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# First Meeting of Regional Technical Advisory Group (RTAG) on Dengue

*Report of the Meeting  
Club Andaman Beach Resort, Phuket, Thailand  
17-18 September 2007*



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## Executive summary

The first meeting of the Regional Technical Advisory Group on dengue (RTAG-Dengue) was held in Phuket, Thailand on 17-18 September 2007. The meeting was organized to provide technical guidance to the Regional Director of the World Health Organization's (WHO) South-East Asia Region on prevention and control of dengue. The meeting was attended by TAG members, and staff from Tropical Diseases Research, WHO headquarters, the Regional Offices for the South-East Asia and Western Pacific Regions, and country offices of Member countries.

In the meeting, the global dengue situation and the state of the disease in the South-East Asia (SEA) and Western Pacific (WPR) Regions was reviewed; the draft strategic plan (2007-2015) prepared by South-East Asia Regional Office and the draft log frame prepared by Western Pacific Regional Office; and the technical updates including the Special Programme for Research and Training in Tropical Diseases (TDR) on dengue-SWG were presented and discussed.

There was also consensus on a single harmonized Asia-Pacific Strategic Plan for Dengue Control (2008-2015).

The recommendations made were as follows:

- The draft Asia-Pacific Strategic Plan for Dengue Control (2008-2015) should be harmonized.
- The Strategic Plan should include the costing (estimates) and timelines for implementation.
- The scope of the Strategic Plan should be broadened to ensure the engagement of key partners in the public and private sectors e.g. the Ministries of the Environment, Education, Tourism and, local self governments.
- The composition of the Asia-Pacific Dengue TAG should be formalized by June 2008.
- The SEA Regional Office should utilize the log frame for the Asia-Pacific Plan in consultation with programme managers.

- The Regional Office should present the final Asia-Pacific Strategic Plan to the meeting of Health Ministers or the Regional Committee (RC) Session in 2008 for endorsement.
- All Member countries should be encouraged to implement the Bi-Regional Plan. Implementation should be accompanied by close monitoring and review in some of the countries. Any further increase in activities should be based on the proof of concept and availability of funds.
- RTAG welcomes TDR's business lines in relation to dengue and recommends that the South-East Asia and Western Pacific Regions approach TDR for the creation of a regional dengue business line.
- A close link between the research and academic sectors that directly benefit the programme should be established.
- RTAG identified the following priority topics for research. This list is neither exhaustive nor detailed and requires further discussion:
  - Undertake multi-country comparison of the cost effectiveness of vector-control measures
  - Identify predictive markers of vascular leakage in dengue haemorrhagic fever (DHF)
  - Identify chemotherapeutic agents to control vascular leakage in DHF.
  - Identify the relative contributions of human, viral and mosquito genetic factors, and human behaviour and ecology to the transmission of dengue viruses.
  - Initiate burden of disease studies, using standardized methodology.
  - Complete currently ongoing studies to update dengue case definition.

## **1. Background of the meeting**

The Regional Technical Advisory Group was constituted by Dr Samlee Plianbangchang, Regional Director of the WHO South-East Asia Region. The purpose and objectives of the first meeting of RTAG was discussed and agreed by the SEA and WP Regional Offices through consultation. WPRO agreed to participate as a partner with plans towards a Bi-regional TAG. The first meeting of RTAG of the SEA Region on dengue was held in Phuket, Thailand on 17-18 September 2007. The meeting was organized to provide technical guidance to the Regional Director for South-East Asia Region on prevention and control of dengue after a review of the draft Asia-Pacific Strategic Plan, recommend new tools in the prevention, diagnosis and treatment of dengue and studies on the burden and socioeconomic impact of dengue. The meeting included TAG members, temporary advisers and staff from TDR, WHO headquarters, the two Regional Offices and country offices from the two Regions. A list of participants is provided in Annexure 1. Dr Khin Maung Lwin, Myanmar, was appointed as the chairperson and Prof. Emran Bin Yunus, Bangladesh, as rapporteur for the meeting.

## **2. Objectives of the meeting**

The general objective was to provide technical guidance to the Regional Director of the South-East Asia Region on prevention and control of dengue. The specific objectives are to undertake technical review of the draft Asia-Pacific Strategic Plan for dengue prevention and control, and to review the new tools in the prevention, diagnosis and treatment of dengue and studies on the burden and socioeconomic impact of the disease.

