x	X	UWI/CAREC/ Caribbean Subregion IMS-Dengue Coordinating Team		Pesticide control boards may be resources for this.

R1A3. Incorporate an IVM Network (linked by webpage, internet) within the Caribbean Subregion to facilitate timely communication and information sharing.	1. Use tools and mechanisms established through Caribbean Subregion IMS-Dengue Network.	X			CAREC		
R1A4. Strengthen entomological surveillance and control	1.Develop Subregional Standard Operating Procedures for field activities	X	X		CAREC, UWI, Caribbean Subregion IMS-Dengue Coordinating Team		
	2. Routine monitoring of insecticide resistance.	X	X	X	Member states, CAREC, Caribbean Subregion IMS-Dengue Coordinating Team		
R1A5. Promote regional cooperation among country members to consider environmental problems linked with dengue.	1. Coordinate with key stakeholders (private, public NGO) to establish intersectoral and intracountry collaboration (e.g., tire management).	X	X	X	Network member countries, CARICOM		
R1A6. Monitoring and evaluation of the implementation of IVM.	1. Develop SOPs for monitoring and evaluation.	X	X	X	CAREC, UWI, CDC, Caribbean Subregion IMS-Dengue Coordinating Team		
	2. Conduct reviews of implementation stages of IVM.	X	X	X	CAREC, UWI, CDC, DSDS, Caribbean Subregion IMS-Dengue Coordinating Team		

	3. Disseminate summary reports.	X	X	X	CAREC, UWI, CDC, DSDS, Caribbean Subregion IMS-Dengue Coordinating Team		

*Execution period: S = short (1 year), M= medium (2-3 years), L = long-term (4-5 years)

IV. SOCIAL COMMUNICATION

RESULTS	INDICATORS	VERIFICATION SOURCE	ASSUMPTION/RISKS
R1. A subregional communications framework to obtain behavior change to reduce morbidity and mortality associated with dengue.	Subregional communications framework endorsed by CARICOM within a 1 year period.	Minutes of CARICOM's COHSOD meeting to reflect endorsement	CARICOM will endorse the subregional communications framework.
	Subregional communications framework submitted to other appropriate authorities of Non-CARICOM member countries.	A letter of submission of communications framework to appropriate authorities of Non-CARICOM member countries	Subregional communications framework submitted to relevant authorities
	At least 75% of countries of the Caribbean Subregion adapt and implement a national communications framework based on the proposed subregional framework.	Country reports on dengue activities detailing communication actions.	• Participation and continuous dialogue amongst subregional stakeholders to complete the draft proposal. • Political will in support of implementation • Adequate resources available

Results	Activities
R1. A subregional communications framework to obtain behavior change to reduce morbidity and mortality associated with dengue	R1A1. Coordinate communication activities through a Communications Technical Working Group within the Caribbean Subregion. R1.A2. Develop a subregional communications framework to obtain behavior change to reduce morbidity and mortality associated with dengue.

Activities	Tasks	Time			Person Responsible	Costs	Comments
		ST	MT	LT			
R1A1. Coordinate communication activities through a Communications Technical Working Group within the Caribbean subregion.	1. Develop TOR and establish the Communications Technical Working Group.	X			PAHO CPC Office		The PAHO CPC Office will initiate the establishment of the Communications Technical Working Group
	2. Establish accepted communication links for continued participation by members of the Communications Technical Working Group	X			Communications Technical Working Group		
	3. Identify a process to develop the subregional communications framework, utilizing best practices methodology.	X			Communications Technical Working Group		
R1.A2. Develop a subregional communication framework to obtain behavior change to reduce morbidity and mortality associated with dengue.	1. Conduct literature review on existing best practices.	X			Communications Technical Working Group and national social communications specialist, Caribbean Subregion IMS-Dengue Coordinating Team		At the Subregional level
	2. Review the other components of the integrated management strategy for dengue prevention and control	X					
	Examine current situation regarding dengue programmes utilizing multiple approaches e.g. SWOT, Rapid Reconnaissance Survey (RSS), Situational Analysis.	X					
	Identify and pretest the behavioral objectives	X					
	Segment audiences	X					
	Identify appropriate	X					

Activities	Tasks	Time			Person Responsible	Costs	Comments
		ST	MT	LT			
	communication channels						
	Develop messages appropriate to audiences		X				
	Pretest the messages and materials		X				
	Develop budget to reflect demands of the communications strategy		X				
	Mobilize resources to support the production of appropriate material.		X				
	Provide technical support as requested to facilitate the development and implementation of the subregional communications framework at the country level	X	X	X			The subregional communications framework should complement country experiences and optimize opportunities of economies of scale and harmonization of subregional actions
	To monitor and evaluate the implementation of the subregional communications framework at the country level.	X	X	X			
	Present reports and adjust subregional communications framework based on lessons learnt.	X	X	X			

V. CLINICAL CASE MANAGEMENT

Expected Results	Indicators	Verification Sources	Assumptions
R1. Reduce mortality by 50% in the Caribbean Subregion by 2014.	Case fatality rate	1. Database of the National Epidemiological Surveillance Systems and hospital statistics.	Political support Availability of human, material and financial resources CHRC continues to appoint an official representative to coordinate dengue care. Baseline mortality established in each country by 2010. Each country will maintain lethality from severe forms of dengue < 1% and < 5% of Dengue hospitalized patients will DHF/DSS

Results	Activities
R1. Reduce mortality by 50% in the Caribbean Subregion by year 2014.	R1A1. Establish a Caribbean Subregion Group of Clinical Experts in Dengue R1A2. Establish Caribbean Subregional Guidelines for Clinical Case Management of Dengue. R1A3. Training of health workers in clinical case management. R1A4. Contingency Plan includes the following tasks: All hospitals, health centers and private doctors should have a contingency plan, triage at all levels, updated manual of contingency plan, clinical case management updated, medical supplies for treatment of patients, hematocrit supplies.

