THE DENGUE STRATEGIC PLAN FOR THE ASIA PACIFIC REGION 2008–2015

World Health Organization

Executive Summary

The Dengue Strategic Plan for the Asia Pacific Region (2008–2015) has been prepared in response to the increasing threat from dengue. Among an estimated 2.5 billion people at risk globally, about 1.8 billion (more than 70%) reside in the Asia Pacific Region. Development of this Strategic Plan is also important to meet the requirements of the International Health Regulations (IHR) 2005. The goal is to reverse the rising trend of dengue in the countries in the Region.

Countries in the Region vary in terms of their preparedness, their capacity to respond and in the allocation of financial resources in the prevention and control of dengue. The Strategic Plan provides generic recommendations to allow its local adaptation.

Dengue does not respect international boundaries. Effective dengue control is not possible if control efforts are limited to one country or a few countries. It requires the adoption of a regional approach through collaboration among countries and sustained partnerships to enable countries to implement evidence-based interventions and the use of best practices.

The Dengue Strategic Plan for the Asia Pacific Region will assist countries to enhance their outbreak preparedness and response, and limit dengue epidemics through effective prevention and control. The Strategic Plan should be implemented in harmony with the Strategic Framework for the Asia Pacific Dengue Partnership (APDP).

A key component of the Dengue Strategic Plan for the Asia Pacific Region is the Log Frame, which can be used as a road map to develop or improve upon existing national operational plans; to build capacity and strengthen health systems; to establish networking; to harmonize with the APDP strategic framework for mobilization of resources; to sustain ongoing information exchange; and to advocate for prevention and control of dengue. It should also assist in increasing access to innovation, including tools for the diagnosis, prevention and treatment of dengue.

1. Introduction

Dengue is the fastest emerging arboviral infection. The maximum burden is borne by countries of the Asia Pacific Region. Among an estimated 2.5 billion people at risk globally, about 1.8 billion—more than 70%—reside in Asia Pacific countries. Its epidemiology is rapidly evolving, with increased frequency of outbreaks and expansion to new geographical areas that were previously unaffected. Mortality is highest during the initial period of the outbreak or epidemic. Children in particular are at high risk of mortality as a result of complications and lack of access to prompt treatment.

The progressive worsening of dengue in the Asia Pacific Region is attributed to unplanned urban development, poor water storage and unsatisfactory sanitary conditions, all of which contribute to the proliferation of the main vector, the *Aedes aegypti* mosquito. High population density of the vector increases the opportunities for transmission of dengue.

The occurrence of dengue in one country is a threat to other countries, and the spread of dengue is worsened by increasing trade and travel. Therefore, dengue cannot be controlled if efforts are limited to one country. Hence, the WHO Regional Offices for the Western Pacific and South-East Asia decided to adopt a biregional approach in the Asia Pacific Region.

While current dengue control programmes in many Asia Pacific countries lack adequate resources and have limited response capacities in their health systems. Others have had more favourable experiences, including Malaysia, Singapore and Thailand. Although the interventions that are currently available have been relatively effective for more than two decades, there is clearly a need for the development of new and improved diagnostic, preventive and therapeutic tools. Until then, available tools should be used wisely. The cost of not doing so could be very high.

2. Guiding principles

The Dengue Strategic Plan for the Asia Pacific Region underpins the following guiding principles:

- collaboration, cooperation and biregional solidarity for effective and sustained prevention and control of dengue in countries of the Asia Pacific Region;

- use of existing policy frameworks and infrastructure for dengue prevention and control programmes, and integrating disease surveillance within the umbrella of basic health services;

- use of national, multi-country, biregional and global partnerships to support country activities;

- use of evidence-based interventions and best practices in developing and implementing dengue prevention and control programmes;

- use of networking to optimize available resources;

- intersectoral and inter-programmatic collaboration to maximize the provision of integrated services, e.g. links developed with the Asia Pacific Strategy for Emerging Diseases (APSED) to strengthen health systems for surveillance and contribute to IHR (2005); and

- adoption of evidence-based interventions that are currently available, while at the same time recognizing the need for vaccine development, improved diagnostics and other innovations for the prevention and treatment of dengue.

3.   Constraints, opportunities and lessons learnt

Dengue is the fastest-growing arbovirus infection with a rapidly evolving epidemiology. It is among 40 emerging diseases of global importance. The increasing burden of dengue in the Asia Pacific Region is a matter of serious concern since the disease is spreading to new geographical areas. Several countries continue to experience high mortality rates during the early stages of the epidemic, especially in children.

Dengue epidemics are an indication of the failure of public health systems to respond rapidly. Timely control of epidemics requires preparedness and capacity to undertake suitable and effective control activities during the inter-epidemic period. Resolution of an epidemic requires sustained high-level government commitment and strengthening of public health infrastructure, intersectoral collaboration and community participation.

The disease was until recently predominantly urban. Dengue outbreaks do tend to attract considerable adverse publicity and coverage in the media, whether an outbreak has been confirmed or is only rumoured. This may impact negatively on tourism and other industries, and result in heavy economic losses to countries affected by the disease.

Resources for dengue control programmes are insufficient. Among the biggest challenges in the prevention and control of dengue is the mobilization of resources to implement interventions that have

been known to be effective for more than two decades. At present, the allocation of funds for larval control and source reduction through community participation is very low, even though this approach has proven to be adequate.

There is no specific treatment for dengue fever (DF) and dengue haemorrhagic fever (DHF). Existing antiviral drugs are not effective for prevention or treatment. No vaccine exists for the prevention of dengue. Resources are required to strengthen capacity for research and development, to intensify efforts to develop a vaccine, and to improve diagnostic tools as well as treatment options. WHO and international partners need to advocate more to mobilize the required resources.

The spread of dengue involves many factors, making it a disease that calls for multisectoral actions for its prevention and control. Dengue should be a concern for everyone. But despite the worsening scenario, dengue has remained a neglected public health issue.

Although considerable progress has been made in source reduction and dengue prevention through intersectoral partnerships and community mobilization, these interventions have not been implemented widely enough to really have a national impact. Intercountry cooperation is required to have an impact across the entire Asia Pacific Region.

Evidence shows that case fatality rates can be reduced to 1% or less if cases of dengue haemorrhagic fever are admitted early and treated appropriately according to standard treatment procedures. Achieving this target would require strengthened capacity in large and small hospitals in standard case management of dengue haemorrhagic fever and dengue shock syndrome.

4.   Rationale for the strategy on prevention and control of dengue fever and dengue haemorrhagic fever

The emergence of dengue, its rapidly evolving epidemiology and the economic losses resulting from the disease make a compelling case for accelerating prevention and control efforts. The disease has attracted much media attention in recent years. Besides causing ill-health and excess mortality, it has affected socioeconomic development due to loss of work and impacts the private sector, such as the tourism industry.

The national programmes need to implement a healthy public policy as part of any development project, both in urban and rural areas. At present, the national programmes expend little resources in dengue control; and a major part of those expenses is incurred on insecticide sprays and chemical larvicides, which have little impact on controlling the epidemic. In contrast, evidence shows

that vector control through larval monitoring, source reduction and personal protection, combined with a good sanitary environment within households and in communities, are effective in preventing dengue.

Community participation and social mobilization for behaviour modification are beginning to render good results in different settings. Investing in this approach and in an integrated vector management (IVM) strategy needs to be encouraged.

Dengue prevention and control should be everyone's concern. The role of national policies is to strengthen the response to dengue within the health sector, facilitate intra-programmatic collaboration and effectively mobilize intersectoral collaboration.

The Dengue Strategic Plan for the Asia Pacific Region is intended to utilize currently available evidence-based interventions while advocating for intensified research in the development of a suitable vaccine, antivirus drugs and appropriate diagnostics for dengue.

5. Regional goal, vision and mission

The goal of the Dengue Strategic Plan for the Asia Pacific Region is to reduce the disease burden due to major parasitic and vectorborne diseases to such an extent that they are no longer major public health problems.

The vision of the Dengue Strategic Plan for the Asia Pacific Region is to minimize the health, economic and social impact of the disease by reversing the rising trend of dengue.

The mission of the Dengue Strategic Plan for the Asia Pacific Region is to enhance the capacity in countries and the Asia Pacific Region through partnerships, so that evidence-based interventions can be applied in a sustainable manner through better planning, prediction and early detection, characterization and prompt control and containment of outbreaks and epidemics.

Objectives

General objective

To reduce incidence rates of dengue fever and dengue haemorrhagic fever.