## **3. Opening session**

Dr Chusak Prasittisuk, Coordinator, Communicable Diseases Control, WHO-SEARO, read the message of the SEA Regional Director. Dengue has emerged as a serious public health problem in countries of the Asia-Pacific. More than 70% of the “at-risk” population of the world resides in the countries of the Asia-Pacific Region. The frequency of outbreaks is

increasing and the epidemiology of the disease is evolving. The health, economic and social impact of epidemic dengue is expected to grow. Despite significant progress, an effective and safe vaccine for paediatric use in endemic countries is unlikely to be available during the next 5-10 years. On the other hand, vector-control measures, standard case management and improved surveillance are known to work and have been available for more than two decades. A new effort to prevent and control this disease will require sustained commitment on the part of all countries where this disease is endemic, as well as by international funding agencies. The Asia-Pacific Dengue Partnership (APDP) was formed after the meeting of the partners in Chiang Mai in March 2006. The WHO Regional Offices for South-East Asia and the Western Pacific have developed a Strategic Plan (2008-2015) for the Prevention and Control of Dengue in the Asia-Pacific which will help to operationalize key interventions. This meeting of the RTAG should discuss the technical content of the strategic plan and also identify and prioritize research on dengue. RTAG should discuss the complementarity of research within the programme.

Dr Tee Ah Sian, Director, Combating Communicable Diseases, WHO WPRO expressed concern over the major outbreaks of dengue in the Western Pacific Region in recent years. She considered dengue to be a neglected and resource-constrained disease. The Regional Director of the Western Pacific Region committed to the members of the Regional Committee in 2007 that a dengue prevention and control plan will be developed in consultation with the Member states and introduced at the next meeting of the Regional Committee in 2008 for endorsement. For this purpose both Regions should prepare an overarching and harmonized strategy for all stakeholders and identify a niche for each one. The biggest challenge in the control of dengue is to attract more resources and engage the partners. In advocating for resources, it is important to highlight besides the health impact of the disease the broader impact of dengue on tourism, trade, travel and the economy.

Dengue is also a challenge to international health security. Therefore, it will be important to leverage dengue control with the International Health Regulations (IHR) 2005. She hoped that there will be a joint Technical Advisory Group for the SEA and WP Regions on dengue. Steps should also be taken to evolve a harmonized Asia-Pacific Strategy. She also hoped that technical components of the draft strategy will be reviewed by RTAG.

## **4. Dengue situation**

### **4.1 Global situation**

The cases of dengue reported to WHO have almost doubled every decade during the last 50 years. There has been a remarkable geographical spread of the disease. Each Region of WHO reports cases of dengue differently. This creates problems in interpretation of data on dengue. *Aedes albopictus* has expanded in the Americas, Europe and Africa during the last 25 years. The consequence of this in recent years has been the spread of chikungunya fever to India and more recently to Italy. This is an instance of global spread of the disease probably as a result of increased travel. The control of dengue and chikungunya fever requires the adoption of a common approach since both these diseases are spread by *Aedes mosquito*. Industrialized countries have to support the control of these diseases to protect themselves from the ill effects of these diseases.

There is very serious concern on the rapid urbanization during the last five decades. About 20 cities in the world will grow to reach a population of five million by the year 2015. Most of these will be in the Asia-Pacific Region. Nearly 1.5-2 billion persons are travelling each year across the globe. This increases the risk of spread of viruses and other pathogens to threaten global health security. Recently the Zika virus has spread to the Pacific Region countries and other emerging diseases are likely to spread to new places as a result of rapid urbanization and increasing global travel. In 1970, Type I and Type II dengue viruses were prevalent in the Americas and Africa while all the four virus subtypes were circulating in Asia. Now, however, the entire tropical world is hyperendemic to all the four virus subtypes. Despite these serious developments, policy and decision-makers around the world do not seem to have realized the enormity of the scale of spread of the virus.