Activity	Task	Execution Period			Responsible	Cost **	Comments
		S	M	L			
R1A1. Establish a Caribbean Subregion Group of Clinical Experts in Dengue	1. Identify leading experts and interested physicians in dengue in each country.	X			CPC, PAHO, Ministries of Health		
	2. Convene a meeting of the Caribbean Subregion Group of Clinical Experts in Dengue.	X			Caribbean Health Research Council		
R1A2. Establish Caribbean Subregional Guidelines for Clinical Case Management of Dengue.	1. Review meeting of the WHO TDR Guidelines for Clinical Management of Dengue.	X			Caribbean Subregion Group of Clinical Experts in Dengue, CHRC		
	2. Disseminate CHRC Caribbean Subregional Guidelines for Clinical Case Management of Dengue.	X			Caribbean Subregion Group of Clinical Experts in Dengue		
R1A3. Training of health workers in Clinical case management: • Knowledge of Diagnosis of clinical forms of Dengue Fever • Differential Diagnosis by geographic areas • Recognition of early warning signs of symptoms of plasma leakage	1. Develop e-Learning activities	x			Caribbean Subregion Group of Clinical Experts in Dengue, CHRC, UWI, Caribbean Subregion IMS-Dengue Coordinating Team		
	2. Conduct a Caribbean Subregional training of trainers for physicians in Dengue Diagnosis and Treatment.	X			Caribbean Subregion Group of Clinical Experts in Dengue		

• Appropriate triage of patients • Monitoring and treatment of patients. • Real time information on development of the vaccine	3. Training 100% of healthcare workers at different levels of service (Certified / Accredited Training, where appropriate) • Doctors in public and private care practice(specialists and general practitioner) • Nurses • Paramedics • Community health workers	X	X		Caribbean Subregion Group of Clinical Experts in Dengue - Professional Associations - Country Universities - CHRC		
	4. Solicit the inclusion of dengue as a unit in Continuous Medical Education.	X	X		Caribbean Subregion Group of Clinical Experts in Dengue - Professional Associations - Country Universities - CHRC		

R1A4. Ensure Contingency Plan includes the following tasks: 1. All hospitals, health centers and private doctors should have a contingency plan 2. Triage at all levels 3. Updated manual of contingency plan 4. Clinical case management updated 5. Medical supplies for treatment of patients 6. Hematocrit supplies	See contingency plan		X		National authorities		

VI. LABORATORY

Results	Indicators	Verification Sources	Assumptions / risks
R1. Laboratory capacity is strengthened to support surveillance and outbreak investigation for a timely response to clinicians and public health officials.	Number of countries that can conduct or access serological testing including MAC ELISA and NS1 Number of countries with access to virological testing through reference laboratories Number of countries reporting laboratory data to CAREC/PAHO	Guidelines for laboratory diagnosis and annual reports.	Human and financial resources available Reporting results in real time (weekly)

Results	Activities
R1. Laboratory capacity is strengthened to support surveillance and outbreak investigation for a timely response to clinicians and public health officials.	R1A1. Survey to determine national laboratory capacity for dengue testing throughout the Caribbean Subregion. R1A2. Technical assistance to national laboratories to support dengue surveillance and outbreak investigation by reference laboratories. R1A3. Establish a Caribbean Subregional Laboratory network among all national laboratories for information sharing, research, capacity building and quality assurance. R1A4. Establish periodic sampling of NS1 positives for isolation and genetic typing studies for each country in the subregion.

Activities	Task	Execution period*			Responsible	Cost ** US$	Comments
		S	M	L			
R1A1. Survey to determine national laboratory capacity for dengue testing throughout the Caribbean Subregion.	1. Create assessment tools and conduct survey.	X			CAREC, CDC		The survey needs to be simple and easy to perform.
	2. Evaluate survey results and develop the testing algorithm for dengue.	X	X		CAREC, CDC		Requires the support of MOH for each country
	3. Update CAREC guidelines and recommendations for dengue laboratory diagnosis	X	X		CAREC		
R1A2. Technical assistance to national laboratories to support dengue surveillance and outbreak investigation by reference laboratories.	1. Create and disseminate WHO bulk pricing list for commercial kits.	X	X		WHO, PAHO, TDR		A list is created in which each country can determine which kit according to price and needs is best suited for their lab.
	2. Provide proficiency panel upon request by national laboratories.				CAREC, CDC		
	3. Provide training as requested by national laboratories by e-Learning, site visits, etc.				CAREC, CDC, Institut Pasteur.		
R1A3. Establish a Caribbean Subregional Laboratory network among all national laboratories for information sharing, research, capacity building and quality assurance.	1. List all national laboratories and contact information on the PAHO and CAREC websites.	X			CAREC, CDC, Institut Pasteur		This information will be obtained from survey results.
	2. Include laboratory report in epidemiological periodic reports.	X	X		CAREC, PAHO, Caribbean Subregion IMS-Dengue Coordinating Team		In coordination with national epidemiologist.

