

UNIVERSITI TEKNOLOGI MARA

TECHNICAL REPORT

APPLICATION OF DIFFERENTIAL
TRANSFORMATION
METHOD TO THE SIR MATH MODEL OF
THE SPREAD OF DENGUE FEVER

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ABSTRACT

Dengue fever is one of the critical diseases in Malaysia. It has turned into a primary issue for authorities everywhere throughout the world including our nation, Malaysia. Millions cases of dengue infection is reported worldwide each year. Usually, the infection occurs in tropical and subtropical areas. Dengue fever with extreme form is called hemorrhagic fever, which may lead to severe bleeding, a sudden drop in blood pressure and the worst is death. As a contextual analysis, the information utilized is the reported dengue fever cases from year 2011 until 2016 in Kota Bharu, Kelantan. According to the data dengue fever cases collected, it showed dengue fever cases was increase drastically from 2011 until 2014 with the highest is in 2014 by 10 955 cases. However, dengue fever cases in year 2015 and 2016 were reported greatly decreased. In this report, we study on the SIR model for the spread of dengue fever. This report paper is aim to estimate the recovery rate (α), transmission rate (β) using Euler's method and applying Differential Transformation Method (DTM) to the SIR model in dengue fever. It is observed that when number of infected increase rapidly, the number of susceptible also decrease rapidly. The value of β is calculated and we found that the higher value of β the number of dengue fever cases reported is lower and vice verse.

1 INTRODUCTION

1.1 Background of Study

Dengue fever is a disease which is affected by mosquito-borne (aedes) that occurs in tropical and subtropical areas of the world. Millions cases of dengue infection is reported worldwide each year which require hospitalization. The extreme form of dengue fever is called hemorrhagic fever which may lead to severe bleeding, a sudden drop in blood pressure and the worst is death.

According to Hussin et al. (2005), dengue fever is most general and widespread in the world today. No less than 100 million instances of dengue fever are estimated yearly and cases of dengue hemorrhagic fever (DHF) are assessed 500,000 which require hospitalization. Our nation, Malaysia recorded 19,544 cases in 1997, which is the most highest recorded ever. Of 19,544 cases, 806 were DHF with 50 passings. 90% are kids less than 15 years old years. DHF death rates normal 5%, with assessment 25,000 passings every year (Narwani as refered to in WHO, 2005). A whole of 4,716 occurrences of dengue fever and dengue hemorrhagic fever were represented in Kota Bharu, Kelantan, Malaysia for the year 1998 to 2003, including 4,476 (94.9%) dengue fever cases and 240 (5.1%) dengue hemorrhagic fever cases.

Aedes mosquitoes mainly attack in the morning and sundown time. The infection from Aedes can be transmitted on just a single bite. It is expressed that female Aedes likewise get infected while sucking the blood of a man who is contaminated with dengue fever. Furthermore, this dengue fever can likewise be transmitted through the blood items which is tainted furthermore through the donation of an organ.

At the point when the female aedes mosquitoes are contaminated during the blood supper