

ESTIMATING REPRODUCTION NUMBER OF DENGUE TRANSMISSION IN 2013 AND 2014, SINGAPORE

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Abstract. In order to evaluate the reproduction number of vector-borne diseases, which are prevalent in regions for decades and, as a result, the human population is no longer completely susceptible to the disease due to development of natural immunity or vaccination, it is necessary to develop a mathematical model of the disease transmission, the solution of which gives the number of infected cases periodically reported by surveillance organizations. We generated a model and applied it to a dengue epidemic in Singapore in 2013 and 2014. A new estimation formula for the reproduction number was obtained under the assumption that the human population was not completely susceptible to the disease. Using the actual dengue data, we evaluated the reproduction number of dengue transmission in Singapore in 2013 and 2014. The new formula is effective in estimating the reproduction number of a vector-borne disease under the circumstances that the human population is not completely susceptible to the disease.

Keywords: dengue, reproduction number estimation, mathematical model, vector-borne disease

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