	3. Develop a plan to encourage private sector laboratories to report dengue results to the ministry of health.	X	X		CAREC, CDC, CIRE		
R1A4. Establish periodic sampling of NS1 positives or suspected acute dengue cases for isolation, serotyping and genotyping studies for each country in the subregion.	1. Submission of samples from National labs during outbreak/epidemic investigation and random sampling during inter-epidemic periods.	X	X	X	CAREC, CDC, Institut Pasteur		The crucial step requires financial support for shipping of samples.
	2. Identify sources for financial to support shipping of samples to reference laboratories.	X	X		PAHO, Ministries of Health		WHO/PAHO support is important for customs issues.
	3. Serotyping and genotyping by the reference laboratories.	X	X	X	CAREC, CDC, Institut Pasteur		Utilize CDC/ Institut Pasteur sequencing protocol.

*Execution period: S = short (1 year), M= medium (2-3 years), L = long-term (4-5 years)

VII. RESEARCH

Results	Indicators	Verification Sources	Assumptions / risks
R1. Conduct research projects.	Number of subregional projects in progress or completed	Project reports Manuscripts	Financial resources available

Results	Activities
R1. Conduct research projects.	R1A1. Conduct research in epidemiology surveillance. R1A2. Conduct entomology operational research. R1A3. Conduct social communication research. R1A4. Develop clinical research. R1A5. Develop new diagnostic tests.

Activities	Task	Execution period*			Responsible	Cost ** US$	Comments
		S	M	L			
R1A1. Conduct research in epidemiology surveillance.	1. Develop links and collaborations with universities, research institutions, research team of the subregion (e.g., in the field of identification of disease risk factors, mobilization, epidemic predictions, etc)	X	X	X	IMS coordinating team, UWE, UAG (Universita Antilles Guyane), CIC-EC (Centre d'investigation Clinique – DFA)		
R1A2. Conduct entomological research.	1. Set regional research agenda e.g., Evaluation of insecticide impregnated curtains, key premises and key containers.	X	X		CAREC/UWI/ Multidisciplinary IMS coordinating Sub regional team		

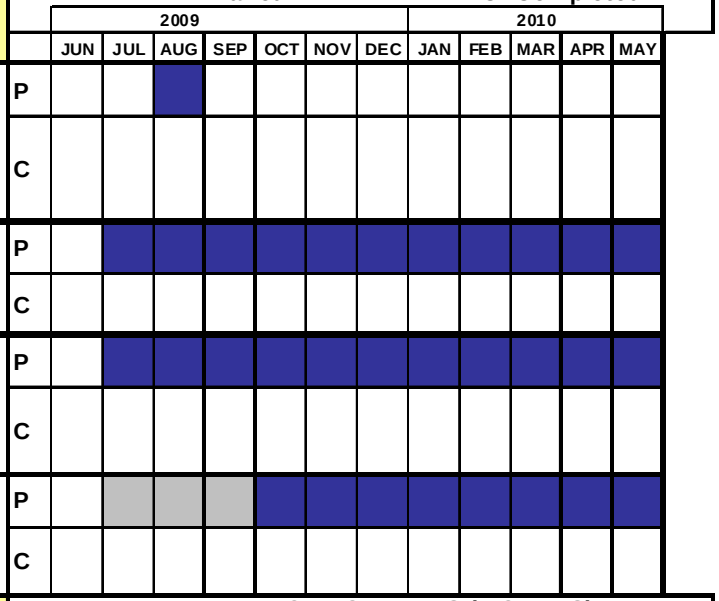
	2. Establish links with universities and academic or private institutions to support research activities.		X		CAREC/UWI/ Multidisciplinary IMS coordinating Sub regional team		
	3. Develop a plan to encourage private sector laboratories to report dengue results to the ministry of health.	X	X		CAREC/CDC/CIRE		
R1A3. Conduct social communication research	1. Develop social communication projects as needed.	X	X	X	Communications Technical Working Group		
R1A4. Conduct clinical research	1. Develop and share clinical research protocols. (e.g., dengue in pregnancy study)	X	X	X	Caribbean Health Research Council (CHRC), Caribbean Subregion Group of Clinical Experts in Dengue		
R1A5. Develop new diagnostic tests.	1. Develop research diagnostic test for acute dengue samples.	X	X	X	CAREC, CDC, Institut Pasteur.		

*Execution period: S = short (1 year), M= medium (2-3 years), L = long-term (4-5 years)

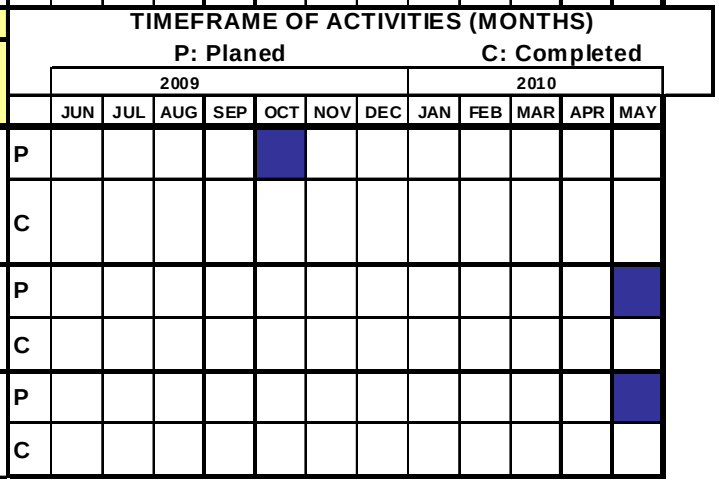
CARIBBEAN SUBREAGION IMS-DENGUE IMPLEMENTATION, MONITORING AND EVALUATION AGENDA