Specific objectives

(1)   To increase capacity of Member States to monitor trends and reduce dengue transmission.

(2) To strengthen the capacity of Member States to implement effective integrated vector management.

(3) To increase the capacity of health workers to diagnose and treat patients and improve health-seeking behaviour of communities.

(4) To promote collaboration among affected communities, national health agencies and major stakeholders to implement dengue programmes for behavioural change.

(5) To increase capacity to predict, detect early and respond to dengue outbreaks.

(6) To address programmatic issues and gaps that require new or improved tools for effective dengue prevention and control.

6. Supportive strategies

Dengue outbreaks and epidemics are reflections of the failure of public health systems to prevent and control dengue. Dengue is a neglected disease that gains attention during an epidemic. Public interest, as well as government commitment, tends to decline after the epidemic is controlled. Many of the affected countries do not even have a national programme. Its control requires a high level of sustained government and public commitment, strengthening of the public health infrastructure, intersectoral and intercountry collaboration, and community mobilization.

A number of supportive strategies are needed for effective implementation of the Dengue Strategic Plan for the Asia Pacific Region (2008–2015).

6.1 Mobilization of resources

Despite the growing threat of dengue, resources for the control of dengue have not increased. National and international support continues to remain far short of the needs, even though there are untapped resources at the national, regional and global levels. Countries need to prepare operational plans that identify funding gaps and devise an advocacy plan for mobilizing the resources on a sustained basis. The Asia Pacific Dengue Partnership (APDP) was conceived by WHO, Member States and other key stakeholders to play an important role in advocating on behalf of the countries to mobilize much needed resources for the prevention and control of dengue. The Dengue Strategic Plan for the Asia Pacific Region was developed taking APDP's role and responsibilities into consideration.

A national dengue prevention and control programme should be implemented as a part of national policy in Member States. Such a programme needs to find a niche and visibility within the existing disease surveillance programmes and should be linked to both the IHR (2005) and the vectorborne disease control programme. It has to be a part of basic health services and must find a place within the policy of decentralization in the national programme.

6.2 Partnerships

The Asia Pacific Dengue Partnership for dengue prevention and control was formed in March 2006. The Dengue Strategic Plan for the Asia Pacific Region recognizes that partnerships are required to mobilize additional resources for the prevention and control of dengue and to increase collaboration among countries. Sustained partnerships are crucial for showcasing the cause of dengue prevention and control through advocacy.

6.3 Programme planning and management

Effective programme management necessitates the preparation of an operational plan that identifies the resources committed and the resource gaps. The capacity of staff at different levels—national, subnational and district—in programme planning and management has to be increased. Human resource development is a key component of capacity development. The development of capacity for the prevention and control of dengue is not an isolated effort but an integral part of strengthening the health system for improving the control of vectorborne diseases, disease surveillance—including IHR (2005)—and the provision of basic health services. Capacity development is to be undertaken based on training needs, the institutional environment and national policy. Since health systems and policies vary throughout the Asia Pacific region, national dengue prevention and control programmes have to be consistent with the country situation. The Dengue Strategic Plan for the Asia Pacific Region should be used by countries as a framework to develop or improve upon existing operational plans.

Even within a decentralized or an integrated framework, it is necessary to identify the specific needs of dengue prevention and control so that control measures have adequate visibility. These include increased laboratory capacity, standard case management of dengue, and vector surveillance. Programme planning and management also includes developing a system for procurement, logistics and effective supply management. The health management information system and revamped surveillance are crucial in the context of dengue control since the disease often strikes in the form of outbreaks.

7.   Monitoring and evaluation

A monitoring and evaluation framework is necessary to track the progress of implementation of the operational plan. Monitoring should be results based, and the framework should include outcome and output indicators that are easily measurable and verifiable. The indicators are included in the log frame that follows (see Annex 1).

8.   Implementation of the Strategic Plan

The first draft of the Dengue Strategic Plan for the Asia Pacific Region was discussed at a meeting of partners on dengue from the Asia Pacific Region in Chiang Mai, Thailand, in March 2006. It was further developed to include a Log Frame during an informal consultation in Manila, Philippines, in August 2007. The informal consultation was attended by representatives of WHO and the United States Centers for Disease Control and Prevention, as well as leading regional experts in the field. The plan draft was further developed at a biregional programme managers meeting in Phuket, Thailand, in September 2007. The last draft was revised and finalized in May 2008 during a second biregional dengue meeting in Singapore, attended by most of the dengue programme managers in Western Pacific and South-East Asia Regions. It will be presented to the Regional Committee for the Western Pacific in September 2008 for consideration of endorsement.

During the May 2008 meeting in Singapore, programme managers agreed Member States would require assistance in preparing operational plans, with budgets, and in identifying funding and resource gaps as one of the initial steps that would need to be taken to implement the Dengue Strategic Plan for the Asia Pacific Region. Political, technical and managerial expertise in counties will need to be mobilized to increase capacity in order to implement the operational plans. To implement the Dengue Strategic Plan for the Asia Pacific Region it will be necessary to harness the expertise available in the countries through collaboration and networking. Additional technical guidance should be provided by a biregional technical advisory group to be appointed following endorsement of the biregional plan. Regular reviews of national programmes will be encouraged and efforts will be made to encourage research and development in such areas as diagnostics, drugs and a vaccine for the prevention and control of dengue in the Asia Pacific Region.

The Log Frame that follows provides a clear road map to the Dengue Strategic Plan for the Asia Pacific Region. The "general objective" mentioned above in Section 5 is referred to as the "regional objective" in the Log Frame. The specific objectives contained in the narrative section of this document are listed, as is the purpose of each of six components which constitute the backbone of the Log Frame and of the integrated dengue prevention and control approach.   Each of these

components comprises a set of expected results, indicators and activities (see Annex 1, Appendix 1). Countries will be able to achieve the Strategic Plan's objective, purposes and expected results in the context of their current capacities and policies.

LOG FRAME DENGUE STRATEGIC PLAN

Component I. Dengue Surveillance

Planning elements	Indicators	Verification source	Assumptions and risks
Regional goal			
To reduce the disease burden due to major parasitic and vectorborne diseases to such an extent that they are no longer major public health problems			
Regional objective			
To reduce incidence rates of dengue fever and dengue haemorrhagic fever	• The rising trend in dengue stemmed between 2008 and 2010 relative to 2005–2007 • Regional average reported incidence rate reduced by at least 20% (2010–2012 average versus 2005–2007) • Regional average reported incidence rate reduced by at least 20% (2013–2015 average versus 2010–2012) • Impact of outbreak mitigated[1]	Regular WHO updates Dengue outbreak response report	Political commitment Funds Human resources Coordination and surveillance systems in place
Purpose			
To increase capacity of Member States to monitor trends and reduce dengue transmission	• Number of Member States with surveillance system in place and reporting to WHO monthly • Number of Member States with national surveillance policy statements consistent with the IHR (2005) commitments • Number of Member States with resource commitments in place for dengue	Member States' monthly reports National policy statements National plan and budgets	Political commitment Funds Interest and capacity of stakeholders to participate

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[1] Measured by morbidity and mortality rates, number of cases, geographical containment, and duration of outbreak

Planning elements	Indicators	Verification source	Assumptions and risks
	programme based on surveillance data • Number of Member States whose interventions are based on surveillance data • Number of Member States able to report cases within 48 hours from health facility to programme level	Surveillance reports Guidelines on outbreak response	
Expected results			
1. Existing standard dengue case definition adopted	• Number of Member States using the standard case definition based on WHO guidelines • Number of Member States in which DF/DHF is notifiable	Policies on the use of standard case definition National plans and standard operating procedures National policy National legislation	Policies are applied by Member States
2. Laboratory surveillance strengthened	• Number of Member States with at least one laboratory able to serologically confirm dengue diagnosis, carry out serotyping and virus isolation procedures • Number of Member States with laboratories upgraded for improved surveillance (Note: needs to be defined) • Number of Member States with reference laboratories providing quality control and quality assurance (QC/QA) services • Number of regional reference laboratories providing QC/QA services • Number of Member States with laboratories participating in regional QC/QA	External evaluation reports (from WHO and peer reviewers) Cross-checking reports Network reports	Official acceptance of quality control mechanism Availability of sensitive tests Human and financial resources

