Caribbean vector-borne disease research and control
Current networks and World Health Organization collaborating centres

Communication initiative - Innovative approach for educating children about *A. aegypti* mosquito control.

The Caribbean Public Health Agency (CARPHA), in collaboration with the Institute of Corporate Development, developed and launched an interactive Google accessible mobile game application for android devices that is called Zap-a’quito. The development of Zap-a’quito was funded by the European Union. The game targets children and provides educational materials about the identification and control of breeding sites of *A. aegypti*. The approach takes advantage of the widespread availability of mobile devices and the frequency of their use by children for playing games. Initial evaluation of Zap-a’quito documented high acceptance and enjoyment and increased knowledge about *A. aegypti* among children who played the game. The developers have already launched the game on Google and plan to provide regular game updates, to share the game with Ministries of Health and Education, to promote the game via social media, to monitor and evaluate its use and to develop a Case Study based on experience.

Global Outbreak Alert and Response Network (GOARN)

GOARN\(^1\) is an operational unit within the World Health Organization (WHO) that receives formal reports from countries and informal/unofficial reports from other sources; reviews and verifies reports and events to determine their risk of being a Public Health Emergency of International Concern. GOARN disseminates information within WHO and externally, as appropriate, and assists with the response. The aim is to ensure that countries are on the alert and ready to respond, to assist countries to readily access appropriate expertise, advice and interventions and to ensure that the international community can rapidly detect and respond to events with potential for international consequences. Since a single institution or country may not have all relevant expertise needed for a response, GOARN is able to utilize global resources to quickly identify and recruit experts to be deployed in multi-disciplinary teams (e.g. that provide support in epidemiology, laboratory, clinical management, infection control, environmental health, behavioural scientists, medical anthropology, risk communication, logistics etc.) to assist or to provide surge capacity during outbreak responses. GOARN coordinates and supports the work of the international teams, accesses and coordinates resources and shares information about best practice or facilitates technology transfer within and across countries. GAORN has been involved in various

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\(^1\) See [http://www.who.int/csr/en/](http://www.who.int/csr/en/) for information on WHO/GOARN
outbreaks (e.g. influenza A [H1N1] global pandemic, Ebola in West Africa, cholera in Haiti) and events in which experts from the Americas and Caribbean were deployed to assist in outbreak control (e.g. dengue in Cape Verde). Countries can request support from GOARN via WHO or the Pan American Health Organization (PAHO) offices.

**WHO Collaborating Centres (WHO CC)**

There are approximately 700 WHO CC\(^2\) in 80 member states helping to implement mandated work and programmes with expertise in science, medicine and public health. WHO CCs are designated following proposals by WHO departments or programmes and subject to appropriate review to ensure that they fulfil certain set criteria. WHO CCs are designated for a limited time (usually 4 years) and have specific mutually agreed deliverables, terms of reference and a detailed work plan. Planned activities do not represent the routine work of the institute that is a designated WHO CC. WHO CCs are expected to provide or mobilize financial resources for the proposed activities, and funding is subject to established WHO’s policies for avoiding any real or perceived conflict of interest with industry and the private sector. WHO CCs report annually, and annual re-designation is not automatic, but subject to satisfactory performance, future needs and relevance to WHO’s work plans and programme needs. There are 20 WHO CCs working on vector-borne diseases (VBDs) and four of them are situated in the Americas.

**British network**

The Public Health England (PHE)\(^3\) agency has a medical entomology group that conducts:

- Surveillance for endemic and non-native ticks and mosquitoes;
- Targeted vector surveillance for West Nile virus (WNV) mosquito vectors;
- Pathogen detection in ticks and mosquitoes and weather/climate modelling of seasonal activity of ticks to target Lyme disease exposure and messages;
- Research into the impact of climate and environmental changes on vectors;
- Communication initiatives on ticks to provide advice and increase awareness of the public.

PHE also collaborates and provides technical advice on surveillance of vectors within a European network on VBDs (VBORNET/VECTORNET). The network is funded by the European Centre for Disease Prevention and Control (ECDC) and has members from over 50 European countries. The network develops reports, technical guidelines, maps of vectors (invasive mosquitoes, WNV vectors, ticks and phlebotomine sand flies), performs surveillance activities and provides *ad hoc* expert support to VBD outbreaks. Historical data and examples were provided of the distribution of various invasive mosquito vectors and the occurrence of VBD outbreaks of dengue and chikungunya in Europe. During the period 2007 to 2014 a few European countries reported autochthonous transmission of dengue (Croatia, France and Portugal) and chikungunya (Italy and France) and PHE detected imported cases of chikungunya in England in 2014 that were linked to Barbados, Grenada and Jamaica. PHE is willing to contribute to improving global health and health security. Collaboration with CARPHA is on-going. Assistance with outbreaks/incidents

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\(^3\) See [https://www.gov.uk/government/organisations/public-health-england](https://www.gov.uk/government/organisations/public-health-england) for information on Public Health England
and public health capacity building and mapping of vectors are areas of interest.

