



# ZIKAction

## **ZikaPLAN and ZikAlliance working together on Mathematical Modeling for Zika**

The explosive Zika virus epidemic in the Americas has the potential to amplify the spread into previously unaffected regions of the world, including Europe. As summertime approaches in the northern hemisphere, *Aedes* mosquitoes in Europe may find suitable climatic conditions to acquire and subsequently transmit Zika virus from viremic travelers to local populations.

While *Aedes albopictus* has proven to be a vector for the transmission of dengue and chikungunya viruses in Europe, there is growing experimental and ecological evidence to suggest that it may also be competent for Zika virus.

The ZikaPLAN Mathematical Modeling Group began by modeling the extent of Zika viremic air passenger introductions from Brazil into Europe<sup>1</sup> and analyzing and overlaying the monthly flows of airline travelers arriving into European cities from Zika affected areas across the Americas. The predicted monthly estimates of the basic reproduction numbers of Zika virus in areas where *Aedes* mosquito populations reside in Europe were also compiled.

In order to inform the efficient use of human disease surveillance, vector surveillance and control, and public education resources,<sup>2</sup> specific geographic areas and timing of risk for Zika virus introduction and possible spread within Europe were highlighted.

To further expand on this work, ZikaPLAN hosted ZikAlliance modelers and funded a 2-day workshop on April 3 & 4, 2017 at the London School of Hygiene & Tropical Medicine (LSHTM).

Participants included:

- ZikAlliance modelers and scientists: Dr. Oliver Brady, Dr. Simon Cauchemez, Dr. Sebastian Funk, Dr. Adam Kucharski and Prof. Philip Mayaud



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- ZikaPLAN scientists: Dr. Moritz Kraemer, Prof. Eduardo Massad, Prof. Joacim Rocklov, Prof. Annelies Wilder-Smith (ZikaPLAN project director) and Dr. Laith Yakob.

Presentations included:

- Dr. Moritz Kraemer of HealthMap, Boston: How GeoSentinel, a global network for travel medicine providers for sentinel surveillance on diseases in returning travelers, can be used for monitoring Zika internationally. (Annelies Wilder-Smith was involved in a recent GeoSentinel paper on this subject.<sup>3</sup> )
- Dr. Beate Sander: The Canadian Research Response to Zika and how to use cost effectiveness and utility studies for Zika in the future
- Dr. Laith Yakob: the need for novel methods to bundle activities against *Aedes* mosquitoes<sup>4</sup> and the policy implications<sup>5</sup>
- Dr. Adam Kucharski: results from a study led by Dr. Laith Yakob on the likelihood of Zika outbreaks sustained through sexual contact alone<sup>6</sup>
- Prof. Philippe Mayaud and Prof. Joacim Rocklov: sexual transmission
- Prof. Eduardo Massad: how to estimate mosquito populations (such estimates are lacking for many of the modeling approaches)
- Dr. Simon Cauchemez: presented his data on predicting ICU health care utilization during a Zika outbreak in Martinique

The meeting concluded with an action plan for common projects between ZikAlliance and ZikaPLAN, and a follow up meeting was planned for September 19, 2017, at the LSHTM.

As an intriguing spin-off from this meeting, several researchers will also set out to work on the current Yellow fever outbreak in Brazil.



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2. Rocklov J, Quam MB, Sudre B, et al. Assessing Seasonal Risks for the Introduction and Mosquito-borne Spread of Zika Virus in Europe. *EBioMedicine* 2016; **9**: 250-6.
3. Hamer DH, Barbre KA, Chen LH, et al. Travel-Associated Zika Virus Disease Acquired in the Americas Through February 2016: A GeoSentinel Analysis. *Ann Intern Med* 2017; **166**(2): 99-108.
4. Yakob L, Walker T. Zika virus outbreak in the Americas: the need for novel mosquito control methods. *The Lancet Global health* 2016.
5. Yakob L, Funk S, Camacho A, Brady O, Edmunds WJ. *Aedes aegypti* Control Through Modernized, Integrated Vector Management. *PLoS currents* 2017; 9.
6. Yakob L, Kucharski A, Hue S, Edmunds WJ. Low risk of a sexually-transmitted Zika virus outbreak. *Lancet Infectious Diseases* 2016; 16(10):1100-2.

The EU-funded consortia, ZIKAction, ZIKAlliance and ZikaPLAN work closely to build a preparedness platform in Latin America and the Caribbean. They collaborate on harmonized protocols for cohort studies among pregnant women, infants and children, common communication strategies and the development of data sharing tools and methodology.