No.	IMPLEMENTATION AGENDA AT THE SUBREGIONAL LEVEL	RESPONSIBILITY	SUPPORT	TIMEFRAME OF ACTIVITIES (MONTHS) P: Planed C: Completed	2009 JUN	JUL	AUG	SEP	OCT	NOV	DEC	2010 JAN	FEB	MAR	APR	MAY
1	To Present the Integrated Management Strategy for dengue prevention and control (IMS-DENGUE) to the CARICOM Member States, French and Dutch Ministries of Health through PAHO/WHO, for its review and approval.	PAHO	Caribbean Subregion IMS-Dengue Coordinating Team	P												
				C												
2	to support the subregional advocacy process and to give technical advice to the countries in the subregion.	PAHO	Caribbean Subregion IMS-Dengue Coordinating Team	P												
				C												
3	To form a Subregional multidisciplinary IMS-dengue Network to support the subregional advocacy process and to give technical advice to the countries in the subregion.	PAHO	Caribbean Subregion IMS-Dengue Coordinating Team	P												
				C												
4	To negotiate with international funding organizations the financial resources necessary for strengthening the implementation of Caribbean IMS-dengue with the support of PAHO/WHO and other subregional organizations.	PAHO	Caribbean Subregion IMS-Dengue Coordinating Team	P												
				C												
5	To facilitate the implementation of the IMS-dengue subregional activities in the countries, in all its component(Clinical management, Integrated vector management, social comunication, epidemiological sueveillance, laboratory capacity and envornmental management) supported by PAHO/WHO.	PAHO	Caribbean Subregion IMS-Dengue Coordinating Team	P												
				C												

No.	MONITORING AGENDA	RESPONSIBILITY	SUPPORT	TIMEFRAME OF ACTIVITIES (MONTHS) P: Planed C: Completed



No.	EVALUATION AGENDA	RESPONSIBILITY	SUPPORT	TIMEFRAME OF ACTIVITIES (MONTHS) P: Planed C: Completed



No.	AGENDA AT THE NATIONAL LEVEL	RESPONSIBILITY	SUPPORT	TIMEFRAME OF ACTIVITIES (MONTHS) P: Planed C: Completed	2009							2010				
					JUN	JUL	AUG	SEP	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY
1	Each participant will present a report of the IMS-dengue workshop to the relevant Country's Health authority.	National participant	PAHO Caribbean Subregion IMS-Dengue Coordinating Team	P												
				C												
2	Each Country to convene a meeting with the relevant Multisectoral Autorithies (Political and technical), in order to present the Caribbean Integrated Management Strategy for dengue prevention and control (IMS-DENGUE) at the country and local level, to prepare the countryl implementation agenda.	Health autorithies	PAHO Caribbean Subregion IMS-Dengue Coordinating Team	P												
				C												
3	To form a Country multisectorial IMS-dengue task force to adapt the subregional IMS-dengue to the national reality, with the support of the Subregional Dengue Technical Group.	Health autorithies	PAHO Caribbean Subregion IMS-Dengue Coordinating Team	P												
				C												
4	To circulate the Country IMS-dengue for review, in order to be adopted at the multisectorial level.	Health autorithies	PAHO Caribbean Subregion IMS-Dengue Coordinating Team	P												
				C												
5	To negotiate budget resources for the Implementation of the IMS-dengue.	Country multisectorial IMS-dengue task force	PAHO Caribbean Subregion IMS-Dengue Coordinating Team	P												
				C												
6	To submit monthly progress reports to the national coordinator of the Country multisectorial IMS-dengue task force.	Health autorithies	PAHO Caribbean Subregion IMS-Dengue Coordinating Team	P												
				C												

Framework for Contingency Plan to Respond to Dengue Outbreaks in the Caribbean Subregion

Activities	Task	Responsible	Cost ** US$
1. Adjust National Emergency Contingency Plans to respond to Dengue outbreaks.	1. Review the existing protocols and develop a standardized contingency protocol for the Subregion	IMS coordinating group, PAHO, Caribbean Disaster Emergency Management Agency (CEDEMA)	
	2. Standardize the methods used to determine the criteria to confirm the start of a dengue epidemic.	IMS coordinating group, PAHO, CEDEMA	
	3.Disseminate the standardized contingency protocol and the standardized method for the declaration of the epidemic to Subregional Member countries	IMS coordinating group, PAHO, CEDEMA	
	4.Adapt the standardized contingency protocol to national plans	Ministries of Health	
2. Confirmation / Declaration of the beginning of an outbreak	1. Declare of the occurrence of a dengue epidemic and notify the IHR National Focal Points (IHR website)	Ministries of Health, PAHO	
	2. Implement regional standardized contingency protocols	Ministries of Health from Members	
	3. Activate the multisectoral Committee to implement the national contingency plan	Ministries of Health from Members	
3. Monitor and assess the epidemic situation	1.Activate and maintain the situation room at national and subregional level	Ministries of Health, IMS group	
	2. Establish routine communication mechanisms with relevant national and international organizations	Ministries of Health, IMS group, IHR national focal point	