Planning elements	Indicators	Verification source	Assumptions and risks
	• networks • Number of integrated laboratory networks established in the Asia Pacific Region		
3. Regional dengue information system developed	• System in place and functioning with information on trends and updated situation analysis • Regional website operational	Regional database Data on website	Political commitment Human resources Time availability of personnel assigned Human and financial resources
4. Mechanisms for sharing timely and accurate data strengthened	• Number of Member States reporting validated information, i.e. data on case incidence and case fatality rates (CFR), for working intervals (Note: different intervals may apply for case incidence and CFR) • Shared information system in place • Number of Member States that sign agreement to provide data into a shared surveillance system • Number of Member States whose monthly data of the previous quarter is accessible from the regional website (i.e. dengue information system)	Member States' monthly reports Agreements Website and/or DengueNet Signed agreement Data on website	Political commitment (i.e. Member States' willingness to share their data) Human resources User-friendly information system in place
5. Regional/intercountry response to timely advisory and resource (personnel, financial, stockpiling) mobilization improved	• Number of Member States that act upon advisory • Intercountry high-level discussions for coordinated response to dengue situation within the framework of IHR (2005) • Number of Member States reporting to WHO regional offices and	Advisories and reports on actions Meeting reports Country reports	Political commitment Funds Human resources

Planning elements	Indicators	Verification source	Assumptions and risks
	Headquarters as per IHR (2005)		
6. Incorporate dengue surveillance (case, vector and seroprevalence) into an integrated and strengthened disease surveillance system	• Number of Member States reporting dengue via the integrated diseased surveillance programme (IDSP) • Number of Member States in which dengue surveillance and vector surveillance are integrated	Country reports Programme review (e.g. programme managers meetings, external reviews)	Political commitment Funds Human resources
7. Monitoring member state surveillance systems	• Number of Member States subject to internal yearly monitoring and external monitoring every 3 years	Monitoring reports	Political commitment Funds Human resources

Activities	Outputs	Responsible	Resources and time frame
Expected result 1: Existing standard dengue (DF/DHF) case definition adopted and case fatality rate standardized			
1.1 Circulate standard case definition to Member States	• Standard case definition packaged and distributed	Programme managers WHO	Funds (e.g. during regional programme managers meetings) Q4 2008
1.2 Add DF and DHF on notifiable diseases list	• Legislation adopted: DF and DHF are notifiable diseases in all member countries in the Asia Pacific Region	Ministry of Health	Starting 2009
1.3 Circulate standard case fatality rate criteria to Member States	• Standard CFR criteria distributed and adopted	Programme managers WHO	Funds Q4 2008
1.4 Conduct internal discussions in country to promote standard case definition	• Agreements and discussion proceedings	WHO Surveillance authorities	Funds Documenter Q1 2009
1.5 Organize consultation with Member States for consensus	• Consensus reached during programme managers meeting (Note: meeting needs to happen during first quarter of 2009)	WHO Programme managers	Funds Q1 2009
1.6 Provide technical assistance for Member States to put in place the standard definition	• Terms of reference and list of qualified consultants • Appointment of consultant and dissemination of consultant's report	WHO Member States	Funds Expert Q1 2009
1.7 Support training for personnel where necessary	• Training results and reports	WHO regional offices WHO country offices	Funds Experts Partners Q2 to Q4 2009
Expected result 2: Laboratory surveillance strengthened			
2.1 Develop evaluation criteria, assess and/or map out current status and identify gaps of existing laboratories	• Inventory of laboratories and testing available • Assessment results and reports	Programme and/or laboratory managers WHO	Political commitment Funds Experts Q4 2008 to Q1 2009

Activities	Outputs	Responsible	Resources and time frame
2.2 Develop standards for all laboratories including quality assurance	• Laboratory standards and quality assurance procedures produced and disseminated to Member States • List of reference laboratories that meet standards	Regional reference laboratories in the Asia Pacific Region	Funds Experts Regional reference laboratory services Q4 2008 to Q1 2009
2.3 Integrate dengue into existing national/regional laboratory network and ensure that the network is functional	• Dengue serological confirmation and/or typing integrated into surveillance and routine reporting in laboratories at all levels • Functional (coordination and communication) laboratory network in place	Ministry of Health and related agencies WHO	Funds for monitoring and supervision Experts 2009 to 2015
2.4 Monitor laboratory performance once a year	• Performance reports from assessments • Plans for quality improvement	Programme managers Laboratory managers WHO regional offices WHO country offices	Funds Human resources Experts 2009 to 2015
2.5 Set up a national reference laboratory for virus isolation and characterization or integrate it into an existing emerging/ remerging diseases reference laboratory	• Reference laboratory in place with the capacity for virus isolation and characterization and seroprovalence	Ministry of Health WHO regional offices WHO country offices Partners	Funds Human resources Experts 2010+
2.6 Designate regional reference laboratories, at least one in each Region, and enhance country collaboration	• At least one regional reference laboratory designated in the South-East Asia Region and the Western Pacific Region	WHO regional offices Partners	Funds Experts 2009
2.7 Enhance laboratory capacity through training and human resource development	• Training courses for laboratory personnel conducted • Training guidelines developed	Ministry of Health National and regional reference laboratories WHO Partners	Funds Experts 2009 to 2015

Activities	Outputs	Responsible	Resources and time frame
Expected result 3: Regional dengue information system developed			
3.1 Agree on a dengue information system and designate national focal points	• System defined • Focal points available	Ministry of Health WHO	Political commitment Funds Q1 2009
3.2 Produce and disseminate guidelines	• Manual of operation	WHO Programme managers	Funds for training Expert Functional system Q2 2009
3.3 Develop and pilot test the information system at different levels within the health sector	• Functional system • Reports of Member States' experiences during pilot test • Evaluation and enhancement of system	WHO Programme managers	Funds for pilot test Expert Functional system Q3 2009 to Q4 2010
3.4 Support training on information system	• Training results and reports	WHO Programme managers	Funds for training Expert Facilitator Functional system 2011+
3.5 Implementation and use of the system	• Reports of Member States feeding and/or accessing data from the system	Programme managers	Human and financial resources 2011+
3.6 Monitor performance of the system and implement corrective action as needed	• Sustained use of the information system verified through monitoring reports	WHO Programme managers	Human resources and financial resources 2011+
Expected result 4: Mechanisms for sharing timely and accurate data strengthened			
4.1 Conduct mapping exercise of existing mechanism including information on how they function	• Inventory report of existing mechanisms for subnational, national and regional sharing of data	Programme managers WHO Ministry of Health	Funds Human resources 2009
4.2 Establish system for reporting timely (to be defined) and accurate data within the countries, within the Regions and between the two Regions	• Memorandum of understanding between WHO and Ministry of Health • Reporting system in place • Focal person in each Member State and at subnational level	Ministry of Health WHO regional offices WHO country offices	Funds Expert 2009

Activities	Outputs	Responsible	Resources and time frame
4.3 Support workshops to train on timely reporting of accurate data	• Training results and report	Ministry of Health Officers in VBDCTS responsible for dengue data WHO	Funds for training Experts 2009 to 2010
4.4 Conduct monitoring and assessments of the reporting system	• Reports by programme managers and reference laboratory managers to assess compliance with agreed upon standards	Programme managers Reference laboratories	Political commitment Funds Experts 2011+
Expected result 5: Regional and intercountry response to timely advisory and resource (personnel, financial, stockpiling) mobilization improved			
5.1 Use mechanisms established to exchange information within the IHR (2005) framework	• Protocol for intercountry response • List of contact persons • Regular information sharing between the two Regions	WHO regional offices WHO country offices Partners	Political commitment (all levels) 2010
5.2 Conduct orientation and briefing of WHO Representatives	• Mission reports	WHO regional offices WHO country offices	Funds 2009
5.3 Mobilize financial resources, personnel and stockpiles	• Funds, human resources available • Stockpiles defined, purchased and maintained	WHO country offices WHO regional offices	Focal points at regional and country offices 2009+
Expected result 6: Incorporate dengue surveillance (case, vector and seroprevalence) into an integrated and strengthened disease surveillance system			
6.1 Identify strengths and weaknesses of existing national diseases surveillance systems through mapping and desk review	• SWOT analysis	Ministry of Health WHO	Political commitment Funds Experts 2009
6.2 Initiate activities to address the weaknesses	• Strengthened national diseases surveillance system	Ministry of Health WHO	Political commitment Funds Experts 2010+

