

UNIVERSITI TEKNOLOGI MARA

TECHNICAL REPORT

A STUDY OF THE SIR MODEL
FOR SPREAD OF DENGUE FEVER DISEASE

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ABSTRACT

Various mathematical model has been used to investigate dengue transmission. The *SIR* model for dengue disease transmission is discussed here. In this paper, we study the *SIR* model which includes Susceptible which is the number of susceptible person, Infected which is the number of infected people and Removed which is the number of recovered people. Our interest here is to derive, apply and predict the transmission of *SIR* model. We will investigate the transmission of the dengue viruses between the human population and the mosquitoes population in Malaysia and the result we got by using maple software. By using Maple we use the technique of dsolve to get the graph. The aim for our project to measure and control the number of infected people by predict the cases using Maple software. In order to reduce the Dengue Haemorrhagic Function (DHF) patients and to keep the number of patients at an acceptable level by the prediction the cases. We also using the data from Kementerian Kesihatan Malaysia for the year 2005 until 2014.

1 INTRODUCTION

1.1 Background of Study

Dengue is a mosquito-borne viral infection found in tropical and subtropical regions around the world. Dengue Fever (DF) is characterized by flu-like symptoms that are generally reported as quite unpleasant – but usually not fatal (World Health Organization, 2012). Symptoms include severe joint and muscle pain, swollen lymph nodes, headache, fever, exhaustion, and rash. The presence of fever, rash, and headache is characteristic of dengue fever. One of the name for the illness is “breakbone fever”, comes from the excruciating bone pain that victims sometimes feel. However, in some cases patients can contract a more serious form of the disease, known as Dengue Hemorrhagic Fever (DHF), which is far more dangerous. Dengue is caused by Dengue Virus (DENV), a mosquito-borne flavivirus. DENV is a single stranded RNA positive-strand virus of the family Flaviviridae which is a genus Flavivirus. This genus includes also the West Nile Virus, Tick-borne Encephalitis Virus, Yellow Fever Virus and several other viruses which may cause encephalitis. DENV causes a wide range of disease in humans, from a self-limited Dengue Fever (DF) to a life threatening syndrome called Dengue Haemorrhagic Fever (DHF) or Dengue Shock Syndrome (DSS). There are four antigenically four serotypes of the virus which is DENV-1, DENV-2, DENV-3, and DENV-4. Nowadays, about 2.5 billion people or 40As stated by Faisal, Ibrahim and Taib (2008), basically, dengue is transmitted by several species of mosquitoes which is by the genus name “Aedes”. The mosquitoes generally acquire the virus while feeding on the blood of an infected person. Through this process the virus was transmitting into the body. Actually there is no evidence to prove whether every mosquitoes carrying the dengue virus. The dengue virus circulates in the blood of infected humans for two to seven days, at approximately the same time that they have fever. Treatment of acute dengue is supportive, using either oral or intravenous rehydration for mild or moderate disease, and intravenous fluids and blood transfusion for more severe cases. Since the number of cases of