### **4.2 South-East Asia**

All the countries in the Region, with the exception of DPR Korea now report dengue. Dengue epidemics have been spreading during the past couple of decades. The five-year moving average of reported cases is showing an increasing trend. The main areas of concern in the Region are

Indonesia, Myanmar, Sri Lanka and Thailand. In India dengue is a serious emerging disease but the extent of reporting of the disease from different states is variable. Consequently, the full impact of dengue is yet to be ascertained. These countries account for more than 80% of all cases of reported dengue. Dengue outbreaks have been reported in different seasons in different countries of the Region. In the last decade dengue outbreaks have been reported from Bangladesh, Bhutan and Nepal. Since the first instance of reporting these outbreaks have continued to occur in these countries. Although the case fatality rates are declining in the larger cities, these continue to be high in the smaller ones. In addition to the outbreaks of dengue, epidemics of chikungunya fever in India, Maldives and Sri Lanka over the past two years have also been a cause for concern.

### **4.3 Western Pacific Region**

Countries coping with the problem of dengue in the Western Pacific Region are Viet Nam, Malaysia, Cambodia, Laos, the Phillipines and Pacific Islands. The problem is acute in Viet Nam. The case fatality rates are declining though they exceed 1% in some countries. The outbreak of dengue epidemic in Cambodia in 2007 prompted the country to declare an emergency. The extent of reporting of dengue is considered reliable in 13 countries in the Region. The key challenges in the Region are lack of human and financial resources, lack of sustained political commitment, lack of interest amongst donors, weak surveillance system and poor laboratory support, variation in case definition, and irregular reporting to WHO. There is the felt need for strengthening surveillance and on the importance of linking with the IHR (2005). Vector control should be intensified and IVM approach adopted. Effective control of dengue would require intersectoral coordination. In Singapore, the National Environmental Agency of the Ministry of Environment is the nodal agency for dengue control.

#### ***Discussion on the situation of dengue***

The importance of development of early warning systems for predicting epidemics was stressed. The triggers evoking an international response should be identified in IHR (2005). Dengue should be an integral part of IHR (2005) and given prominence in the portfolio of neglected diseases for

greater visibility. Prediction of outbreaks is critical for reducing the impact of dengue. This requires seasonal transmission surveillance, uniform application of case definition, use of information on meteorological data and movement of population. Dengue is both grossly under-reported and over-reported in different areas. Lack of accurate information is also a constraint in mobilizing resources for its prevention and control. Several regions report dengue and DHF together. This creates difficulties in interpreting case fatality rates (CFRs). Dengue control requires intersectoral collaboration between the ministry of health, ministry of environment, ministry of urban planning, and municipalities and cross-country cooperation between other entities and agencies.

## **5. Strategic plan for prevention and control of dengue in the Asia-Pacific**

An overview of the Strategic Plan for the Prevention and Control of Dengue in the Asia-Pacific Region (2007-2015) was presented and discussed. The plan has been readied to guide the countries to prepare national operational plans, identify resource gaps, conduct advocacy and mobilize resources for the prevention and control of dengue. The strategy supports collaboration, and biregional solidarity for effective and sustained prevention and control of dengue. The strategic plan should be implemented within the national policy framework as an integral part of vector-borne disease control and integrated disease surveillance. The thrust of the strategy is on interprogrammatic and intersectoral collaboration and it should be harmonized with the Asia-Pacific Dengue Partnership. The plan will use evidence-based interventions and implemented by employing best practices.

The goal is to enhance capacity through partnerships, so that evidence-based interventions can be implemented through better planning, prediction and early detection, characterization, and prompt control and containment of outbreaks of dengue. The objectives of the strategy are (1) to strengthen the system for prediction, early detection, preparedness and early response to outbreaks of dengue; (2) to improve standard case management of dengue; (3) to support the prevention of dengue through IVM and community mobilization; and, (4) to refine strategic interventions

through access to innovations in the prevention and control of dengue. The expected results for each objective were described and for each expected result the key activities were identified. The supportive strategies include (1) supportive policy environment; (2) mobilization of resources; (3) community participation; (4) developing and sustaining partnership; (5) programme planning and management; and, (6) monitoring and evaluation. Key indicators that are measurable and verifiable were presented.