Activities	Outputs	Responsible	Resources and time frame
6.3 Operationalize and integrate dengue surveillance with the national disease surveillance system in accordance with IHR (2005)	• Integrated surveillance plan and/or framework • Testing operationalization of integrated plan at all levels	Ministry of Health WHO	Political commitment Funds Experts 2010+
6.4 Enhance the surveillance capacity through training and feedback	• Training programmes • Impact assessment of training programmes	Ministry of Health WHO Partners	Political commitment Funds Experts Ongoing
Expected result 7: Monitoring member state dengue surveillance systems			
7.1 Conduct external situation analysis of existing surveillance systems	• Monitoring reports	Ministry of Health WHO	Political commitment Funds Experts Every three years starting in 2010
7.2 Internal review of existing surveillance systems	• Monitoring reports	Ministry of Health	Political commitment Funds Experts Yearly starting in 2010

Component II. Dengue Integrated Vector Management

Planning elements	Indicators	Verification source	Assumptions and risks
Regional goal			
To reduce the disease burden due to major parasitic and vectorborne diseases to such an extent that they are no longer major public health problems			
Regional objective			
To reduce incidence rates of dengue fever and dengue haemorrhagic fever	• The rising trend in dengue stemmed between 2008 and 2010 relative to 2005–2007 • Regional average reported incidence rate reduced by at least 20% (2010–2012 average versus 2005–2007) • Regional average reported incidence rate reduced by at least 20% (2013–2015 average versus 2010–2012) • Impact of outbreak mitigated [2]	Regular WHO updates Dengue outbreak response report	Political commitment Funds Human resources Coordination and surveillance systems in place
Purpose			
To strengthen the capacity to implement effective integrated vector management	• Number of Member States with vector control policies implemented	National policy statements Programme reports	Political commitment Funds
Expected results			
8. Vectors fully described and vector indicators regularly monitored	• Number of Member States monitoring and reporting • Reports of identified vector key containers and/or habits • Records of changes in vector populations • Number of Member States reporting reduced vector population	Annual reports Vector surveillance reports	Availability of qualified vector surveillance team Funds

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[2] Measured by morbidity and mortality rates, number of cases, geographical containment, and duration of outbreak

Planning elements	Indicators	Verification source	Assumptions and risks
9. Regional integrated vector management (IVM) strategy developed	• Regional IVM strategy produced and disseminated	Regional strategy	Political commitment Funds
10. Evidence-based strategies to control vector populations adopted according to IVM principles	• Number of Member States that have adopted IVM strategy and guidelines as an integral component of their dengue national plan • Number of countries that have adopted healthy public policy • Number of Member States with regulatory mechanisms in place in relation to environment and pesticide management • Number of partners and/or sectors participating in and contributing to vector control	National policy statements Regulatory mechanisms Plans of key sectors and/or agencies integrating vector control	Political commitment Funds Availability of qualified vector surveillance team
11. Member State-level IVM strategy and guidelines developed consistent with regional strategy	• Number of Member States with IVM implementation plan • Number of Member States adhering to the regional IVM implementation guidelines	National plan with IVM component Implementation guidelines	Political commitment of Ministry of Health and other sectors
12. Capacity strengthened to implement IVM including training and recruitment of entomologists	• Number of Member States implementing IVM for control of dengue • Number of Member States with non-health-related staff trained on IVM • Number of Member States with trained entomologists supporting IVM activities • Number of Member States with trained personnel at national and subnational levels implementing IVM activities (e.g. changes in water management,	Training reports Progress reports on national plan implementation	Political commitment Interest of agencies and public sector Staff motivation and incentives

Planning elements	Indicators	Verification source	Assumptions and risks
	changes in architectural design, environmental modification, solid waste management)		
13. Mechanisms to facilitate community involvement for vector control established[3]	• Number of Member States with organized community-based groups planning and implementing vector control activities	Survey reports to identify groups	Staff motivation and incentives
14. Rational use of insecticide for vector control promoted	• Number of Member States with policies and/or guidelines on the rational use of insecticides based on the guidelines of the WHO Pesticide Evaluation Scheme (WHOPES) • Number of Member States that enforce guidelines	Reports from regulatory agencies Annual reports	Political commitment Local expertise
15. Vector resistance monitoring strengthened	• Number of Member States that have established a vector resistance monitoring system	Monitoring results	Funds Local expertise

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[3] Community involvement in vector control elaborated in Component IV. Social Mobilization and Communication for Dengue

Activities	Outputs	Responsible	Resources and time frame
Expected result 8: Vectors fully described and vector indicators regularly monitored			
8.1 Analyse and review current vector surveillance activities and availability of baseline data	• Baseline data on vector distribution, ecology abundance and seasonal trends gathered for one year	Ministry of Health WHO collaborating centres (data to be gathered from other available sources if necessary)	Funds Experts Q4 2009
8.2 Develop vector surveillance plan at national level (lower levels if needed)	• Vector surveillance plan to include: • stratified areas at risk for intervention identified (district, provincial levels); • frequency and coverage of surveys.	Ministry of Health with support of WHO country focal point	Ministry of Health commitment Funds Experts
8.3 Develop training manual and guidelines on vector surveillance	• Training needs assessment in terms of available resources and target groups • Training manual on vector surveillance disseminated	Ministry of Health WHO	Funds Experts
8.4 Training on vector surveillance methods including data analysis and reporting	• Training results and reports • Training of trainers and refresher courses to be considered	Ministry of Health WHO	Funds Experts
Expected result 9: Regional IVM strategy developed			
9.1 Develop guidelines for situation analysis and needs assessment on IVM	• Guidelines developed and disseminated	WHO regional offices	Funds Experts 2008–2009
9.2 Conduct meetings with programme managers to finalize the regional IVM strategic plan 9.3 Establish IVM intersectoral task force to develop the national IVM strategy	• Agreements recorded in minutes of meetings • Regional and national strategies • Financial proposal outlining needs for potential funding	WHO regional offices WHO country offices Ministry of Health Partners	Funds
Expected result 10: Evidence-based strategies to control vector populations adopted according to IVM principles			
10.1 Organize workshops on geographic information	• Develop risk maps at appropriate levels	Ministry of Health	Funds Technical support 2009–2010

Activities	Outputs	Responsible	Resources and time frame
systems (GIS) or basic mapping methods			
10.2 Develop vector control plan and/or strategy based on mapping	• Vector control strategy developed based on risk mapping	Ministry of Health WHO Partners	Funds Experts
10.3 Conduct periodic re-mapping (to be linked to periodic surveillance 8.1)	• Vector maps periodically updated	Ministry of Health WHO Partners	Funds Expert Collaborating centres for vector control
10.4 Carry out vector control trials and/or pilot test for evidence-based IVM approach at local levels	• Documented evidence-based strategies with appropriate indicators	Ministry of Health Research and collaborating centres in collaboration with other agencies (e.g. Global Environment Facility)	Funding for pilot Experts
Expected result 11: Member States adopt or develop IVM strategy and guidelines consistent with regional strategy			
11.1 Disseminate regional IVM strategy among programme staff	• National plans that incorporate IVM	Programme managers WHO regional offices WHO country offices	Funds Human resources 2009
11.2 Conduct internal discussion and analysis within programmes to encourage adoption and integration into national plans	• Agreements recorded in minutes	Programme managers WHO regional offices WHO country offices	Funds Experts
11.3 Identify and select IVM task force and draft strategy	• National IVM strategy	Ministry of Health WHO	Funds Experts
11.4 Obtain political support for strategy	• Political commitment from national government	Prime Minister's or President's office Ministry of Health Programme managers Chair of the national IVM task force	Effective advocacy (e.g. Melanesian Spearhead Group, ASEAN heads of government)
11.5 Mobilize intersectoral support for IVM	• Intersectoral collaboration (including public and private sector)	Ministry of Health WHO Partners	Effective advocacy among other sectors Funds

Activities	Outputs	Responsible	Resources and time frame
Expected result 12: Capacity to implement IVM including training and recruitment of entomologists strengthened			
12.1 To assess the national need for entomologists and regional entomology training centres	• Entomologist need assessment • Regional training to address needs of countries	Ministry of Health or Ministry of Environment	Funds 2009–2010
12.2 Mapping of entomologists or other qualified technical support at the regional level (including vector control personnel)	• List of personnel working as entomologists and on vector control	Programme managers	Funds Experts
12.3 Training of entomologists and vector control personnel on IVM	• Entomologists and vector control personnel trained on IVM • Training results and reports • Integrated training to include entomology	WHO Headquarters WHO regional offices WHO country offices	Funds Experts
Expected result 13: Mechanisms to facilitate community involvement for vector control established [4]			
13.1 Conduct assessment of Member States that have organized community-based groups	• Assessment results and report • Inventory of available advocacy resources for community awareness in Member States	Programme managers WHO Partners Urbani School Health Kit	Funds Experts 2009
13.2 Committee to be setup to provide technical support on social mobilization	• Task force set up • Country could establish their own task force	Ministry of Health WHO	Resources
13.3 Disseminate and conduct advocacy based on results of assessment	• Documents, website and/or reports on good practices • Advocacy of political leaders	WHO Programme managers	Political will Funds
13.4 Develop orientation modules on community involvement for vector control	• Modules available for various target groups • Contents to be target group specific	WHO regional offices WHO country offices Partners	Funds Experts

