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## Zika virus: Is Pakistan next?

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Dear editor,

Zika virus (ZIKV) crisis, which caught Brazil in 2015, heralded the rapid spread throughout Americas and has imparted catastrophic devastation to human population in the form of severe teratogenic outcomes and neurological malformations, *e.g.* microcephaly in neonates, Guillain Barre Syndrome, encephalitis, and acute myelitis in adults. Since 2007, mosquito-borne ZIKV transmission has been confirmed in 76 countries and territories. Of 76 countries, more than 20 countries have reported an increased incidence in microcephaly and Guillain Barre Syndrome. ZIKV has been presented in some regions of Asia for many years, and accumulating evidence indicate the occurrence of small outbreaks or occasional cases of ZIKV infections in number of Southeast Asian countries[1]. A study published in ‘Nature’ reported that ZIKV isolated from Americas, French Polynesia and other Pacific Islands in 2013 and 2014 was Asian strain[2]. Local residents of Asian countries are suspected to be immune to ZIKV infection; whereas, the travelers may still be vulnerable to it because of no prior exposure and immunity. In September 2016, Centre for Disease Prevention and Control (CDC) issued an alert about presence of ZIKV in Southeast Asia and singled out 11 countries: Vietnam, East Timor, Cambodia, Maldives, Thailand, Indonesia, Laos, Malaysia, Myanmar, the Philippines,

and Brunei that are unsafe to visit because of possible worst effects of ZIKV in these countries. The recent wave of ZIKV linked birth-defects in Singapore and Thailand indicate the likelihood of the further spread of ZIKV in Asia (Figure 1).



**Figure 1.** The recent wave of ZIKV linked birth-defects in Singapore and Thailand indicate the likelihood of the further spread of ZIKV in Asia.

In the past decade, outbreaks of different *flaviviruses* infected large proportions of Pakistani population. Arboviral infections are usually

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misdiagnosed and overlooked because of vague clinical symptoms and extensive differential diagnosis that overlap with other viral pathologies. CHIKV has recently been confirmed in Karachi[3], whereas, Lahore has experienced large DENV outbreak in 2011 that infected more than 14 000 people, of which more than 300 were dead. Most appallingly, DENV associated death toll is rapidly mounting in Pakistan because of infrequent epidemics that occur every year[4].

Although, no confirmed case of ZIKV has been identified in Pakistan, the evidence of serological traces exists[5]. The possible reason that might obscure the detection of ZIKV is the lack of proper screening system that can differentiate ZIKV from other *flaviviruses*. The laboratory confirmation of ZIKV is challenging because of serological cross-reactivity with other *flavivirus*, particularly with DENV. There is a possibility that ZIKV has entered Pakistan and is unreported or misdiagnosed yet because many people do not visit doctor due to mild symptoms; secondly, ZIKV shares not only its vector *Aedes aegypti* with CHIKV and DENV but also the clinical features and geographic distribution.

Long range dispersal of vector, mosquito *Aedes aegypti* is responsible for the rapid surge in viral infections. Punjab, which is the largest province of Pakistan, is home to the principal vector carrying Zika, *Aedes* mosquito.

Analysis of climate, previous *flavivirus* outbreaks, travelling patterns, and mosquito biology has improved our ability to predict the expected path and next landing spots of ZIKV in Pakistan. Explosive epidemic of ZIKV is expected to occur during July to September because summer season and monsoon rainfall provide suitable breeding habitats to mosquitoes. People living in slum areas of the country are at greater risk of infection due to standing water and open sewage drains that are breeding pockets for *Aedes* mosquito. It is anticipated that Karachi and Lahore, two largest cities of Pakistan are more susceptible to ZIKV outbreak because of rapid growth in slum areas and vector population. Besides Karachi and Lahore, other metropolitan areas especially Islamabad, Multan, Quetta, Gwadar, and Peshawar are the potential routes of ZIKV entry because of major airline traffic flow between pandemic regions. Moreover, recent study published in 'Lancet' revealed that the highest proportion of high-risk travelers who arrive from Singapore, Miami, USA, Florida, and Brazil can contribute to ZIKV transmission in Pakistan (Figure 2).

Currently, clinicians are underestimating and ignoring the spread of ZIKV in Pakistan because of lack of resources to test for Zika infections on a large scale. However, the widely distributed significant high population of competent vector, *Aedes* mosquito, and Zika's foothold in other neighboring Asian countries indicate the potential threat of ZIKV epidemic in Pakistan will be more destructive and calamitous than other *flavivirus* infections because of associated neurological complications.



**Figure 2.** highest proportion of high-risk travelers that can contribute to ZIKV transmission in Pakistan arrive from Singapore, Miami, USA, Florida, and Brazil.

Public health officials must implement robust surveillance through integrated vector control strategy because once the virus start spreading locally, it will become entrenched in population and will be extremely difficult to eradicate; therefore, the spread of ZIKV can only be controlled by reducing *Aedes* mosquito populations and limiting human contact with this vector. The rising fear of ZIKV epidemic in Pakistan calls for coordinated effort of scientific community to address the strategies for halting the spread of ZIKV because the scenario of Zika's rampage in Pakistan will be much worse than Brazil due to its potential to pose serious threat to 182 million population as well as 14 000 babies born every day.

### Conflict of interest statement

We declare that we have no conflict of interest.

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