Seven components were identified during the consultation as identified in the draft log frame. These included dengue surveillance, integrated vector management, dengue case management, social mobilization, dengue outbreak response, research and partnership, and resource mobilization. Expected results were identified for each of the components except for research, partnerships and resource mobilization.

The strategic plans were further discussed by the RTAG and the next steps reviewed. Inclusion of indicators in the log frame and identification of budget needs as well as gaps will help advocate with the countries and the donors to commit resources for the control of dengue. The plan will also require a roadmap and key milestones to monitor the implementation. Although the processes in the two regions are different, there was consensus that efforts should be made to produce a single harmonized Asia-Pacific Strategic Plan (2008-2015) for the prevention and control of dengue. It was proposed to develop a harmonized draft plan before the end of the year and the Regional Office will move forward to encourage Member States to develop national operational plans. WPRO will convene a Programme Managers' Meeting to consolidate the planned draft and will also place the strategic plan to its Regional Committee in 2008. This harmonized plan will be implemented in WPRO Member States after endorsement at the Regional Committee.

Mobilization of resources should be a priority for the programme. Besides a Biregional Strategic Plan it will be necessary to highlight the successes to encourage donors to contribute. Success in prevention and control of dengue has been achieved in countries such as Cuba and Singapore. It has been possible through sustained investment, ongoing effort during the inter-epidemic period including surveillance, and emphasis on behaviour change since vector monitoring and non adulticide measures are

effective. The dengue programme should not duplicate the efforts of others. Instead it should create a niche in existing programmes. Laboratory capacity can be increased under the banner of Asia-Pacific Strategy on Emerging Diseases (APSED), vector control can be strengthened as a part of the malaria control programme, the dengue control programme can also be implemented as a part of the healthy setting initiative, and partnerships can be developed with urban planning and the ministry of environment.

## **6. Technical issues**

### **6.1 Clinical management**

Dengue (DF) and Dengue Haemorrhagic Fever (DHF) are two different diseases. Viraemia is higher in DHF and less in dengue fever. Presence of fever, positive tourniquet test and leukopaenia are reliable in diagnosing about 70% of all dengue cases. In DHF there is the occurrence of thrombocytopenia and haemoconcentration. The latter is related to plasma leakage. DHF occurs typically when the fever reduces. There is no pleural effusion in dengue while the same is common in DHF. DHF/DSS are classified into four grades while there is no gradation recommended for dengue fever. The above-mentioned tests (platelet count, haematocrit and leukocyte count) are simple to perform and can be done in any hospital. The PCR test does not distinguish between dengue fever and DHF/DSS.

### **6.2 Laboratory diagnosis**

Laboratory diagnosis of dengue was reviewed and discussed. Viraemia is present 2-3 days before the illness and lasts for about 4-5 days after the onset of illness. IgM peaks at 4-5 days after the onset of illness while IgG rises later in the course of the disease (around day 6 or 7) after the onset of illness and persists for life. A second episode of illness leads to an anamnestic response. Haemagglutination test is positive but non-specific. Most countries use IgM-capture ELISA. This is not a confirmatory test since IgM persists for 60-90 days after dengue. It is useful for surveillance purposes but not for clinical management. NS ELISA is a new test attracting a lot of attention. This may be a predictor for severe disease. Other new

tests are in the pipeline but they are not ready for routine use. Micro array is an example of a promising test. Commercial test kits are available. This is, however, a lazy approach for surveillance and for diagnosis of dengue. They may not be reliable. WHO TDR is in the process of evaluating the diagnostic tests for dengue. New technology is becoming available and research on new tests should be encouraged to support surveillance of the disease.