Note: Each country should have its own situation room to provide data to the regional room	3. Analyze and interpret weekly data and develop a weekly outbreak report	Ministries of Health, IMS group, IHR national focal point	
	4.Provide support and technical assistance to affected countries	IMS group, IHR	
4. Organize the intervention, mobilization and redistribution of materials, pesticides, medicines, inputs, reagents, response coordination teams and regional collaboration	1. Determine the needs for additional resources and regional collaboration	National level unless requested	
	2. Ensure necessary resources are provided	Ministries of Health	Potential sources of funding: USAID, EC,
	3. Establish technical and logistical cooperation for: • Communication plan • National laboratory services • patient care service • vector control service	Ministries of Health, PAHO, IMS group	
5. Optimize the use of laboratory resources	1. Implement the sampling criteria for confirmation of suspected cases of dengue to monitor the epidemic according to CAREC PAHO/WHO guideline	Ministries of Health	
	2. Mobilize additional resources as necessary	Ministries of Health	
6. Organize patient care services	1. Review and adapt the patient care protocol according to the epidemic situation	Ministries of Health	
	2. Conduct triage to optimize resources	Ministries of Health	
	3.Mobilize additional resources as necessary	Ministries of Health, PAHO	
7. Implement the risk/crisis communication plan	1.Conduct ongoing training in risk/crisis communication	Ministries of Health, PAHO	
	2. Activate the risk/crisis communication team	Ministries of Health	

	3.Coordinate the communication partners (media, community leaders, private and public sector, NGOs, stakeholders) and develop a communication mechanism	Ministries of Health	
	4. Enact the national agreement on making the public announcement and ongoing release of information	Ministries of Health	
	5. Establish a mechanism to monitor communication messages and channels	Ministries of Health	
	6.Implement and monitor risk/crisis communication plan according to the phase: • Pre epidemic • Epidemic alert • Epidemic declare • Post epidemic	Ministries of Health	
	7.Mobilize additional resources to support the communication plan	Ministries of Health	
8. Intensify vector control measures	1. Implement emergency vector control procedure according to PAHO/WHO recommendations and national contingency plan	Ministries of Health / environment	
9. Monitor and evaluate the contingency plan	1.Monitor the implementation of the contingency plan (surveillance, vector control, patient care, risk communication, costs)	Ministries of Health, IMS group	
	2.Evaluate the efficacy of the contingency plan	Ministries of Health, IMS group	
	3. Prepare and disseminate the comprehensive final report	Ministries of Health, IMS group	

LIST OF ANNEXES BY ACTIVITY OR COMPONENT

- **EPIDEMIOLOGY**
  Annex 1. Format of the report for an international outbreak or significant health event.
  Annex 2. Bulletin: Update of epidemiological Dengue surveillance data in the French Overseas Territories: Martinique, Guadeloupe, Saint Martin, Saint Barthelemy, French Guiana.
  Annex 3. Dengue surveillance, prevention and control Plan in the French Overseas Territories: Martinique, Guadeloupe, Saint Martin, Saint Barthelemy, French Guiana.
  Annex 4. International Health Regulations (2005)

- **ENTOMOLOGY AND ENVIROMENTAL**
  Annex 4. Entomological activities when the first cases of dengue are reported.
  Annex 5. Expert group review: presentation of Dengue in Martinique, Guadeloupe and French Guiana in 2003.
  Annex 6. A review of entomological sampling methods and indicators for Dengue vectors by Dana A. Focks *et al.* - Special Programme for Research and Training in Tropical Diseases (TDR) - UNICEF/UNDP/WORLD BANK/WHO.
  Annex 7. Guidelines for assessing the efficacy of insecticidal space sprays for control ofthe dengue vector Aedes aegypti By: P. Reiter & M.B. Nathan. WHO/CDS/CPE/PVC/2001.1
  Annex 8. Armed Forces Pest Management Board.

- **SOCIAL COMMUNICATION AND COMMUNITY PARTICIPATION**
  Annex 9. List of communications websites and references

- **CLINICAL CASE MANAGEMENT**
  Annex 10. CAREC Clinical and Laboratory Guidelines for Dengue Fever and Dengue Haemorrhagic Fever/Dengue Shock Syndrome for Health Care Providers
  Annex 11. DENCO study clinical management of dengue patients.
  Annex 12. DENGUE VACCINE INFORMATION: Pediatric Dengue Vaccine Initiative (PDVI)

- **LABORATORY**
  Annex 13. Organizational structure of laboratories for the diagnosis of dengue in Caribbean subregion.
  Annex 14. Dengue Antibody kinetics during a primary and secondary infection.
  Annex 15. Simplified Testing algorithm.

- **Annex 16.** SWOT analysis for Caribbean Subregion

- **Annex 17. REFERENCE DOCUMENTS**

- **Annex 18. LIST OF PARTICIPANTS and CARIBBEAN SUBREGION IMS-DENGUE WORKING GROUPS**

EPIDEMIOLOGY

Annex 1. Format of the report for an international outbreak or significant health event.

COUNTRY:

Outbreak of [HEALTH EVENT/DENGUE] in [LOCATION], province/dpt, state/region of [PROVINCE/ DPT/ STATE/ REGION], [MONTH and YEAR or PERIOD OF TIME].