**European Centre for Disease Prevention and Control (ECDC)**

ECDC identifies, assesses and communicates emerging health threats from communicable diseases\(^4\). ECDC plans to disseminate a publication on the risk of Zika. ECDC recognizes that Europe has international links and needs partnerships to conduct effective disease surveillance. ECDC surveys malaria, WNV, YF, viral haemorrhagic disease and has a list of mandatory notifiable diseases as well as other diseases that countries report voluntarily. Risk assessments for VBDs identify human travel and behaviours. ECDC recognizes the need to modernize tools and approaches to performing risk assessments. Indicators should be used, with triggers established to implement follow up action. Countries develop preparedness and response plans and undertake vector control. While ECDC assesses disease risk, it is not involved in risk management. ECDC has an interest in assessing the cost effectiveness of vector control. A WNV risk assessment tool was shown, key elements of which were categorization of risks at 5 levels depending on epidemiological situation linked to recommendations on measures to be taken at each level. ECDC has a network and guidelines for surveillance of invasive and native mosquitoes and collaborates with WHO on vector control. Network support is available via ECDC to access laboratories for assistance with diagnosing diseases’ aetiologies and capacity building, for External Quality Assessment (EQA), evaluation of diagnostics and to obtain positive controls to initiate PCR testing. Mapping of European laboratories’ capacities has been done and results of EQAs are being used to map capacity to detect different pathogens and to follow up on capacity building efforts. ECDC uses data from different sources to assess or model the length of disease transmission season e.g. environmental determinants are used in assessments for chikungunya. Risk assessments are made available to countries, linked territories and to travelers.

**Canadian Public Health Laboratory Network (CPHLN)**

CPHLN\(^5\) started out as a Technical Advisory Committee (TAC) established in 1947 to ensure maximum efficiency in public health laboratory services. The TAC evolved into the CPHL, whose core members include the National Microbiology Laboratory and 10 provincial public health laboratories. Several associate members represent diverse disciplines/interests relevant to laboratories (e.g. biosafety; food borne, environmental and zoonotic infectious diseases; emergency preparedness and response; immunization etc.). The CPHLN has international partnerships with public health agencies in the United States of America and Mexico. Examples were provided of activities conducted by CPHLN that included responding to the Influenza A (H1N1) pandemic and Severe Acute Respiratory Syndrome (SARS) outbreak; publication on the Core Functions of Public Health Laboratories; case definitions for notifiable diseases etc. Some necessary network sustainability factors were listed as access to funding for management support, training of personnel and capacity building and effective communication strategies to provide evidence of the network’s valuable contributions to developments in science and public health. Mention was made of a few areas of immediate concern to CPHLN:

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\(^5\) See [https://www.nml-inm.gc.ca/cphln-rlspc/index-eng.htm](https://www.nml-inm.gc.ca/cphln-rlspc/index-eng.htm) for information on CPHLN
• Staff attrition as technical experts age and retire and need for succession planning
• Climate change and vector-borne diseases
• Anti-microbial resistance
• Disease outbreaks - Ebola/Middle East Respiratory Syndrome Coronavirus (MERS-Co-V)
• Rapidly evolving technologies - genomics/bioinformatics

Regional Dengue Laboratory Network (RELDA)

RELDA⁶ developed out of the work of PAHO/WHO collaborating centres for dengue that are situated in Argentina, Brazil, Cuba, Puerto Rico, and Trinidad and Tobago. The centres have held joint meetings and training workshops since 2004. The objectives of RELDA are:

• Integration of scientific and technology capacities to respond to outbreaks and epidemics;
• Technology and scientific capacity building;
• Standardization of laboratory test protocols, including evaluations of diagnostic kits and methods, and exchange of reference reagents;
• Provision of proficiency testing and strengthening of quality control and laboratory quality management systems.

RELDA’s organizational structure and reach throughout the Americas were presented. RELDA achievements were listed that included: completion of a regional survey of laboratories that determined testing capacity for dengue and other arboviruses and identified training needs; conduct of training workshops; proficiency testing for dengue IgM detection; evaluation of commercial kits; elaboration of a test algorithm for use for chinkungunya surveillance and diagnosis; and, participation in international working groups and initiatives. Challenges were discussed as well as future plans.

