

UNIVERSITI TEKNOLOGI MARA

TECHNICAL REPORT

**A STUDY OF
BITING RATES OF MOSQUITOES IN
TRANSMISSION OF DENGUE DISEASE**

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IN THE NAME OF ALLAH, THE MOST GRACIOUS, THE MOST MERCIFUL

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ABSTRACT

The SIR model for dengue disease transmission is discussed here. The host (human) population is divided into three compartments : susceptible, infected, and recovered. The mosquito population is divided into two compartments : susceptible and infected. The interest here is to derive SIR model to predict the spread of dengue fever disease in Malaysia. SIR model is used to investigate the spread of dengue fever disease due to different biting rates of mosquitoes. The data is obtained from Health Ministry for the year 2010 till 2015. The SIR model are solved by ODESOLVE command from maple software. From the observations, if the values of biting rates are increased, so the susceptible host population are decreased. Then, the number of infected hosts population increases quickly with the increase in biting rates. The spread of dengue transmission due to biting rates of mosquitoes can control if there is high level awareness among people. Other than that, in order to reduce infectives in both host and vector population, the biting rates of mosquitoes can be controlled.

1 INTRODUCTION

1.1 Research Background

Dengue fever is defined as infectious disease that dangers regarding 2. 5 billion people around the world. As stated by Side & Noorani (2013), about 50 to 100 million reported cases worldwide. Dengue fever has become major plague ailment in Southeast Asia. For example, epidemic arises starting with environmental change and shortage of knowledge in population and the data about dengue fever may be not so good. Dengue fever is caused by the dengue infection. The causes of dengue fever is separated under four separate serotypes for example, dengue virus 1 (DEN1), virus 2 (DEN2), virus 3 (DEN3), and virus 4 (DEN4). The symptoms of dengue fever include high fever, extreme joint, muscular point, vomiting, eye pain, and others. These infections are conveyed by two types of mosquitoes such as *Aedes aegypti*, *Aedes albopictus*. *Aedes aegypti* is primary vector of dengue infection transmission and *Aedes albopictus* can transmit the dengue infection.

Aedes albopictus is a small, dark mosquito with a white dorsal stripe and banded legs. They are strongly attracted to bite humans, but will feed on cats, dogs, squirrels, deer and other mammals, as well as birds. They will bite any exposed skin surface. They bite outdoors and indoors, but are usually found outside. To lay the eggs, these mosquitoes can use natural locations or habitats and artificial containers with water . The female mosquito lays her eggs just above the surface of the water about four or five days after feeding on blood. The larvae hatch When rain covers the eggs with water. Generally larvae feed upon small aquatic organisms, algae and particles of plant and animal material in water-filled containers. Egg production sites are likely to be close to where this mosquito is found with a short flight range (less than 200 m).

Aedes albopictus mosquitoes remain alive through the winter in the egg stage in temperate climates (areas with four seasons) but are active throughout the year in tropical and subtropical locations. *Aedes albopictus* is a very aggressive daytime biter. Its peak feeding times are