### **6.3 Surveillance**

A few countries have prepared surveillance and emergency response plans. Countries that have effective surveillance mechanism in place do not have adequate response mechanisms. It is recommended that dengue and DHF should be made a notifiable disease. In countries where dengue is a notifiable disease, the focus should be on implementation of the policy of notification while in others where it is not notifiable, a policy of notification should be initiated. Standard case definitions for dengue DHF and DSS recommended by WHO are not widely used. Surveillance can be very useful in providing early warning for the epidemic of dengue. Epidemics can be predicted with proper and timely surveillance. This can be used to abort incipient dengue epidemics or to reduce the overall impact of the epidemic. In Puerto Rico five epidemics were predicted and four of them the prediction was found to be accurate. A timely response, however, was not mounted. By spreading the transmission over a longer period of time there is a possibility of reducing the morbidity and mortality. Surveillance of dengue can be active, passive and sentinel. Active surveillance should be the mainstay in the interepidemic period since it determines dengue transmission. It includes time, location, serotype, sub-type and disease severity. Fever alert is important since it helps to identify increased febrile activity in the community. This is done by the community health workers (CHWs) but there is a need for better communication between the CHWs and the doctors/laboratory to make the effort more effective. The samples that are representative of fever activity should be collected round the year on a weekly basis for testing. Reporting systems should be organized at local, district, state, national and international levels. Ideally it should be in electronic form to assess public health and economic implications as well as for timely interventions.

Passive surveillance depends on the medical community. It is, however, inefficient, insensitive, and with low index of suspicion, there is misdiagnosis and exclusion of mild illness with self treatment. During the transmission there is over-reporting of dengue. Where the health system is inadequate or a large proportion of patients are treated in the private sector, under-reporting of the disease is a common occurrence.

In sentinel surveillance, sentinel clinics (sites) that represent the sentinel areas should be responsible for active surveillance. Sentinel hospitals should pick up cases of dengue haemorrhagic fever. They are responsible for looking after serious infectious diseases. There is a greater opportunity to consider the blood and tissues of the patients in the sentinel sites where patients are hospitalized. A paired sample is important. Once an epidemic occurs the focus should be on severe disease. For effective surveillance of dengue, laboratory-based surveillance is more critical now than ever before because of the spread of chikungunya. National and regional laboratories should have the capacity to diagnose dengue reliably and be able to investigate other viruses. The countries should use standardized reporting formats and reporting systems with networking for regular sharing of information within the country and to WHO. Besides disease surveillance, entomological surveillance is critically important to identify the species of the mosquito, seasonal distribution, density, principal breeding sites and insecticide resistance. Vector build-up is a good predictor for the occurrence of the epidemic of dengue.

Discussions - More research is required to develop early warning systems to predict accurately the epidemics of dengue since interventions during the interepidemic period can be useful in reducing the impact of the epidemic. There are problems relating to the thresholds at which the dengue epidemic becomes an issue. Besides fever surveillance, laboratory and vector monitoring, it is also necessary to monitor the metrological data, and movement of the population in the early warning of epidemics. Passive surveillance is currently quite insensitive since it relies on the reporting from health systems and there is no uniform case definition. Active surveillance is important to capture the events in the community. It also helps to determine the circulating serotypes and the severity of the disease. Active surveillance is important during the interepidemic period. The case management of DHF and DSS has improved and the CFRs are declining. It is important to better understand the pathogenesis of the disease in DHF

and DSS and be able to predict the occurrence of DHF and DSS so that through timely interventions their management can be further improved.

There was consensus that there should be a single harmonized strategic plan for the Asia-Pacific. A plan with a log frame and budget would be acceptable and is likely to be useful in mobilizing the resources for implementation by the Member States. The model for the Asia-Pacific Strategic Plan on emerging diseases should be followed. It would be appropriate if both Regional Committees of the South-East Asia and Western Pacific Regions endorse the strategic plan. While this is proposed for WPRO, it is currently not on the agenda of the next Regional Committee in 2008. However, efforts should be made to introduce it for discussions during the Health Ministers Meeting in 2008 and if this can be achieved it will be subsequently brought to the attention of the Regional Committee.

#### **6.4 Social mobilization and communication**

Progress on Communication for Behavioural Impact (COMBI) in the prevention and control of dengue was discussed. Several case studies reflecting the experience on dengue have been published in a special supplement of the *Dengue Bulletin* (2005). The ten steps for COMBI have been elaborated in a publication of WHO (2005). These steps should be followed. Myanmar showed a video prepared for Behavioural Change Communication (BCC) in the country. Larval control and timely case management are the two behavioural objectives for the control of dengue. In Myanmar, the disease is spreading to rural areas and affects all parts of the country but for the mountains along the international border with China. Myanmar organized a COMBI workshop a few years ago. The cost implications of COMBI are a negative factor. Myanmar has attempted a low-cost approach for COMBI. Evaluation is needed to assess the behaviour impact of the strategy after implementation.

