



# Dengue: A Global Health Problem

Advanced tools and systems



## Dengue: A Global Health Problem

Dengue fever is an infectious disease, transmitted by the Aedes mosquito principally in urban tropical and sub-tropical areas and is now endemic in more than 100 countries. Dengue can develop into dengue haemorrhagic fever, fatal in one in twenty cases without proper treatment.

Dengue also places a heavy economic burden on affected regions with estimated annual costs running to several billion dollars.

Since no vaccine exists against the dengue virus, the primary means of disease prevention is to target the mosquito vector and break the transmission cycle. This requires large scale well organised and well funded intervention programmes. While programmes exist in most affected countries, currently employed vector control strategies have not been adequate to combat dengue. Novel tools and approaches are therefore desperately needed.

The IVCC is supporting projects which are developing tools and intervention methodologies to help support those working in dengue vector control.

## Dengue Model

- The Dengue Model is a state of the art user friendly computer model for simulating mosquito vector population and virus transmission.
- Environmental, clinical, epidemiological and control intervention data are used to assess the likely impact of intervention strategies.
- The Dengue Model incorporates a wide range of variables, but allows users to focus only on those relevant to their situation – making it powerful but simple to use.
- Through integration with the Dengue Decision Support System the Dengue Model will support the management of control interventions to maximise efficacy and value for money.

### Background

Mosquito abundance and dengue virus transmission rates can vary widely at different times and locations depending on a range of environmental and epidemiological factors. Quantitative models are the best way to account for inherent variation in dengue transmission and to predict how fluctuations in local dengue mosquito vector populations will impact the incidence of disease among humans.

The Dengue Model is a sophisticated, but user friendly Windows™ based quantitative model that uses environmental, clinical, epidemiological and control intervention data to help users assess the relative impact of individual or combined disease control strategies. Specifically, data on climate, mosquito biology and behaviour, virus factors, human demographics, immune status, insecticide space spraying, removal of mosquito development sites, insecticide treated materials and vaccines can be included.

The Dengue model is nearing the end of its development and will shortly be piloted in the field. We expect the Dengue Model to be available in late 2010.

# Dengue Decision Support System (DDSS)

- The DDSS software package aims to support management and analysis of mosquito vector and dengue disease data.
- The DDSS facilitates monitoring and evaluation and supports informed decision making by local control managers.
- The DDSS incorporates data on mosquito vectors and dengue disease in a GIS backbone for cross-cutting mapping and spatial analyses.
- Using state of the art software components, the DDSS empowers the user to easily access relevant information and produce practical outputs in the form of maps, charts and reports.
- Flexible and powerful querying and reporting tools in the DDSS allows users to tailor outputs to their precise needs.
- Data from the DDSS can be exported for use in the Dengue Model application.
- Use of the DDSS will increase the speed of information flow between health facilities and vector control personnel and thus allow for more rapid and focused vector control response to dengue cases.
- The DDSS can be customised to ensure it fits in with existing infrastructure and suits the needs of a given user community.
- The DDSS is currently under development and will become available in late 2010.

## Background

Electronic public health information systems are commonplace in the developed world. Implementation of such systems have led to standardization of data collection formats, increased speed of information flow and improved connectivity between stakeholder groups, and improved capacity not only for monitoring and evaluation of vector and disease control program performance but also for rapid response activities. Adapting these systems, which often use at-cost software components with high licensing costs, for use in resource-poor environments is a new frontier in vector-borne disease control.

We are addressing this challenge by developing a Dengue Decision Support System (DDSS) software package to aid vector and dengue control programs in their daily operational activities. We aim to provide a powerful and user-friendly DDSS tool comprised entirely of software components that can be provided to the user without licensing costs to deliver maximum capacity at minimal cost.

# New Vector Control Products and Approaches: Casa Segura

The IVCC works proactively with industry and other organizations to develop more efficient and effective vector control products and approaches for sustainable vector control. The IVCC's organizational structure, expertise, reputation, and partnerships are designed to facilitate such development.

The IVCC provides invaluable subject area and in country expertise and capacity to rapidly assess new intervention paradigms for vector control. The IVCC also partners with industry and other stakeholders to develop target product profiles for the most efficacious vector control products.

The IVCC is a point of contact with Ministries of Health and vector control programs in disease endemic countries. The IVCC decision support systems and other tools provide for monitoring and evaluating of new vector control products and programs.

For example, the IVCC is currently testing a Casa Segura (Safe house) approach for proactive dengue vector control.

The Casa Segura is a proactive vector control approach based on the use of insecticide-treated materials, for example in the form of long-lasting insecticide treated curtains and door drapes, to protect homes and other indoor environments from intrusion by *Aedes aegypti* and dengue virus transmission.

We are currently undertaking a detailed field evaluation in Mexico with a novel long-lasting insecticide treated curtain, produced locally by IVCC industry partners, to determine its potential for use as a consumer product to protect individual homes from mosquito vectors and reduce indoor dengue virus transmission.



# The IVCC

The IVCC is a Product Development Partnership developing vector control products and information systems, bringing together expertise and technical resources with an initial award of \$50.7 million from the Bill & Melinda Gates Foundation.

The IVCC is a not for profit company registered as a charity in the UK. The strategy and scope of the IVCC is directed by its Executive Committee under governance of the Board of Trustees who represent a wide range of expertise as well as other stakeholders in the field.

## Further information

If you would like further information on IVCC's dengue systems and products, contact:

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Printed on revive 50:50 Silk

A recycled paper containing 50% recycled waste and 50% virgin fibre and manufactured at a mill certified with ISO 14001 environmental management standard. The pulp used in this product is bleached using an Elemental Chlorine Free process (ECF).

Published by IVCC Communications.

Photography courtesy of M Coleman, J Morgan, P Skov/Vestergaard Frandsen, Syngenta and MRC.

