

# Recurrence of chikungunya outbreak; an upcoming problem for Pakistan

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“As the rainy season approaches and with the main cargo port in Karachi, prevention and control of the disease is essential to protect the local inhabitants as well as to avoid travel-based infection to other cities or neighboring countries.”

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In Pakistan, the initial outbreak of chikungunya was reported in November–December 2016 in the city of Karachi. A total 1740 people were brought to hospital between December 2016 and March 2017 [1]. Recurrence of infection was observed again with thousands of cases in April 2017. It is proposed that due to the upcoming rainy season and poor sanitary system of the city, reemergence of the *Aedes aegypti* (*A. aegypti*) borne viral disease will be highly predictable. During the recent outbreak, the highest numbers of cases were reported from Malir followed by Ibrahim Hyderi, Kemari, Bin Qsim, Kemari and Lyari [2]. In April 2017, a large number of confirmed and suspected cases were reported from the city. According to the Health Department of Sindh, from April 2017 to 5 May 2017, a total of 212 chikungunya cases were confirmed by testing acute-phase samples for presence of viral RNA and convalescent-phase samples for the presence of antibodies. Out of these reported cases, the highest number of patients (131) arrived at Ibrahim Hyderi Hospital, followed by 81 infected patients from Malir and Kemari, whereas only nine were reported from Saudabad [3].

The situation is alarming, considering that 21,000 suspected patients were tested for chikungunya or given symptomatic treatment at hospitals in the city [4]. On 4 May 2017, the WHO shared its findings to the provincial Government that five out of six city districts of Karachi were disease-infested. As a result, it was highly recommended to the Government to take ‘radical’ measures to safeguard the city from the increasing incidence of chikungunya [5].

## Epidemiology

The virus has its root in eastern Africa before the 18th century; it then spread to Asia and has recently reached subcontinent countries. WHO has declared this disease endemic to Africa, Asia and southeast Asia [6]; however, epidemic outbreaks have been reported from Pacific Islands, Australia and several countries of the Americas in 2015 [7]. Chikungunya fever is caused by an arthropod-borne (*A. aegypti*) alphavirus that leads to an acute delirious illness. It is an RNA virus that belongs to the family *Togaviridae*. *Aedes aegypti* can also transmit other infections like dengue and Zika virus. Chikungunya virus is persisting in those countries where dengue is present because the carrier of both viruses is same mosquito [8]. Pakistan had already suffered severe outbreaks of dengue in the most populated province of Punjab from 2011 to 2015 [9] due to the confirmed presence of *A. aegypti*. Chikungunya fever is causing serious morbidity, while the mortality rate continues to be erratic and poses a serious threat to the fragile healthcare structure of Pakistan [6]. As *A. aegypti* is a common vector for both dengue virus and chikungunya virus, coinfection/parallel infection of these viruses can deteriorate the management of patients.

## Instigation of infection in Pakistan

The chikungunya virus was originally found in rodents in 1983 [10]. In 2011, however, a few cases of chikungunya fever were reported among children with nonspecific feverish illness during an epidemic outbreak of dengue fever in Lahore [11], indicating that it might spread to other regions of the country. In November 2016, a large number of individuals in Karachi were observed with a so called 'mysterious disease'. Initially the Health Ministry and WHO denied its presence and stated that reports regarding the presence of chikungunya virus in Karachi were unconfirmed [12]. Later on, the presence of chikungunya virus was confirmed by NIH Pakistan [13] and in 2016, around 30,000 infections were reported in Karachi alone [1].

## High risk groups

Data analysis of infected patients establish that high risk groups include: >65 years of age, arthritis, underlying medical conditions like; high blood pressure, cardiac issues or diabetes mellitus. The pregnant women also owe a risk of transmitting the virus to new born babies. People with jobs or hobbies that involve long-time outdoors activities and work/living in buildings that are unlikely to have window screening or air conditioning are also high risk due to their high exposure to mosquito bites. Humanitarian workers and people visiting friends/relatives in localities where chikungunya has become locally established should also take preventive measures [6,14]. In Karachi, Pakistan, most of the infected people were from 30 to 39 years of age [5].

## Risk factors for future

Karachi produces tons of garbage each day as there is no proper garbage collection system in the city, the garbage is dumped everywhere in streets across the city. Due to upcoming rainy summer season, it seems that the problem will be worse in coming months. There are multiple risk factors that make Karachi more vulnerable;

- Karachi is the most densely populated city of Pakistan with more than 23 million inhabitants, that is over 24,000 people per square kilometer, or 63,000 per square mile [15]. Such high population density facilitates the quick spread of vector-borne diseases;
- The change in climate of this megacity has supported the outbreak of many arboviral infections including dengue, chikungunya and malaria. Due to El Niño southern oscillation and anticyclonic circulations over Khairpur and Nawabshah region average winter temperature is currently higher when compared with previous records [16];
- Poor sanitary conditions, no proper entomological indices and socioeconomic situations of the inhabitants have further worsened the scenario and helped breeding of the vectors;
- Pakistan is an underdeveloped country with poor health standards and inadequate facilities. Such fragile health conditions resulted in more than 30,000 chikungunya infection cases including 17 doctors, 31 paramedic staff and 8 sanitary works in Karachi during last 10 years [17].

## Preventive measures

As the rainy season approaches and with the main cargo port in Karachi, prevention and control of the disease is essential to protect the local inhabitants as well as to avoid travel-based infection to other cities or neighboring countries. To control future outbreaks in the country some guidelines are proposed:

- The government should take steps to establish a well-equipped diagnostic laboratory in Karachi for the timely diagnosis of the disease;
- Healthcare workers must be trained and educated about the management of the disease;
- People should be educated about the disease, its transmission routes, treatment accessibility and integration of control methods;
- Natural and artificial water bodies are needed to be monitored to avoid mosquitoes breeding in close proximity to human habitation;
- The mobilization of affected communities should be monitored;
- Insecticide sprays should be deployed to kill immature larvae and flying mosquitoes as an immediate preventive measure, whereas long-term entomological surveillance is also needed as a long-term strategy;
- Less skin exposure to the day biting vector by wearing full sleeves clothes;
- Use of mosquito repellent, coils and insecticide treated nets;

- The Pakistan Government should arrange special campaigns with the involvement of social, electronic and print media. Healthcare education programs should be established widely for raising awareness about chikungunya viral infection;
- NGOs and different community based organizations should assist in increasing community education regarding prevention and care of chikungunya virus infection.

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