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[4] Community involvement in vector control elaborated in Component IV. Social Mobilization and Communication for Dengue

Activities	Outputs	Responsible	Resources and time frame
13.5 Conduct orientation among Member States on the developed modules	• Orientation workshop agendas and reports for community groups	Programme managers Community leaders Civil society	Funds Experts
Expected result 14: Rationale use of insecticide for vector control promoted			
14.1 Draft legal framework for judicious use of chemical insecticides	• Develop draft legislation	Ministries of Agriculture, Health and Environment Focal point on Stockholm Convention, etc.	Intersectoral coordination
14.2 Provide WHOPES guidelines on pesticide management to Member States	• Recommendations during regional programme managers meeting • National policy on rational use of insecticides according to WHOPES guidelines • Member States' guidelines adapted from WHOPES • Annual reporting of insecticide use	WHO Ministry of Health	Political will Funds
Expected result 15: Vector resistance monitoring strengthened			
15.1 Provide regional training on vector resistance monitoring	• Regional training conducted	WHO	Funds
15.2 Identify monitoring sites for insecticide resistance and collect baseline data	• Maps showing current levels of resistance to insecticides in use: species, insecticide, location	National vectorborne disease contol programme (VBDCP)	Political will Funds for field collection, laboratory testing, compiling and reporting data
15.3 Collection of data in monitoring sites at two- to three-year intervals	• Updated maps showing recorded changes in effectiveness of insecticides	National VBDCP WHO	Political will Funds for field collection, laboratory testing, compiling and reporting data
15.4 Use data to change national policy	• Change policy on purchase and use of insecticides based on results of resistance tests	Ministry of Health Ministry of Environment WHO Partners	Funds Political will
15.5 Develop guidelines and train personnel on use of new insecticides	• New guidelines issued • Training results and reports	National VBDCP Regulatory procurement authorities WHO	Funds for new guidelines and training

Component III. Dengue case management

Planning Elements	Indicators	Verification source	Assumptions and risks
Regional goal			
To reduce the disease burden due to major parasitic and vectorborne diseases to such an extent that they are no longer major public health problems			
Regional objective			
To reduce incidence rates of dengue fever and dengue haemorrhagic fever	• The rising trend in dengue stemmed between 2008 and 2010 relative to 2005–2007 • Regional average reported incidence rate reduced by at least 20% (2010–2012 average versus 2005–2007) • Regional average reported incidence rate reduced by at least 20% (2013–2015 average versus 2010–2012) • Impact of outbreak mitigated [5]	Regular WHO updates Dengue outbreak response report	Political commitment Funds Human resources Coordination and surveillance systems in place
Purpose			
To increase health workers' capacity to diagnose and treat patients and improve health-seeking behaviour of communities	• Case fatality rate (CFR) • Number of patients who seek consultation in health facilities within 48 hours of fever onset • Notification as early as possible	Surveillance reports (day of illness at time of notification) Death records Community-based survey results[6]	Political commitment Funds Standardized definition of case and CFR Deaths are properly recorded
Expected results			
16. Public awareness on warning signs and actions to be taken for dengue, increased	• Proportion of target population able to identify key warning symptoms and take appropriate action	Comparative analysis of knowledge, attitude and practices (KAP) and communication for behavioural impact (COMBI) survey results (pre and post)	Funds Facilitators Willingness of communities

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[5] Measured by morbidity and mortality rates, number of cases, geographical containment, and duration of outbreak.

[6] Community-based surveys shall be conducted in conjunction with KAP surveys under Component IV. Social mobilization and communication for dengue.

Planning Elements	Indicators	Verification source	Assumptions and risks
17. Strengthen capacity of health care providers to diagnose, treat or refer cases	• Number of health facilities per country that have standard training guidelines • Number of Member States with health workers trained on case management • Number of Member States with health workers who apply standard case management • Proportion of health facilities with at least one trained health professional • Number of Member States that have a functional clinical management committee • Percentage of Member States' health care facilities with reorganized services for patient care • Number of Member States with a functional blood bank	Follow-up, observation and/or monitoring reports Health facility records Survey of facilities Standards for case management Listing of available blood banks	Funds Facilitators Interest and willingness of health facilities Cases are properly recorded
18. Laboratory support for case management improved	• Number of health facilities and/or laboratories per Member State capable of performing laboratory clinical tests (i.e. complete blood count, at the very least a microhaematocrit and microscope for platelet count)	Health facility records Survey of facilities Ministry of Health records Laboratory records	Funds Willingness of hospital authorities Available equipment Competent personnel
19. Referral network system in public and private sectors established	• Number of Member States with a functional patient referral system	Ministry of Health report External review	Funds Experts

Activities	Outputs	Responsible	Resources and time frame
Expected result 16: Public awareness on warning signs and actions to be taken for dengue increased			
16.1 Conduct KAP[7] survey and investigate constraints to early health care seeking by the communities	• KAP survey results	Ministry of Health	Political commitment Funds Human resources Q1 2009
16.2 Develop and implement COMBI approach	• Improvement in KAP as against baseline	COMBI resource group[8] Partners	Funds Human resources Q3 2009–Q1 2010
16.3 Assess impact of COMBI strategy on behavioural change	• COMBI impact assessment	COMBI resource group[9]	Funds Experts Six months after implementation
16.4 Evaluation of sustainability of COMBI strategy	• Monitoring and evaluation report	COMBI resource group	Funds Experts 12 months after implementation
Expected result 17: Capacity of health professionals to diagnose, treat or refer cases strengthened			
17.1 Set up a core group (clinical management committee) composed of public and private sector and other stakeholders	• Terms of reference and work plan for clinical management committee	Ministry of Health WHO Partners	Funds Political commitment Q4 2008 at the latest
17.2 Conduct situation analysis and map capacity levels of public and private health professionals	• Assessment results and reports[10]	Ministry of Health WHO Clinical management committee Partners	Experts Funds Q1 2009
17.3 Develop training programmes and guidelines for different target groups	• Training programmes, modules with guidelines and content areas	Ministry of Health WHO Clinical management committee	Experts Funds Q1 2009

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[7] Knowledge, attitude and practices (KAP) survey will be conducted in conjunction with Component IV. Social Mobilization and Communication for Dengue.

[8] Refer to Component IV, Expected Result 1.

[9] Refer to Component IV, Expected Result 1.

[10] Assessment should include training gaps and other capacity needs such as medical supplies and equipment.

Activities	Outputs	Responsible	Resources and time frame
17.4 Conduct training for various target groups, starting with priority areas	• Training results and reports	Ministry of Health WHO Partners	Experts Funds Q2 2009–Q4 2009
17.5 Monitor implementation of training and health care management capacity	• Monitoring reports showing extent to which targeted facilities adhere to guideline • Targeted facilities with effective system in place	Ministry of Health WHO Clinical management committee	Experts Funds Q3 2010
17.6 Monitor the management and outcome of severe cases (DHF/DSS)	• Case fatality rate	Ministry of Health Clinical management committee WHO	Funds Ongoing
17.7 Conduct mortality review	• Chart review • Clinical audit	Ministry of Health Clinical management committee	Experts Funds Ongoing
17.7 Establish and/or strengthen capacity at blood bank to respond to DHF/DSS	• A system in place capable of adequately addressing needs in complicated cases	Ministry of Health Partners	Funds Equipment Human resources Q1 2009
Expected result 18: Laboratory support for case management improved			
18.1 Conduct situation analysis on clinical laboratory capacity including private sector	• Situation analysis report with identified gaps in infrastructure, supplies and human resources	Ministry of Health Clinical management committee Partners	Experts Funds Private sector involvement Q1 2009
18.2 Strengthen capacities (supplies, infrastructure)	• Laboratories are properly equipped	Ministry of Health Public and private health laboratories	Funds Private sector involvement Experts Q3 2009
18.3 Build capacity building of personnel – develop training modules	• Training programmes and modules and content areas	Ministry of Health Public and private health laboratories Clinical management committee	Funds Private sector involvement Experts Q2 2009