To date [DATE OF REPORT] the occurrence of [NUMBER of CASES] of [HEALTH EVENT] is reported with the presentation of [MAIN SIGNS AND SYMPTOMS], in/neighborhoods, unit(s) and/or dependency(ies) of [NEIGHBORHOOD/UNIT/DEPENDENCY] with a population of [POPULATION] in the locality of [LOCALITY] of [Nº of INHABITANTS] inhabitants. Cases have occurred between [INITIAL DATE, EPIDEMIOLOGICAL WEEK] and [FINAL DATE or TODAY FOR CURRENT OUTBREAKS]. The area is mainly [DESCRIPTION] and has previously presented occasional outbreaks of [PREVIOUS OUTBREAKS].
The most remarkable characteristic of the cases is [PERSONAL CHARACTERISTIC].
Of these cases, [Nº of DEATHS] died and [Nº of HOSPITALIZED] required hospitalization, cases have been treated with [THERAPY], after which have they have developed [DEVELOPMENT].
Samples [Nº SAMPLES] have been taken [TYPE OF SAMPLES], which have been sent to [LABORATORY] to be processed. [ETIOLOGY, GENETIC CHARACTERIZATION] was confirmed or suspected.
The epidemiological research shows that the outbreak was caused by [POSSIBLE MECHANISM, SOURCE, EXPOSURE FACTORS].
Control actions and principal organization or country informed that have been taken are [ACTIONS].

Annex 2. Bulletin: Update of epidemiological Dengue surveillance data in the French Overseas Territories: Martinique, Guadeloupe, Saint Martin, Saint Barthelemy, French Guiana.
http://www.invs.sante.fr/surveillance/dengue/peh_guadeloupe.html

http://www.invs.sante.fr/surveillance/dengue/peh_martinique.html

http://www.invs.sante.fr/surveillance/dengue/peh.html

http://www.invs.sante.fr/surveillance/dengue/peh_petites_antilles.html

Annex 3. Dengue surveillance, prevention and control Plan in the French Overseas Territories: Martinique, Guadeloupe, Saint Martin, Saint Barthelemy, French Guiana.
http://www.invs.sante.fr/surveillance/dengue/default.htm

http://www.martinique.sante.gouv.fr/accueil/cire/psage.htm

For information on **INTERNATIONAL HEALTH REGULATIONS** (2005):
www.who.int/ihr/elibrary/en/index.html

ENTOMOLOGY AND ENVIROMENTAL

Annex 4. Entomological activities when the first cases of dengue are reported.

This is a short set of integrated control actions to address the reporting of one or several suspected or probable dengue cases within a specific geographic area (minimum of 200 meters in diameter), without transmission.

Actions to take:

- Appropriate disposal of breeding sites
- Treatment of breeding sites (chemical or biological)
- Adult vectorial control with light equipment
- Search for febrile cases
- Sampling
- Community mobilization and communication to incorporate actions to be taken
- Monitoring of actions taken

Annex 5. Expert group review: Presentation of Dengue in Martinique, Guadeloupe and French Guiana in 2003.

Annex 6. A review of entomological sampling methods and indicators for dengue vectors. Dana A. Focks *et al.* - Special Programme for Research and Training in Tropical Diseases (TDR) - UNICEF/UNDP/WORLD BANK/WHO.

http://apps.who.int/tdr/svc/publications/tdr-research-publications/dengue_vectors

Annex 7. Chemical control references
Guidelines for assessing the efficacy of insecticidal space sprays for control of the dengue vector *Aedes aegypti*. P. Reiter & M.B. Nathan.
WHO/CDS/CPE/PVC/2001.1
http://whqlibdoc.who.int/hq/2001/WHO_CDS_CPE_PVC_2001.1.pdf

Pesticides and their Application for the control of vectors and pests of public health importance. WHO/CDS/NTD/WHOPES/GCDPP/2006.1
http://whqlibdoc.who.int

Annex 8. Armed Forces Pest Management Board: www.Afpmb.org

SOCIAL COMMUNICATION AND COMMUNITY PARTICIPATION

Annex 9. List of communications websites and references:
Planning mobilization and social communication for dengue prevention and control. Step-by-step guide.
http://www.paho.org/english/AD/DPC/CD/den-step-by-step.htm

Lloyd LS. Strategic report 7: Best practices for dengue prevention and control in the Americas. EHP. 2003. Accessed June 11, 2009.
http://www.ehproject.org/PDF/Strategic_papers/SR7-BestPractice.pdf

Centers for Disease Control and Prevention. Crisis and emergency risk communications. 2002. Accessed June 11, 2009.
http://www.bt.cdc.gov/cerc/pdf/CERC-SEPT02.pdf

Sandman PM. Risk communications website. Accessed June 11, 2009.
http://www.psandman.com

World Health Organization Outbreak Communication Planning Guide.

www.who.int/ihr/elibrary/communications/en/index.html

PAHO Website: www.paho.org

CLINICAL CASE MANAGEMENT

Annex 10. CAREC Clinical and Laboratory Guidelines for Dengue Fever and Dengue Haemorrhagic Fever/Dengue Shock Syndrome for Health Care Providers.

http://www.carec.org/publications/DENGUIDE_lab.htm

Annex 11. DENCO study: Clinical Management of dengue patients.
This document is still under review. Final version expected August 2009. Contact PAHO or WHO for updated information.

