d Diagnosing infections caused by dengue, chikungunya and zika virus — the '*Aedes* trio'

Dengue (DENV) and Zika viruses (ZIKV) are not transmitted in South Africa because the mosquito vector of these viruses has a limited range in South Africa with highest densities in parts of northern Limpopo, and northern KwaZulu-Natal provinces. It is also not well understood if the African subtype of *Aedes aegypti* does not support the lifecycle of these viruses, and further, the African subtype preferentially feed on animals, thus reducing the risk to South Africans. Chikungunya (CHIKV) is also transmitted by *Aedes aegypti* mosquitoes, and is endemic the far North-Eastern parts of Limpopo Province South Africa, but cases were last recorded in the 1970s. However, these viruses have recently experienced a massive expansion in range globally, and a number of returning travellers to South Africa have presented with illnesses clinically compatible with these infections. The distribution of these viral infections across the globe reflects the distribution of *Aedes* mosquitoes – a geographical band encompassing the tropics in the Americas, Africa, Asia and the Pacific islands (Figure 1).

While DENV and ZIKV are flaviviruses, and chikungunya is an alphavirus, all three present with similar clinical symptoms, namely fever, headache, myalgia, arthralgia or arthritis, and rash. Dengue is associated with moderate retro-orbital pain. Mild bleeding secondary to lowered platelets may occur with DENV infection, and has been reported in isolated cases of ZIKV infection. However, almost all cases of DENV, CHIK and ZIKV in adults are self-limited. Only DENV infection may progress to a severe life-threatening forms -dengue haemorrhagic fever and dengue shock syndrome. If DENV infection does progress, symptoms and signs commence after defervesence, and include lethargy, persistent vomiting, hypotension, abdominal pain with hepatomegaly, mucosal bleeding, elevated haematocrit and low platelets.

Laboratory testing is able to differentiate DENV, CHICKV and ZIKV infections. During the first five days of illness, RT-PCR to directly detect DENV, CHIKV or ZIKV nucleic acid, or viral culture using in -vitro cell lines or animal inoculation should be performed on serum from suspected cases. After the initial phase of infection, viraemia ceases, and PCR testing or viral culture is not helpful. Thereafter, serum should be evaluated for anti-CHIKV, anti-ZIKV and anti-DENV IgG and IgM antibodies by immunoassay and/or virus neutralisation test. If initial results are negative for IgG and IgM, and these viruses are still suspected, serum taken two or more weeks after illness onset should be retested for IgG and IgM antibodies. While RT-PCR is specific for DENV, CHIKV and ZIKV, there may be a serological cross-reaction between DENV and ZIKV, as both viruses are flaviviruses and share some molecular antigenic epitopes. Convalescent sera is essential in differentiating ZIKV from DENV, and accurate diagnostics for these two viruses require parallel testing. Please contact the NICD should you require further information on cezd@nicd.ac.za or petrusv@nicd.ac.za or call the NICD hotline at 082 -883-9920. A useful resource to assist with differentiating CHIKV and DENV may be found at: http://www.cdc.gov/dengue/resources/

Source: Centre for Emerging and Zoonotic Diseases, and Division of Public Health, Surveillance and Response, NICD-NHLS; (cezd@nicd.ac.za)

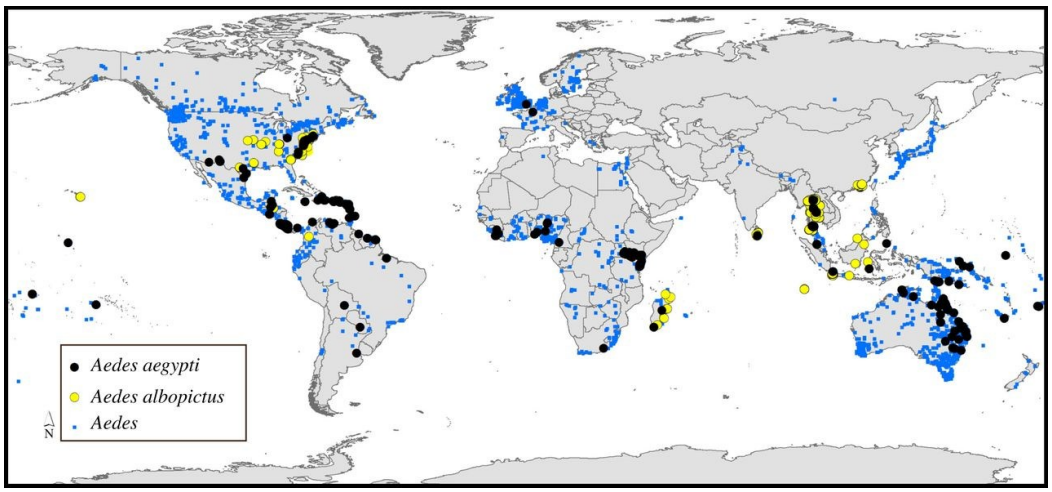

Figure 1. Summary of primary occurrence data available globally for *Aedes* mosquitoes in general (blue) and *Aedes aegypti* (black) and *Aedes albopictus (*yellow). (From Campbell *et al*. Climate change influences on global distributions of dengue and chikungunya virus vectors, Phil Trans R Soc B. 16 Feb 2015.)