The experience with COMBI in Malaysia was discussed. These include: (1) every family should be able to carry out house inspection once a week for 30 minutes, and (2) anyone with fever should seek immediate treatment in clinic/hospital. COMBI was piloted in Johor Bahru in Malaysia in 2001. The key steps for COMBI were followed. The experience has

shown that it is possible to promote behaviour changes through COMBI. All the communication “tools” must be applied as it is difficult to pin-point which “tool” is the most effective. To sustain the interest among the community, the volunteers must perform well. The positive social impact – neighbourhood spirit was at its peak during the campaign. At the end of the 12-week intensive campaign, 85% of the respondents claimed to have carried out weekly house inspections, and on decreasing trend in morbidity was observed in areas where COMBI activities were more intense. In 2002, COMBI was extended throughout the state of Johor. Local politicians were briefed and they helped to promote COMBI as well. In 2003, the Ministers of Health were briefed on COMBI and now COMBI is now a part of the national strategy for dengue control.

## **6.5 Integrated vector management**

Efforts in vector control and COMBI to control dengue in Indonesia were discussed. The project has been funded for a period of five years by Rotary International to support dengue control activities in Purwokoto district, Central Java. The strategic thrusts of the project are vector monitoring and vector control through BCC. The results have been spectacular. Indonesia had the biggest epidemic of dengue in 1998. During that year there were only eight cases of dengue in the project area in Purwokoto. The role played by women volunteers (PKK) in vector monitoring was exemplary. There were no epidemics of dengue recorded during the project but the epidemics have reoccurred after the funds dried up. There is no doubt that COMBI leads to excellent results on a short-term basis but sustained behaviour change resulting from COMBI needs to be proven. COMBI should be expected to bring about a behaviour change. This can be monitored through assessment of mosquito density.

Discussions: RTAG should consider a recommendation to build a network of expertise in Behavioural Change Communication (BCC) through bi-regional collaboration. The network should be able to provide the expertise to the countries desirous of undertaking BCC. The expected outcome of COMBI strategy should be measured in terms of achievement of behaviour objectives but it would not be appropriate to expect an impact on the disease following the implementation of COMBI strategy alone. The research portfolio should include cost effectiveness studies. This will be

useful in advocacy for mobilization of additional funds for national programmes.

## **6.6 Vaccine development**

The current status of dengue vaccine development was reviewed. The current dengue vaccine strategies were described. Vaccine development and use has to go through a series of steps before it becomes a part of the national programme. Initial dengue vaccine was A chimeric carrier. This was developed in Thailand with support from WHO/SEARO, in the late 1980s. It looked promising at that time but led to problems even though it is a good trivalent vaccine. One problem with earlier vaccines has been that it has a mixed virus population while it needs to be homogeneous. Good candidate vaccines are being developed. Five potential vaccines that hold promise are at various stages of development. The vaccine should have all the four virus components. Recombinant vaccine has good attenuation of Dengue 4 virus. A combination of natural attenuation and use of chimeric constructs is quite promising.

A number of strategies have been used in the development of vaccine. Virus particles are promising but there is no final word yet. Work over the next 10 years will evolve around Phase 2:2001-2009, Phase 3:2007–2009, Phase 4 from (2010–2011) and actual registration/ introduction between 2012-2013. Therefore, the vaccine will take more than five years before it is available for public health use. Regarding the Paediatric Dengue Vaccine Initiative (PDVI), there is a need to accelerate evaluation and introduction in paediatric populations in developing countries. PDVI is contemplating the inclusion of a number of countries in SEARO and WPRO for field testing through a consortium. Sustained efforts will be required to achieve coverage with vaccine even after their availability to produce a perceptible impact on dengue. The yellow fever vaccine is a pertinent example. It has been existing for a long time and its efficacy and safety have been well established. Nevertheless, its use has not been widespread. Therefore, while the efforts to develop vaccines should be continued it is important to identify a drug that can arrest the leakage of plasma. There is modeling for anti-viral drug. This is an important research issue. The search for anti-viral drugs is also in progress and a product may be available during the next 5-10 years.

