

Author's Accepted Manuscript

Data informed analysis of 2014 dengue fever outbreak in Guangzhou: impact of multiple environmental factors and vector control

Yi Jing, Xia Wang, Sanyi Tang, Jianhong Wu



www.elsevier.com/locate/jtbi

PII: S0022-5193(16)30423-4
DOI: <http://dx.doi.org/10.1016/j.jtbi.2016.12.014>
Reference: YJTBI8897

To appear in: *Journal of Theoretical Biology*

Received date: 25 August 2016

Revised date: 13 December 2016

Accepted date: 17 December 2016

Cite this article as: Yi Jing, Xia Wang, Sanyi Tang and Jianhong Wu, Data informed analysis of 2014 dengue fever outbreak in Guangzhou: impact of multiple environmental factors and vector control, *Journal of Theoretical Biology*, <http://dx.doi.org/10.1016/j.jtbi.2016.12.014>

This is a PDF file of an unedited manuscript that has been accepted for publication. As a service to our customers we are providing this early version of the manuscript. The manuscript will undergo copyediting, typesetting, and a review of the resulting galley proof before it is published in its final citable form. Please note that during the production process errors may be discovered which could affect the content, and all legal disclaimers that apply to the journal pertain.

Data informed analysis of 2014 dengue fever outbreak in Guangzhou: impact of multiple environmental factors and vector control

Yi Jing^a, Xia Wang^{a,*}, Sanyi Tang^a, Jianhong Wu^b

^a*School of Mathematics and Information Science, Shaanxi Normal University, Xi'an, 710062, P.R.China*

^b*Centre for Disease Modelling, York Institute for Health Research, York University, Toronto, Ontario, Canada*

Abstract

Epidemics of dengue fever in China were reported before 1940 and the outbreak of dengue fever in Guangdong province in 2014 is the most serious so far. The important question is what factors account for this serious outbreak, and how to evaluate the sensitivity of the multiple factors including weather variables and human actions on the dengue disease. Therefore, according to the relations among the temperature (daily mean temperature (DMT) and diurnal temperature range (DTR)), vector parameters and reproduction number we have proposed the analytical formula for the relative vector's capacity and effective reproduction number, and then we have the formula for the likelihood function by employing the generation interval-informed method. This allows us to estimate the unknown vector parameters by the maximum likelihood method and carry out the sensitivity analysis. The correlations between the density of mosquito vectors (the Breteau index (BI), the adult mosquito density) and the daily newly reported cases of four different districts of Guangzhou city have been studied by using the Pearson correlation and cross-correlation analyses. Our findings indicate that both the BI and the adult mosquito density are statistically significantly correlated with the daily newly reported cases, and the vector parameters are closely related to the

*Corresponding author. Tel.: +86 (29)85310232.

Email addresses: xiawang@snnu.edu.cn. (Xia Wang), sytang@snnu.edu.cn, sanyitang219@hotmail.com. (Sanyi Tang)

Download English Version:

<https://daneshyari.com/en/article/5760174>

Download Persian Version:

<https://daneshyari.com/article/5760174>

[Daneshyari.com](https://daneshyari.com)