A technical working group meeting on dengue was held at the headquarters of the World Health Organization (WHO) in Geneva, Switzerland, on 10–12 December 2012. The main objective of the meeting was to brainstorm and develop action plans to implement the Global strategy for dengue prevention and control, 2012–2020.

The Global strategy was published in 2012 to address the growing threat of dengue. It aims to provide advice on how to move from a reactive response in an emergency situation to a proactive and sustainable approach involving risk assessment, early warning systems and preventive measures, guided by entomological and epidemiological surveillance. The Global strategy emphasizes the many new opportunities provided by country experiences and recent research (including vaccine development) that can be seized to reduce morbidity and mortality, and build capacities that increase resilience to future outbreaks. The objectives of the global strategy include reducing, by 2020, morbidity of the disease by 25% and mortality by 50% (using 2010 estimates as base line).

The meeting was attended by 12 participants (see Annex I: List of participants). Dr Ronald Rosenberg was appointed as Chairman and Dr Lee Ching Ng as Rapporteur.

The meeting was held in plenary sessions and included in-depth discussion of the challenges and future course of action in diagnostics, case management, burden estimates, outbreak preparedness and vector control. The meeting also discussed the status of vaccine development and strategies for advocacy and resource mobilization. The first one-and-a-half-days of the meeting were held in the presence of observers for the purposes of exchanging information and sharing views, after which the WHO-appointed experts further discussed the subject and recommended the following key priority action points for 2013–2015.

1. Evidence-based advocacy and resource mobilization/burden estimate

Evidence-based advocacy and resource mobilization

There is very little international funding for dengue prevention and control. The increasing funding gap affects outbreak preparedness and response, capacity building and networking of stakeholders. Communication and advocacy need to be
targeted and periodically assessed. The working group recommends that WHO takes the following key actions:

- document, in collaboration with Member countries, best practices for intersectoral action and community engagement;
- participate in strategic meetings, promote the Global strategy and engage decision-makers and potential partners;
- support the establishment and/or strengthening of a country reporting system;
- highlight and project WHO publications on dengue in the web sites of the organization at all levels.

**Burden estimate**

Estimating the burden of the disease in all areas at risk is fundamental for implementation of the Global strategy. Coordinated and increased efforts around cohort studies are important to estimate the burden, and several longitudinal studies are in progress, but more are needed. Burden estimates will also help programmes to monitor trends over time (meet the targets set in the WHO roadmap on neglected tropical diseases and the Global strategy), and WHO should advocate, initiate and coordinate such endeavours. Burden estimates remain a challenge in parts of Asia and all of sub-Saharan Africa. There needs to be consistency in the data generated and programmes should be clear in measuring and monitoring trends. The actions needed by WHO are:

- engage research groups (e.g. the Spatial Ecology and Epidemiology Group at the Department of Zoology, University of Oxford) and other similar groups involved in burden of disease studies to identify key data to be captured for improving the existing database and its adaptation at country levels;
- review unpublished studies on burden estimates done by vaccine industry and other institutions.

**2. Case management (including diagnosis)**

Mortality from dengue can be reduced to almost zero by implementing timely, appropriate clinical management that involves early clinical and laboratory diagnosis, appropriate and rapid supportive care (e.g., fluid replacement), staff training and hospital reorganization. There is a greater need for better, low-cost rapid diagnostic tools with high sensitivity and specificity to improve diagnosis at the point of care. The actions needed by WHO are:

- develop guidelines for clinical outbreak management;
- focus capacity building on case management of severe dengue in countries identified to have high numbers of dengue deaths and make death audits mandatory;
• standardize, based on available training materials and those being developed, core dengue case management curricula for physicians and health workers, including Web-based continuing medical education units;

• explore alternative strategies for training doctors and nurses, e.g., distance learning.

• support the network of laboratories at the global level and stimulate the exchange of information among the Americas and Asian countries.

• raise awareness among ministerial decision-makers, public health executives and programme managers of the need for training staff at various levels of the health system (Viet Nam and Thailand are successful examples);

• harmonize the case classification in consultation with experts;

• expand the database of medical experts on case management of dengue; encourage intra- and inter-regional training and consultancies from countries already practicing appropriate case management (Viet Nam and Thailand are successful examples);

• standardize, maintain and make available quality assessment of dengue diagnostics in order to meet the needs of countries.

3. **Integrated surveillance**

Although both entomological and epidemiological surveillance data have often been collected in countries, there are few instances in which health services integrate and fully utilize such information to control an outbreak or prevent expansion of dengue to new areas. Moreover, control and prevention efforts do not always correlate with a reduction of transmission and disease. Integrated surveillance (epidemiological and entomological) should be sustained during inter-epidemic periods, and include sentinel surveys of representative sites. Risk stratification maps can be developed by Member States. The actions needed by WHO are:

• assess by further investigation, the significance of “serotypes and genotype switch” and potential for outbreaks in areas endemic for dengue;

• strengthen linkage between surveillance, laboratory confirmation and rapid response needs at country level, and include private practitioners and diagnostic services in this network;

• finalize the list of key indicators for routine surveillance of dengue; and develop behavioural indicators for effective communication.

• include, in the system for monitoring and evaluation of surveillance, performance indicators for detection and reporting,

4. **Sustainable vector control and future introduction of vaccine**

Effective vector control measures are critical to achieving and sustaining reduction of morbidity attributable to dengue. Preventive vector control interventions aim to
reduce dengue transmission, thereby decreasing the incidence of the infection and outbreaks of the disease. Vector control is effective when applied in the early stages of a potential outbreak, but fails to achieve the desired result when it is introduced at a later period. Early detection of a public health threat coupled with a rapid and effective response are, therefore, important components of effective disease reduction. Currently, there is no clearly articulated theory to help guide this kind of process in the control of dengue. In addition to empirical intervention research, theoretical models need to be developed that accommodate contemporary preventive and control measures. Other factors to be considered include data on spatial analysis, geographic proximity, environmental factors, fine-scale local as well as long distance movement of populations and goods, and increasing urbanization. The market for insecticides for dengue vector control is complex and fragmented and without a clear path for industrial patterns to follow, which is an important challenge for investment in new active ingredients and formulations.

Dengue prevention includes the role of potential vaccines along with vector control. The main actions for WHO are:

- conduct a comprehensive review of vector control for dengue;
- prepare guidelines for outbreak control and prevention that include pre-emptive measures;
- document case studies on intersectoral engagements for source reduction, integration of vaccines with vector control, and outbreak detection and rapid response and share them with Member States;
- prioritize monitoring and management of insecticide resistance, and develop and initiate guidelines and studies on the resistance mechanism;
- study the integration of vector control and vaccines in models (mathematical and simulation) and, when possible, in field studies;
- support innovation in the development and delivery of new tools for vector control, as well as more effective use of existing vector control tools and strategies.

5. Establishment of the dengue working group

The Group proposes establishing a formal dengue working group under the Strategic and Technical Advisory Group for Neglected Tropical Diseases; develop terms of reference of the working group, and ensure representation of a wider range of expertise to advise WHO’s Department of Control of Neglected Tropical Diseases on implementation of the Global strategy.
ANNEX 1. LIST OF PARTICIPANTS

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