## **7. Research on dengue**

Dengue is in the TDR portfolios to support research on various aspects of the disease. The recommendations of the TDR-Scientific Working Group on Dengue in 2007 (SWG) were shared. These include the following: (1) reduction of severe disease and case fatality rates; (2) reducing transmission through improved vector control; (3) achieving primary prevention through vaccines and drugs; and, (4) improving public health response through policy research. SWG has recognized that dengue is a global disease.

Early diagnosis, assessment of triage and case management research is the focus. For diagnosis, partnership with industry is proposed. The dengue classification and case management data set on 2000 patients is being analyzed. The aim is to translate research findings into policy and practice. TDR is collaborating with PDVI on diagnostics in the form of multicountry studies. Dengue-targeted interventions are proposed to evaluate vector control interventions. Eco-bio-social studies are recommended to inform the policy on the directions to follow. There are a number of publications that translate research into policy and practice. The guiding principles in research are capacity-building and knowledge management comprising of new knowledge and discoveries. There are many partners in the pipeline who need to be tapped. TDR needs to rethink on how to leverage the opportunities. In the SWG, empowerment and stewardship role are identified for TDR. This would require new structures and then it may translate into increased resources. Dengue focus will be on stewardship.

Discussions: It is recommended to include key research areas identified by SWG into the Asia-Pacific Strategic Plan. TDR should be approached to support the regional business line for dengue research, and develop research packages. This should lead to the development of a business plan for research support which can then be used for advocating to support research on dengue.

## **8. Asia-Pacific dengue partnership (APDP)**

The progress achieved on the establishment of APDP was presented and discussed. A draft strategic framework (2008-2015) for the partnerships has

been developed and reviewed by a core group that was formed by WHO based on the recommendations made at the meeting of the partners in Chiang Mai in 2006. Structure and governance need further deliberations and have to be simplified so that the focus of the partnership is on mobilization of resources and on advocacy. A working group on advocacy and resource mobilization will be required. Singapore is to support APDP activities. A meeting to promote APDP has been proposed to be hosted by Singapore in early 2008 in order to raise the level of awareness of partners, and call for concerted efforts. The meeting proposes to undertake advocacy to mobilize the commitment of the countries and of the partners in the prevention and control of dengue.

RTAG appreciated the progress made by the core group on dengue and endorsed the bi-regional approach. Many other sectors have to be involved in addition to the health sector for effective control of dengue. The effort made by Singapore is an excellent example of partnership between the health and environment sectors. No single country has the capacity to prevent and control dengue and therefore collaboration is important. WHO will work together with the partners and the countries to support the effort. The APDP is very important to WHO. It should be able to contribute to the work of the Region with their unique expertise. APDP needs to be agile and cost-effective, and must decide on the composition of its membership and specific activities. It should also come up with a proposed, simple and effective mechanism to work.

## **9. Conclusions and recommendations**

The RTAG expressed concern over the presence and spread of dengue and noted that it has emerged as a serious public health problem. It also took cognizance of the epidemics and financial losses that follow. Effective control of dengue is likely to lead to a reduction in the overall burden on the health systems. Action-oriented research is required in the control of dengue and this should benefit the people. Since dengue control requires the participation of the community, the active involvement of school students should also be considered by the programme.

The partnership and the proposed bi-regional collaboration will be a historic landmark in working together to address the menace of dengue.

Key recommendations made were as follows:

- The draft Asia-Pacific Strategic Plan for Dengue Control (2008-2015) should be harmonized.
- The Strategic Plan should include the costing (estimates) and timelines for implementation.
- The scope of the Strategic Plan should be broadened to ensure engagement of key partners in the public and private sectors e.g. the ministries of the environment, education, tourism and, local self governments.
- The composition of the Asia-Pacific Dengue TAG should be formalized by June 2008.
- SEARO should utilize the log-frame for the Asia-Pacific Plan in consultation with programme managers.
- SEARO should present the final Asia-Pacific Strategic Plan to the Health Ministers' Meeting or the Regional Committee for their endorsement (2008).
- All countries should be encouraged to implement the Bi-Regional plan. Implementation should be accompanied by close monitoring and review in some countries. Any further increase in activities should be based on the proof of concept and availability of funds.
- RTAG welcomes TDR's business lines in relation to dengue and recommends that SEAR/WPR approach TDR for the creation of a regional dengue business line.
- A close link between the research and academic sectors that directly benefit the programme should be established.
- RTAG identified the following priority topics for research. This list is neither exhaustive nor detailed and requires further discussions:
  - Undertake multi-country comparison of the cost effectiveness of vector-control measures
  - Identify predictive markers of vascular leakage in dengue haemorrhagic fever (DHF)

