Zika Virus, Vector Control and IVCC (Innovative Vector Control Consortium)

- IVCC is a Product Development Partnership (PDP) based at the Liverpool School of Tropical Medicine that was founded in 2005 to find a solution to rapidly developing insecticide resistance in mosquitoes that transmit disease. IVCC is a charity funded by the Bill and Melinda Gates Foundation, DFID (UKAID), USAID, the Swiss Agency for Development and Cooperation, and more recently UNITAID.

- IVCC’s mission is to build partnerships that create innovative solutions to prevent the transmission of insect-borne disease. Specifically, IVCC works with industry and other stakeholders to facilitate the development of novel and improved public health insecticides and formulations, and provides information tools to enable effective use of existing and novel control measures.

- Although IVCC is primarily focused on malaria, the tools and diagnostics developed will be invaluable against a wide variety of other vector-borne diseases, including Dengue, Chikungunya and Zika.

- Working with industry partners and academia, IVCC has a robust pipeline of new active ingredients and formulation solutions specifically targeted at public health. This pipeline will provide malaria and other vector control programs with a strong portfolio of new vector control tools to replace older insecticides, whose field performance is challenged by the rapid onset of resistance. IVCC is also working with the Bill and Melinda Gates Foundation on finding solutions to outdoor transmission of disease by mosquitoes.

- Vector control is proven as an effective means of protecting people from insect-borne disease, saving many millions of lives in the last fifteen years. Many have been protected from the harm that malaria brings as well as the economic consequences that devastate communities and countries where malaria is endemic. Research, published in Nature September 2015, demonstrated that interventions in Africa have averted 663 million clinical cases of malaria since 2000, with vector control treated nets by far the largest contributor (80%).

- Zika virus is an emerging mosquito-borne virus that was first identified in Uganda in 1947. Outbreaks of Zika virus disease have been recorded in Africa, Asia and the Pacific. The infection spread recently to Latin America and the Caribbean. Zika virus is transmitted to people through the bite of an infected mosquito from the genus Aedes. This is the same mosquito that transmits dengue, chikungunya and yellow fever. Aedes aegypti is a common mosquito in warm climates worldwide and appears to be the most important vector of Zika virus.

- There is no specific treatment or vaccine currently available for Zika virus. The best form of prevention at the personal level is protection against mosquito bites.

- The emergence of Zika virus in recent years (e.g, outbreak on the island of Yap, Micronesia in 2007) along with Chikungunya (Reunion, 2005-2006) and the arrival of West Nile virus into the USA in 1999 are a reminder of the risk of emergence and spread of previously obscure vector borne diseases into regions with naive human populations for which there is no specific treatment of vaccine available. In these cases vector control targeting the specific vectors is an essential component of containing and eliminating infection.

- In the case of Zika virus, Aedes aegypti has been implicated as the main vector in the current outbreaks of disease that are making the headlines, however, there are other potential vectors that could also play a role in transmission.
• General vector control approaches such as source reduction (reducing mosquito populations through removal and modification of breeding sites), and preventing contact between mosquitoes and people (use of insect repellents, by wearing bite-proof clothing, physical barriers such as screens, closed doors and windows) may help reduce the risk of transmission. In the case of diseases transmitted by Aedes aegypti, which is predominantly a day biting mosquito (local variation in diurnal behaviors need to be understood as they will vary regionally, but often show peaks during late afternoon), sleeping under mosquito nets may not be an appropriate intervention. Public health interventions such as peri-domestic spraying using thermal or cold fog applications in combination with other vector control interventions, such as the use of larvicides and perhaps targeted IRS application in coordinated programs, can reduce the incidence of disease transmission, particularly in epidemic situations.

• Aedes aegypti populations in many geographic regions have been shown to exhibit resistance to one or more classes of insecticide, including the pyrethroids (one of the commonest insecticides used for mosquito control). Although the impact of resistance on control measures is not well understood, all candidate novel insecticides evaluated through IVCC’s novel public health insecticides development program have been tested against representative strains of Aedes aegypti that show high levels of resistance to pyrethroids and other insecticides.

• Further work is needed to explore the distribution, incidence and intensity of insecticide resistance in Aedes aegypti. Understanding the performance of existing and novel solutions to Aedes control and the potential impact of resistance influencing the performance of current vector control tools aimed at this species is critical.

IVCC and Vector Control

- **Novel insecticides** for public health
- **Long lasting IRS formulations and dual active ingredient bednets** to improve field performance and preserve existing tools against the threat of resistance
- **Effective solutions to protect against outdoor transmission by insect vectors**

- **Public health regulatory system** changes that encourage innovation and reduce time to impact
- **Stakeholder partnerships** that foster efficiency and prevent insecticide resistance
- **Improvements in the consistency and reliability of field data**

- **Access** to novel vector control technologies
- **Tools and solutions** that support the deployment of innovative products

Other key sources of information about IVCC and Zika Virus

http://www.ivcc.com/
http://www.lstmed.ac.uk/research/topics/zika-virus