Activities	Outputs	Responsible	Resources and time frame
18.4 Conduct training	• Training results and reports	Ministry of Health WHO Clinical management committee Public and private health laboratories	Funds Private sector involvement Experts Q3 2009–Q4 2009
18.5 Monitor implementation of laboratory practices	• Monitoring reports showing extent to which targeted facilities adhere to guideline • Targeted facilities with effective system in place	Ministry of Health WHO Clinical management committee Public and private health laboratories	Funds Private sector involvement Experts Q1 2010
18.6 Quality control of laboratory facilities (following national and/or WHO guidelines)	• Checklist • Blind controls	Ministry of Health WHO Clinical management committee Public and private health laboratories	Funds Private sector involvement Experts Ongoing from Q1 2010
Expected results 19: Referral network system in public and private sectors established			
19.1 Set up proper referral network mechanisms	• Documented referral network system available • Impact assessments on CFR available	Ministry of Health Clinical management committee Partners	Human resources Funds Private sector involvement Q1 2009
19.2 Make provisions for hotline consultation and communication	• Functional hotline in place • Regular monitoring mechanisms of hotline • Impact assessments of hotline on CFR	Ministry of Health Clinical management committee Partners (practitioners)	Human resources Funds Private sector involvement Q1 2009
19.3 Provide adequate transport for potentially complicated cases	• Regular monitoring reports especially during outbreaks • Impact assessments on CFR	WHO Ministry of Health Clinical management committee Partners	Human resources Funds Private sector involvement Q1 2009

Component IV. Social Mobilization and Communication for Dengue

Planning elements	Indicators	Verification source	Assumptions and risks
Regional goal			
To reduce the disease burden due to major parasitic and vectorborne diseases to such an extent that they are no longer major public health problems			
Regional objective			
To reduce incidence rates of dengue fever and dengue haemorrhagic fever	• The rising trend in dengue stemmed between 2008 and 2010 relative to 2005–2007 • Regional average reported incidence rate reduced by at least 20% (2010–2012 average versus 2005–2007) • Regional average reported incidence rate reduced by at least 20% (2013–2015 average versus 2010–2012) • Impact of outbreak mitigated [11]	Regular WHO updates Dengue outbreak response report	Political commitment Funds Human resources Coordination and surveillance systems in place
Purpose			
To promote collaboration among affected communities, national health agencies and major stakeholders to implement dengue programmes for behavioural change	• Number of national dengue control programmes engaged in community-based social mobilization and communication strategies that are changing behaviour towards dengue prevention and control	Regional and national plans	Political commitment Funds Interest and commitment of the communities and other major stakeholders
Expected results			
20. Establish a COMBI resource group[12] for COMBI implementation	• COMBI resource group established and interacting with relevant agencies of dengue control programme	Reports from COMBI resource group	Funds COMBI expert Availability of resource groups and/or coordinator

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[11] Measured by morbidity and mortality rates, number of cases, geographical containment, and duration of outbreak.

[12] The COMBI resource group is conceived as a professional service provider that supports development and implementation of COMBI programmes, training of personnel and impact assessment.

Planning elements	Indicators	Verification source	Assumptions and risks
21. Assessment including situation analysis of current strategies (social mobilization, health education) and extent and success of COMBI if implemented (with respect to dengue and other vectorborne diseases)	• Assessment reports by Member States	Assessment reports	Funds Social and/or behavioural expert
22. COMBI training implemented	• Number of countries benefiting from COMBI training	Training materials Training report	Funds Experts Political commitment
23. COMBI approach disseminated and promoted	• Number of Member States committed to COMBI	Promotional materials Reports of activities Mission reports	Other social mobilization approaches have not been effective
24. Development and implementation of COMBI plan supported	• Number of Member States adopting COMBI in their National Plan • Number of Member States designating national COMBI focal point	COMBI plan National COMBI focal point	Political endorsement Funds Availability of resource group
25. Partnerships set up with private sector and other major stakeholders	• Number of partnership agreements with private sector and other major stakeholders	Memoranda of understanding Reports of meetings and joint planning exercises	Interest of private sector and other major stakeholders

Activities	Outputs	Responsible	Resources	Time frame
Expected result 20: COMBI resource group[13] for COMBI implementation set up				
20.1 Prepare terms of reference for COMBI resource group	• Terms of reference	WHO COMBI experts (in consultation with Member States)	Funds	Q1 Year 1
20.2 Identify experts and practitioners with experience in COMBI training, implementation and assessment, and social mobilization and communication	• Roster of qualified experts and their availability • Multi-agency and multisectoral COMBI resource group established	WHO COMBI experts (in consultation with Member States)	Political commitment Funds Experts	Q1 Year 1
20.3 Convene meeting and brief resource group	• Business plan	WHO COMBI experts (in consultation with Member States)	Funds Experts	Q2 Year 1
Expected result 21: Assessment including situation analysis of current strategies (social mobilization and health education) and extent and success of COMBI if implemented (with respect to dengue and other vectorborne diseases)				
21.1 Develop terms of reference on process for conducting the assessment	• Terms of reference	Resource group (in consultation with Member States)	Funds	Q2 Year 1
21.2 Conduct assessment for each Member State	• Assessment report	Resource group Member States	Funds Experts	Q3 and Q4 Year 1
Expected result 22: COMBI training implemented				
22.1 Modify COMBI training curriculum adapted to country setting and based on the outcome of the assessment	• Modified training curriculum	Resource group Member States	Funds Political commitment Experts	Q1 Year 2
22.2 Conduct COMBI training	• COMBI training conducted	Resource group Member States	Funds Political commitment Experts	Q2 Year 2

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[13] The COMBI resource group is conceived as a professional service provider to support development and implementation of COMBI programmes, training of personnel and impact assessment.

Activities	Outputs	Responsible	Resources	Time frame
Expected result 23: COMBI approach disseminated and promoted				
23.1 Request each Member State to designate a country COMBI team	• Local COMBI teams appointed	Resource group Member States	Political commitment	Q3 Year 2
23.2 Compile COMBI orientation package	• COMBI package developed (available online)	Resource group	Funds Expert	Q3 Year 2
23.3 Advocate COMBI to stakeholders at country level	• Reports of advocacy meetings with stakeholders	Resource group Country COMBI teams	Funds	Q3 and Q4 Year 2
Expected result 24: Development and implementation of COMBI plan supported				
24.1 Facilitate the development of country COMBI plans	• Country COMBI plans developed	Resource group (in collaboration with country COMBI teams)	Funds Experts	Q4 Year 2
24.2 Secure funding and resources needed before implementation	• Funding and resources secured	Country COMBI teams Resource group	Experts Political Commitment	Q4 Year 2
24.3 Implement COMBI plan	• Plan implemented	Country COMBI team (supported by resource group)	Funds Experts Human resources	Q1 Year 3
24.4 Monitor and evaluate implementation of COMBI plan	• Progress and evaluation reports • Publication of experiences	Country COMBI team (supported by resource group)	Funds Human resources Experts	From Q2 Year 3
Expected result 25: Partnerships set up with private sector and other stakeholders				
25.1 identify key stakeholders (e.g. donor communities, private sector) who can make significant contributions towards dengue control programme at regional level	• Number of stakeholders identified	Resource group (in consultation with Member States) Stakeholders	Political commitment	Q1 Year 1
25.2 Formalize partnerships through memoranda of understanding	• Memoranda of understanding defining roles and commitments of each partner	Resource group (in consultation with Member States) Key stakeholders and partners	Political commitment Funds	Q2 Year 1

Activities	Outputs	Responsible	Resources	Time frame
25.3 Develop workplans	• Strategies and activities defined in workplans and/or proposals	Resource group (in consultation with Member States) Key stakeholders and partners	Funds Experts	Q2 and Q3 Year 1
25.4 Implement commitments	• Report of accomplishments	Resource group (in consultation with Member States) Key stakeholders and partners	Funds Human resources	Q3 Year 1
25.5 Disseminate reports and achievements	• Publication • Media exposure	Resource group (in consultation with Member States) Key stakeholders and partners	Funds Experts	From Q3 Year 1