Annex 12. DENGUE VACCINE INFORMATION: Pediatric Dengue Vaccine Initiative (PDVI), www.pdvi.org

LABORATORY

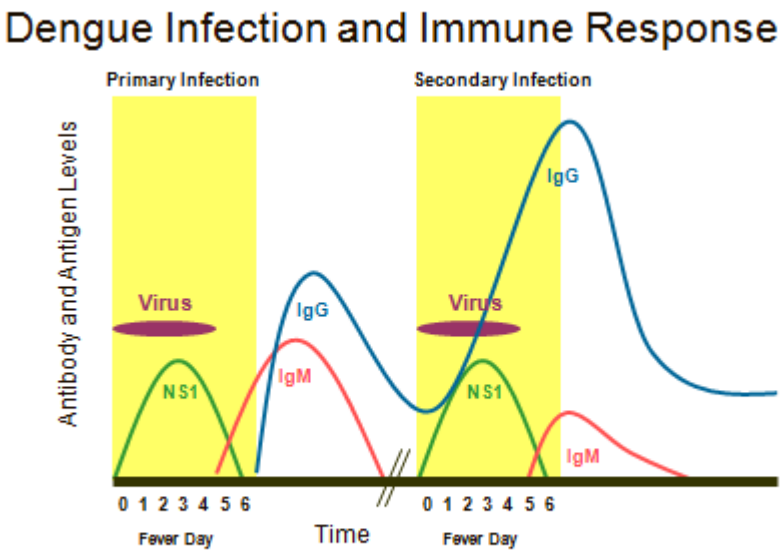
Annex 13. Organizational structure of laboratories for the diagnosis of dengue in Caribbean Subregion.

COUNTRY	REFERENCE CENTER
TRINIDAD	CAREC
PUERTO RICO	CDC DENGUE BRANCH
FRENCH GUIANA	NRC FOR ARBOVIRUS, INSTITUT PASTEUR DE LA GUYANE

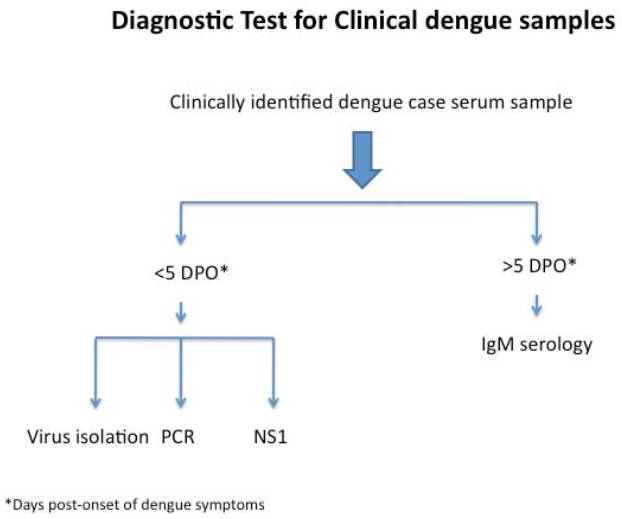
COUNTRY	LABORATORY NETWORK
DOMINICA	PRINCESS MARGARET HOSPITAL
DOMINICA	LA FALAISE
ANTIGUA	MOULT ST JOHN'S MEDICAL CENTER
BARBADOS	LEPTOSPIROSIS LABORATORY
JAMAICA	NATIONAL PUBLIC HEALTH LABORATORY
JAMAICA	DPT OF MICROBIOLOGY, UWI, MONA
MARTINIQUE	LABORATOIRE DE VIROLOGIE, CHU DE FORT DE FRANCE
MARTINIQUE	LABORATOIRE DE BIOLOGIE, CH DU LAMENTIN
GUADELOUPE	LABORATOIREDE MICROBIOLOGIE, CHU DE POINTE A PITRE
GUADELOUPE	INSTITUT PASTEUR DE GUADELOUPE
BELIZE	CENTRAL MEDICAL LABORATORY
STE LUCIA	EZRA LONG LABORATORY, VICTORIA HOSPITAL
TRINIDAD	PUBLIC HEALTH LABORATORY

* EXISTENCE OF A STATE REFERENCE LABORATORY THAT RECEIVES SAMPLES FROM PUBLIC AND PRIVATE LABORATORIES

Annex 14. Dengue Antibody kinetics during a primary and secondary infection.



Annex 15. Simplified Testing algorithm.



Annex 16. CAREC: Caribbean outbreak response toolkit. www.carec.net/outbreak/

Annex 17. SWOT ANALYSIS FOR THE CARIBBEAN SUBREGION

STRENGTHS

- In most countries there is adequate political support for Dengue control, which is strengthened when dengue cases are detected
- Funding in some countries may be adequate while for others this may be a weakness
- Countries have experience with dengue outbreaks
- Increased numbers of dengue cases support earlier dengue forecasting
- Countries have laboratory services and a surveillance unit to detect and identify cases
- Countries have a dengue plan and records of their activities
- Some countries publish monthly bulletins with dengue updates
- Most countries have social communications specialists.

WEAKNESSES

- Human resources
  - may be insufficient to adequately service major populated areas
  - may require training or retraining to motivate and sharpen staff skills
  - rapid turn over and limited training of new staff
  - lack of refresher courses at the regional and local levels
  - no Certification training programme on safe equipment use, calibration, proper application of insecticides
  - lack of training in human resource management and development, both general management and technical programmatic management (all programme components)
- Entomological surveillance is not consistent
  - not timely, in some countries may only be done once a year
  - not reliable and may actually underestimate the vector population
  - large amount of data may be collected but not analysed
  - over-reliance on chemical control in some countries

- In most countries entomological evaluation is not routinely carried out
  - control activities not evaluated
  - resistance status and effectiveness of insecticides not routinely checked.
- Lack of sustained community involvement in control activities
- Programmes are still top down
- Intersectoral support for dengue control activities in many countries is generally during times of increased numbers of dengue cases
- Lack of research being conducted in the region
- Lack specially trained staff to promote and involve community in the control programme (e.g., behavioural scientists)
- Dengue control programmes are often compartmentalized with inadequate communication between the laboratory, epidemiology, health promotion and vector control
- In most countries private physicians are not part of surveillance system
- Some countries rely on passive, not active, surveillance
- Programmes do not utilize maps and freely available mapping programmes (e.g., Google Earth)
- Limited use of computers in many programmes
- Data collection is paper-based, which does not facilitate analysis
- No data analysis = no learning from past experiences

