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Investigating the impact of seasonal variations on the dynamics of Chikungunya

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Abstract

Chikungunya, a re-emerging disease, was first identified in 1952 in Tanzania. The first outbreak of Chikungunya in Bangladesh was observed in Poba upozila Rajshahi in December 2008 (Chowdhury et al, 2012), and in 2017, Bangladesh experienced another major outbreak. Chikungunya is caused by Chikungunya virus (CHIKV), which is a member of alphavirus genus and togaviridae family. According to the World Health Organization, CHIKV is transmitted from human to human by the bites of infected female mosquitoes most commonly the *Aedes albopictus* and *Aedes aegypti* species. The incubation period is usually 3 – 7 days but may vary from 1 – 12 days. The disease may be asymptomatic but in 72% – 97% cases it shows high fever and joint pain (Thiberville et al, 2013). The disease dynamics of dengue, zika, and chikungunya are similar since those all are transmitted by *Aedes* mosquitoes. Vector-borne diseases, such as these, are likely to covary with environmental conditions. Altizer et al (2006) presents an analysis of seasonality and the dynamics of infectious diseases. The abundance of the mosquitoes, rate of pathogen transmission, parasite development within vectors, and many more things are directly related to seasonal variation. Here, we develop and analyze dynamical systems of an Chikungunya epidemic subject to seasonal variations. We consider the transmission rates between the hosts (humans) and vectors (*Aedes* mosquitoes) to vary periodically with time.

References

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