Component V. Dengue Outbreak Response

Planning elements	Indicators	Verification source	Assumptions and risks
Regional goal			
To reduce the disease burden due to major parasitic and vectorborne diseases to such an extent that they are no longer major public health problems			
Regional objective			
To reduce incidence rates of dengue fever and dengue haemorrhagic fever	• The rising trend in dengue stemmed between 2008 and 2010 relative to 2005–2007 • Regional average reported incidence rate reduced by at least 20% (2010–2012 average versus 2005–2007) • Regional average reported incidence rate reduced by at least 20% (2013–2015 average versus 2010–2012) • impact of outbreak mitigated [14]	Regular WHO updates Dengue outbreak response report	Political commitment Funds Human resources Coordination and surveillance systems in place
Purpose			
To increase capacity to predict, detect early and respond to dengue outbreaks	• Number of Member States with an effective early warning system in place and articulated into existing epidemic response (i.e. pandemic influenza, global outbreak alert response network) • Number of Member States that have allocated financial and human resources for dengue outbreak response • Number of Member Sates with a rapid response system in place and the core capacity to respond as per IHR (2005) requirements	Emergency operation centre records and IHR (2005) focal point appointed National plans and budgets Bureau of epidemiology IHR (2005) focal point reports	Political commitment Funds Human resources

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[14] Measured by morbidity and mortality rates, number of cases, geographical containment, and duration of outbreak

Planning elements	Indicators	Verification source	Assumptions and risks
26. Early warning system and dengue surveillance system developed and scaled up	• Number of countries having operationalized early warning system based on disease surveillance data, epidemiological information, virus serotypes (from Component I), vector densities/distribution (from Component II) and environmental data (i.e. rainfall, temperature) and notify within (xx) period of time	Member States' surveillance reports	Political commitment Funds Human resources Functional surveillance system
27. Standard operating procedures (SOPs) and system developed for dengue outbreaks	• Number of Member States with dengue outbreak SOPs in place • Number of Member States with adequate designated staff and necessary infrastructure in place • Number of Member States with the capacity to respond to dengue outbreaks by following standard operating procedures	Standard operating procedures manual Staffing records National plans and SOPs manuals	Funds Experts
28. Coordination mechanisms within the Ministry of Health and with other programmes and sectors established	• Number of Member States with functional intersectoral dengue emergency task force	Terms of reference for dengue emergency task force Reports of task force	Funds Experts
29. Intercountry coordination mechanisms in place	• Number of intercountry meetings held • Number of biregional coordinating meetings	Intercountry meeting reports Biregional meeting reports	Funds Political commitment
30. A mechanism to incorporate rumour surveillance developed and implemented	• Number of Member States with a mechanism (IHR framework) incorporating rumour surveillance into the national surveillance system • Number of Member States with a system incorporating focal persons (health workers) to verify rumours in the community • Number of Member States with the capacity to verify outbreaks within a specified number of hours	National surveillance reports WHO and partners mission reports, outbreak investigation team reports	Funds Experts Political commitment

Planning elements	Indicators	Verification source	Assumptions and risks
31. Regional outbreak response guidelines developed	• Regional outbreak response guidelines available	Copy of regional guidelines	Funds Experts Human resources
32. The ability of health workers to respond to the dengue outbreak strengthened	• Number of Member States with outbreak response guidelines and training manuals for health workers available • Number of Member States with responsible health workers trained on outbreak response SOPs	National training report[15] Staffing records	Funds Human resources Staff motivation
33. Risk communication plan developed	• Risk communication plan with clear roles and responsibilities in communicating with the public • Number of Member States with programmes incorporating risk communication included in their national plan • Number of Member States with standard operating procedures for media interaction	Copies of regional risk communication plan National plan Written SOPs	Political commitment Funds Experts

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[15] Showing results of competence tests on standard operating procedures and guidelines

Activities	Outputs	Responsible	Resources and time frame
Expected result 26: National early warning system/dengue surveillance system developed and scaled up			
26.1 Agree and adhere to components of early warning system	• Outbreak response plans • Adherence to IHR (2005) commitments	Ministry of Health (or relevant agency) WHO	Political commitment Funds Human resources Functional EOC at Ministry of Health and WHO Q4 Year 2
26.2 Develop guidelines for early warning systems	• Guidelines	Ministry of Health (or relevant agency) WHO	Funds Experts Q4 Year 2
26.3 Develop indicators for forecasting of outbreaks.	• Expert meeting report	WHO Experts	Funds Experts Q4 Year 2
26.4 Establish system of weekly reporting	• Weekly reports	Ministry of Health (or relevant agency)	Political commitment Funds Q1 Year 3
Expected result 27: Dengue outbreak standard operating system developed			
27.1 Development of SOPs including triggers for declaring outbreaks and defining stakeholders and their roles and responsibilities	• SOPs manual	Ministry of Health (or relevant agency) WHO	Political commitment Funds Human resources Q4 Year 1
27.2 Training in the use of SOPs	• Training report	Ministry of Health (or relevant agency) WHO	Funds Human resources Q2 Year 2
27.3 Monitoring use of SOPs	• Monitoring reports	WHO Ministry of Health (or relevant agency)	Funds Human resources Annually beginning Q4 Year 2
Expected result 28: Coordination mechanisms within the Ministry of Health and with other programmes and sectors established			
28.1 Constitute an intersectoral dengue emergency task force	• Intersectoral task force coordinated by the Ministry of Health or relevant agency • Minutes and accords resulting from intersectoral meetings within the public as well as involving the private sector	Ministry of Health (or relevant agency) WHO Other sectors	Political commitment Funds Human resources Interest of other sectors Q1 Year 2

Activities	Outputs	Responsible	Resources and time frame
28.2 Collaboration with other health programmes and disease surveillance	• Interdepartmental joint plans, reports and records of intervention	Ministry of Health WHO	Funds Political commitment Q2 Year 2
Expected result 29: Intercountry coordination mechanisms in place			
29.1 Intercountry coordination meetings (four to five)	• Meeting reports	WHO Ministry of Health	Political commitment Funds Human resources
29.2 Biregional meetings (two)	• Meeting reports	WHO	Funds
29.3 Share-point site or equivalent intercountry and biregional communication mechanism	• Electronic communication system in place	Ministry of Health WHO	Funds Human resources Q2 Year 2
Expected result 30: A mechanism to incorporate event-based surveillance developed and implemented			
30.1 Establish effective media and rumour scanning mechanism	• Effective media scanning mechanism in place	Ministry of Information Ministry of Health WHO	Political commitment Media participation Funds Human resources Q2 Year 2
30.2 Strengthen rumour verification mechanism	• Effective rumour verification mechanism in place	Ministry of Health WHO Partners (e.g. CDC)	Political commitment Funds Human resources Q1 Year 3
Expected result 31: Regional outbreak response guidelines developed			
31.1 Develop regional outbreak response guidelines and SOPs targeting different levels	• Guidelines • SOPs	Ministry of Health WHO	Political commitment Funds Experts Q2 Year 2
Expected result 32: The ability of health workers to respond to the dengue outbreak strengthened			
32.1 Mapping of personnel already engaged in outbreak response (e.g. avian influenza)	• Inventory of trained staff in outbreak response (e.g. avian influenza)	Ministry of Health Other ministries (e.g. Environment) WHO	Political commitment Funds Human resources Q2 Year 1
32.2 Training need assessment	• Assessment report	Ministry of Health WHO	Funds Human resources Q2 Year 1

Activities	Outputs	Responsible	Resources and time frame
32.3 Training in outbreak response	• Training reports	Ministry of Health Other ministries (e.g. Environment) WHO	Political commitment Funds Human resources Q2 Year 2
Expected result 33: Risk communication plan developed			
33.1 Develop risk communication plan and incorporate it into dengue outbreak SOPs and incorporate risk communication components specific to dengue into existing epidemic alert and response risk communication plan	• Risk communication plan to be incorporated into dengue outbreak SOPs • Risk communication components specific to dengue incorporated into existing epidemic alert and response risk communication plan	Ministry of Health Other ministries (e.g. Environment) WHO	Political commitment Funds Human resources Q4 Year 1
33.2 Training of focal points in all relevant aspects of risk communication	• Training reports	Ministry of Health Other ministries (e.g. Environment) WHO	Funds Human resources Q2 Year 2
33.3 Collaborate with other sectors to harmonize implementation of risk communication	• Joint plans • Intersectoral meeting reports	Ministry of Health Other ministries (e.g. Environment) WHO	Funds Human resources Q4 Year 2