- Identify chemotherapeutic agents to control vascular leakage in DHF.
- Identify the relative contributions of human, viral and mosquito genetic factors, and human behaviour and ecology to the transmission of dengue viruses.
- Initiate burden of disease studies, using standardized methodology.
- Complete currently ongoing studies to update dengue case definition.

## Annex A

### List of participants

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## Annex B

# Programme

### Day 1 – Monday, 17 September 2007

- 08:30 – 09:00           • Registration
- 0900 – 0930           • Opening ceremony
- RD's messages:  
*Dr Chusak Prasittisuk, CDC/SEARO*  
*Dr Dato Tee Ah Sian, CCD/WPRO*
  - Objectives and introduction of participants:  
*Dr Chusak Prasittisuk, CDC/SEARO*
  - Appointment of Chairperson/Co-chairperson and Rapporteur:  
*Dr Chusak Prasittisuk, CDC/SEARO*
  - Administrative announcements:  
*Dr Vichai Satimai, Director, VBDC/MoPH, Thailand*
- 10:00 – 10:20           • Global situation:  
*Dr Michael Nathan/Prof. D.J. Gubler*
- 10:20 – 10:50           Dengue in SEA/WP Regions:  
*Dr Chusak Prasittisuk/Dr John Ehrenberg*
- 10:50 – 11:00           • Discussions
- 11:00 – 11:30           • Overview of Strategic Plan for Prevention and Control of Dengue in Asia-Pacific (2007-2015):  
*Dr Vijay Kumar, WHO Consultant*
- 11:30 – 12:00           • Discussion on Strategic Plan
- 12:00 – 12:30           • Component of the Bi-regional Strategic Plan:  
*Dr John Ehrenberg*
- 13:30 – 14:15           • Discussions on Strategic Plan and Components
- 14:15 – 14:30           • Update on diagnosis of dengue:  
*Dr Prida Malasit and Dr A.C. Mishra*
- 14:30 – 14:45           • Discussions
- 14:45 – 15:00           • Update on case management and treatment of dengue:  
*Dr Suchitra Nimmanitaya*

- 15:00 – 15:15 • Discussions
- 15:30 – 15:45 • Dengue surveillance  
*Prof. D.J. Gubler/Dr Thomas Suroso*
- 15:45 – 16:00 • Discussions
- 16:00 – 16:15 • Vector Surveillance and Integrated Vector Management:  
*Dr Sustriyu Nalim*
- 16:15 – 16:30 • Discussions
- 16:30 – 16:45 • Communication for Behaviour Impact:  
*Dr Khin Maung Lwin/Dr Hu Suhaili Md. Raili Bin*
- 16:45 – 17:00 • Discussions
- 17:00 – 17:30 • Meeting of WHO Secretariat

**Day 2 – Tuesday, 18 September 2007**

- 08:30 – 08:50 • Update on dengue vaccine  
*Prof. D.J. Gubler*
- 08:50 – 09:00 • Discussions
- 09:00 – 09:20 • TDR-SWG on dengue research:  
*Dr Michael Nathan/Dr Olaf*
- 09:20 – 09:30 • Discussions
- 09:30 – 09:50 • Strategic Framework on Asia-Pacific Dengue Partnership  
(APDP): *Mr Khoo Seow Poh*
- 09:50 – 10:00 • Discussions
- 10:15 – 12:30 • Group work
  - Group 1 – Recommendations on Strategic Plan (2007-2015) for Prevention and Control of Dengue
  - Group 2 – Research topics and priority for Asia-Pacific
- 13:30 – 14:30 • Summary and presentation of group work
- 14:30 – 15:30 • Drafting of conclusions and recommendations
- 15:45 – 16:00 • Conclusions and recommendations
- 16:00 – 16:30 • Closing session