OPPORTUNITIES

- Country support is available from the Regional Dengue Programme of PAHO - the Integrated Management Strategy for Dengue Prevention and Control (IMS Dengue) (CD.44R9)
- Integrated Vector Management: a comprehensive response to vector-borne diseases (CD48/13)
- Enforce reporting legislation and use of, as appropriate, incentives
- CAREC will continue to provide assistance
- Strengthen international health regulations (IHR), and regional, national and municipal legislation
- Improve coordination with other sectors: private sector, non-governmental organizations, schools, in control programmes
- Improve water distribution and environmental management

- Rapid communication and health information systems are available Ease of communication between countries
- Rapid evaluation tools are being evaluated
- New control methodologies that can involve the community are available such as the use of insecticide impregnated fabrics for use within the household
- New entomological sampling methodologies for adult *Aedes aegypti* (i.e., sticky traps) could be evaluated
- Safer longer lasting larvicides available (but no new adulticides)
- Cheap information management systems (computers) available for analysis and unlimited information (internet) available to assist programmes (www.afpmb.org)
- Free detailed mapping tools are available for many countries to assist in planning, operations, evaluation

THREATS

- Global economy may reduce income for countries and further restrict budgets
- Reintroduction of dengue to island nations is always a threat
- Introduction of other vector-borne diseases such as Chikungunya that have the same vectors.
- Insecticide resistance
- Climate variability (in the short term) and climate change (in the long term)
- Reluctance of local authorities to report dengue cases due to international health advisories issued by tourism source countries

Annex 18. REFERENCE DOCUMENTS

Bessoff K, Delorey M, Sun W, Hunsperger E. Comparison of two commercially available dengue virus (DENV) NS1 capture enzyme-linked immunosorbent assays using a single clinical sample for diagnosis of acute DENV infection. Clin Vaccine Immunol. 2008 Oct;15(10):1513-8. Epub 2008 Aug 6. http://www.ncbi.nlm.nih.gov/pubmed/18685015?ordinalpos=3&itool=EntrezSystem2.PEntrez.Pubmed.Pubmed_ResultsPanel.Pubmed_DefaultReportPanel.Pubmed_RVDocSum

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Hunsperger EA, Yoksan S, Buchy P, Nguyen VC, Sekaran SD, Enria DA, Pelegrino JL, Vázquez S, Artsob H, Drebot M, Gubler DJ, Halstead SB, Guzmán MG, Margolis HS, Nathanson CM, Rizzo Lic NR, Bessoff KE, Kliks S, Peeling RW. Evaluation of commercially available anti-dengue virus immunoglobulin M tests. Emerg Infect Dis. 2009 Mar;15(3):436-40. http://www.ncbi.nlm.nih.gov/pubmed/19239758?ordinalpos=2&itool=EntrezSystem2.PEntrez.Pubmed.Pubmed_ResultsPanel.Pubmed_DefaultReportPanel.Pubmed_RVDocSum

Thomas L, Kaidomar S, Kerob-Bauchet B, Moravie V, Brouste Y, King JP, Schmitt S, Besnier F, Abel S, Mehdaoui H, Plumelle Y, Najioullah F, Fonteau C, Richard P, Césaire R, Cabié A. Prospective observational study of low thresholds for platelet transfusion in adult dengue patients. Transfusion. 2009 Mar 20. [Epub ahead of print] http://www.ncbi.nlm.nih.gov/pubmed/19320862?ordinalpos=1&itool=EntrezSystem2.PEntrez.Pubmed.Pubmed_ResultsPanel.Pubmed_DefaultReportPanel.Pubmed_RVDocSum

Thomas L, Verlaeten O, Cabié A, Kaidomar S, Moravie V, Martial J, Najioullah F, Plumelle Y, Fonteau C, Dussart P, Césaire R. Influence of the dengue serotype, previous dengue infection, and plasma viral load on clinical presentation and outcome during a dengue-2 and dengue-4 co-epidemic. Am J Trop Med Hyg. 2008 Jun;78(6):990-8.
http://www.ncbi.nlm.nih.gov/pubmed/18541782?ordinalpos=3&itool=EntrezSystem2.PEntrez.Pubmed.Pubmed_ResultsPanel.Pubmed_DefaultReportPanel.Pubmed_RVDocSum

- **Annex 19. LIST OF CARIBBEAN SUBREGION IMS-DENGUE PARTICIPANTS BY WORKING GROUP**

Last name	First Name	Country	Institution	Function	E-mail	Phone
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CERON	Nicolas	Guyana	PAHO/GUY	Focal Point-CD	ceronnic@guy.paho.org	+1592 225 30 00
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NABETH	Pierre	France	WHO Lyon	Epidémiologiste	nabethp@who.int	+33 627 45 39 20
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SALAS	Rosa Alba	Trinidad	CAREC	Virologist	salasros@carec.paho.org	+1868 622 4262
TABARD	Philippe	Barbados	PAHO/CPC	Focal Point-CD	tabardph@cpc.paho.org	+1246 426 3860
By "Elluminate" from Trinidad						
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Clincal Group						
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MARENCO	Jose	Belize	MoH	Environmental Health Tech. Advisor	jmarenco@health.gov.bz	+501 822 23 63
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