Pasteur Institute (IP) international network

The Institute Pasteur⁷ was established as an international research institute in France in 1887. It has grown over the years and now has 33 institutes (including both public and private sector) in 26 countries and has a global reach. The IP membership includes 18 WHO collaborating centres. IP has an integrative and multi-disciplinary scientific strategy that has 4 missions:

• Basic and translational research
• Public health: monitoring infectious disease, expertise, field interventions
• Sharing knowledge: teaching and training
• Technological transfer and industrial partnerships

The IP has a vibrant research agenda linked to diverse public health priorities for both communicable and non-communicable diseases. For dengue, IP has a task force that aims to develop innovative therapeutic tools that include: new vaccines, prognostic markers and a new vector control strategy. Examples were

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⁶ See http://www.paho.org/hq/index.php?option=com_content&amp;view=article&amp;id=4497&amp;Itemid=39306&amp;lang=en for information on RELDA
⁷ See www.pasteur-international.org for Information on Institute Pasteur
provided of IP’s scientific and research work on other diseases and involvement in global public health. IP has an international teaching and training programme and runs 15 to 20 international courses per year, and plans to conduct a new course in entomology in 2016.

French Caribbean Epi surveillance Network

The French Public Health Institute of France (Institut de Veille Sanitaire, InVS) is the national agency with responsibility for monitoring the health status of the population and providing alerts about public health threats. InVS provides decision support to public authorities and its specific objectives are to implement and coordinate epidemiologic surveillance and investigations, to provide quantitative risk assessments and expert appraisals. A regional unit of the French Public Health Institute (Cellule de l’InVS en Region – “Cire”) provides support to 5 French territories in the Americas (Saint-Barthelemy, French Guyana, Guadeloupe, Martinique and Saint-Martin) and has the following missions to:

- Provide scientific, methodological and technical support to health authorities with regard to field epidemiology and quantitative risk assessment;
- Design, implement and strengthen disease surveillance activities;
- Perform outbreak investigations and health risk assessment when necessary;
- Coordinate and ensure a comprehensive and coherent disease surveillance system, as well as a proper standardisation of tools;
- Provide feedback information.

The objectives and systems for DEN surveillance used by Cire were described. Cire has international collaborations and exchanges data with CARPHA and PAHO and with countries that border the French territories (Brazil, Dominica, St. Lucia, St. Marteen and Suriname).

Caribbean veterinary network (CaribVET)

Caribbean animal health network (CaribVET)\(^8\) has been established to improve animal health and veterinary public health in the region. The specific objectives are to:

- Develop a regional strategy for animal health;
- Strengthen surveillance, diagnosis and control capacities for priority diseases in the region;
- Improve disease knowledge;
- Contribute to establishing early alert system in the countries;
- Promote trade and improve veterinary public health in the region;
- Create/support tools development to assist in decision making.

The network’s members include 33 Caribbean countries and 10 organizations. The operational framework includes a steering committee, a coordination unit and various working groups (on epidemiology, avian diseases, ticks and tick borne diseases, swine diseases, veterinary public health and laboratory). Working groups draw upon regional expertise and obtain technical and scientific support from countries and

\(^8\) See [http://www.caribvet.net/](http://www.caribvet.net/) for information on CaribVET
regional and international organizations. CaribVET has regional institutional and political endorsements. A history of CaribVET development and an overview of its achievements were provided. A regional survey was conducted that led to creation of a database of laboratories, expertise and contact information. Laboratory and surveillance needs assessments were carried out. Training of personnel in various disciplines reached at least 100 professionals in 20 Caribbean countries. Various tools have been developed to assist decision makers (e.g. surveillance and disease specific risk assessment tools), regional surveys have been conducted and surveillance guidelines and protocols developed. A strategic plan on sustainability of the network has also been developed.

**Caribbean public health laboratory network (CariPHLN)**

The CariPHLN\(^9\) is made up of laboratories in 26 member states of CARPHA. CARPHA’s main roles are to support surveillance and strengthen laboratories in member states. Laboratory capacity varies within member states. Therefore CARPHA provides primary testing of referred samples from states that have no capacity to perform specific tests and provides reference services for referred samples requiring more advanced testing or confirmation of findings of tests performed within member states. CARPHA also assists with technology transfer, training of personnel in laboratory diagnostics and quality management systems, and contributes to research on public health issues.

\(^9\) See [http://carpha.org/What-We-Do/Laboratory-Services-and-Networks](http://carpha.org/What-We-Do/Laboratory-Services-and-Networks) for information on CARPHA’s laboratory Service