VI. Dengue research

Planning Elements	Indicators	Verification Source	Assumptions and risks
Regional goal			
To reduce the disease burden due to major parasitic and vectorborne diseases to such an extent that they are no longer major public health problems			
Regional objective			
To reduce the morbidity and mortality rates due to dengue fever and dengue haemorrhagic fever	• The rising trend in dengue stemmed between 2008 and 2010 relative to 2005–2007 • Regional average reported incidence rate reduced by at least 20% (2010–2012 average versus 2005–2007) • Regional average reported incidence rate reduced by at least 20% (2013–2015 average versus 2010–2012) • Impact of outbreak mitigated[16]	Regular WHO updates Dengue outbreak response report	Political commitment Funds Human resources Coordination and surveillance systems in place
Purpose	•		
To address programmatic issues and gaps that require new or improved tools for effective dengue prevention and control	• Programmatic issues and gaps identified • Research priorities identified • Programmatic issues and gaps successfully addressed through research	Situation analysis reports Research findings (e.g. publications, reports)	Political commitment Funds Experts Human resources
Expected results			
34. Operational research capacity in dengue of existing academic and scientific institutions in Member States enhanced	• Number of reports and publications specifically addressing programmatic gaps • Number of collaborating centres participating in operational research • Number of institutions engaged in twinning or collaborations/partnerships within or outside the Asia Pacific Region per year	Publications List of WHO collaborating centres List of memoranda of understanding, joint research protocols and implemented projects Grant agreements	Political commitment Commitment of academic sector/ national research councils or ministries Commitment of WHO collaborating centres Funds Experts Human resources

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[16] Measured by morbidity and mortality rates, number of cases, geographical containment, and duration of outbreak

Planning Elements	Indicators	Verification Source	Assumptions and risks
	• Number of grants directly addressing programmatic gaps in the Asia Pacific Region		
35. Disease burden estimated (epidemiologic impact, social costs and cost of illness)	• Number of Member States engaged in disease burden estimate studies • Number of countries that have completed disease burden estimates	Country reports	Political commitment Commitment of academic sector, national research councils or ministries Commitment of WHO collaborating centres Funds Experts Human resources
36. New knowledge gained, new tools developed, existing tools improved and new strategies developed	• Number of research projects per country addressing development of tools • Number of Member States where new tools are being researched • Number of Member States where new or improved tools are being validated	Publications or reports Country and/or programme reports	Political commitment Commitment of academic sector and national research councils or ministries and private sector Commitment of WHO collaborating centres Funds Experts Human resources
37. Evaluation of tools and strategies for dengue control and case management	• Number of cost-evaluation studies involving new and improved tools • Number of cost-evaluation studies involving new and improved strategies • Number of economic studies such as cost minimization, cost-effectiveness, cost of utility, budget impact	Publications or reports Country and/or programme reports	Political commitment Commitment of academic sector and national research councils or ministries and private sector Commitment of WHO collaborating centres Funds Experts Human resources
38. Translation of new and improved tools into programmatic activities	• Number of programmes in Member States adopting research recommendations in policy formulation and programme implementation • Number of programmes publishing operational research findings • Number of Member States that have established research priorities based on programme needs	Country and/or programme reports	Political commitment Commitment of academic sector and national research councils or ministries Commitment of WHO collaborating centres Funds Experts Human resources

Activities	Outputs	Responsible	Resources and time frame
Expected result 34: Operational research capacity in dengue of existing academic and scientific institutions in Member States enhanced			
34.1 Map of research institutions, researchers and research networks in the Asia Pacific Region	• Listing and/or inventory	WHO Ministry of Health Other ministries	Funds Human resources Year 1
34.2 Conduct workshops to develop operational research protocols	• Workshop reports • Research protocols	WHO Special Programme for Research and Training in Tropical Diseases (TDR) Research councils and/or academic institutions	Funds Experts Human resources Established in Year 1 and ongoing
34.3 Set up a system for information exchange	• Share Point or other system	WHO Research councils and/or academic institutions Ministry of Health Other ministries	Political commitment and interest of research institutions Funds Experts Human resources Established in Year 1 and ongoing
34.4 Training in applied and operational research	• People trained in operational research		Established in Year 1 and ongoing
34.5 Brokering national and international twinning arrangements and collaboration	• Twinning arrangement in place		Established in Year 1 and ongoing
Expected result 35: Disease burden estimated (epidemiologic impact, social costs and cost of illness)			
35.1 Conduct situation analysis on information gaps to estimate disease burden	• Situation analysis report	Ministry of Health Other ministries WHO	Funds Experts Human resources Year 1 and Year 2
35.2 Develop a protocol for disease burden estimation	• Protocol	WHO	Funds Experts Year 1 and Year 2
35.3 Develop methodologies to estimate prevalence incidence and mortality from available data	• Methodologies developed		Year 1 and Year 2

Activities	Outputs	Responsible	Resources and time frame
35.4 Conduct research and publish studies and use these for advocacy	• Reports and/or publications • Advocacy reports	Researchers, academic institutions and collaborating centres WHO Ministry of Health Other ministries	Political commitment and interest of research institutions Funds Expert Human resources Year 2 and ongoing
Expected result 36: New knowledge gained, new tools developed, existing tools improved and new strategies developed			
36.1 Develop and test new surveillance tools and mechanisms	• GIS system in place • Effective surveillance and predictive tools developed • Identification of risk factors	Researchers, academic institutions and collaborating centres WHO Ministry of Health Other ministries	Political commitment and interest of research institutions Funds Experts Human resources Year 1 and ongoing
36.2 Evaluate improved and new vector and other preventive control strategies and tools	• Evaluation reports and/or publications • Results of multicentre studies addressing key indicators	Researchers, academic institutions and collaborating centres WHO Ministry of Health Other ministries	Political commitment and interest of research institutions Funds Experts Human resources Year 1 and ongoing
36.3 Conduct studies on biomarkers in DHF/DSS	• Publications	Researchers, academic institutions and collaborating centres WHO Ministry of Health Other ministries	Political commitment and interest of research institutions Funds Experts Human resources Year 1 and ongoing
36.4 Develop new and improved case management strategies for DHF/DSS	• Reports and/or publications	Researchers, academic institutions and collaborating centres WHO Ministry of Health Other ministries	Political commitment and interest of research institutions Funds Experts Human resources Year 1 and ongoing
36.5 Collaborate in the development of new products and technologies	• Collaboration progress reports and/or monitoring reports of vaccine trials • Collaboration progress reports and/or monitoring reports of vaccine	Researchers, academic institutions, collaborating centres and private sector Ministry of Health Other ministries	Political commitment and interest of research institutions, private sector and other stakeholders Funds Experts Human resources

Activities	Outputs	Responsible	Resources and time frame
	drug trials • Collaboration progress reports and/or monitoring reports resulting from development of new diagnostic tools		Year 1 and ongoing
36.6 Conduct research on insecticide resistance	• Results of research studies	Researchers, academic institutions and collaborating centres WHO Ministry of Health Other ministries	Funds Experts Year 1 and ongoing
36.7 Conduct studies on the effect of climate change on dengue	• Reports and/or publications	Ministry of Health Other ministries	Commitment of academic sector, national research councils or ministries Funds Experts Year 1 and ongoing
Expected result 37: Evaluation of tools and strategies for dengue control and case management			
37.1 Conduct a review of costings of each programme's strategic components	• Report of cost analysis • Publications	Ministry of Health Other ministries WHO	Funds Experts
37.2 Develop protocol for evaluation studies (efficacy, effectiveness, accessibility, acceptability, feasibility and sustainability) in different settings	• Protocol • Publications	Experts WHO	Funds
37.3 Perform cost studies on existing or new dengue prevention, control and case management strategies including COMBI, intersectoral cooperation, integrated vector management	• Proposals and/or protocols • Reports and publications	Experts WHO	Funds
37.4 Use evidence from cost studies for advocacy and mobilization of resources	• Advocacy documents and materials • Resources mobilization plan	Ministry of Health Other ministries WHO Partners	Funds Human resources

Activities	Outputs	Responsible	Resources and time frame
Expected result 38: Translation of new improved tools into programmatic activities			
38.1 Conduct joint meetings and workshops to establish operational research priorities and dissemination of research findings	• Meeting reports • Publication of reports	WHO TDR Ministry of Health Other ministries	Funds Experts Human resources
38.2 Participation of key researchers in programme managers' meetings	• Programme managers' meeting reports	WHO TDR Research councils and/or academic institutions Ministry of Health Other ministries	Funds Experts Human resources
38.3 Establish a working group, task force or liaison among programme staff and researchers who will coordinate, monitor and evaluate the integration of research findings into operations and policies	• Formal entity established • Appropriate allocation of resources	Ministry of Health Other ministries	Funds Human resources