UNIVERSITI TEKNOLOGI MARA

SIR MODEL APPLICATION IN URBAN SETTINGS: UNDERSTANDING DENGUE SPREAD IN HIGH-RISK AREAS

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Bachelor of Science (Hons.) Management Mathematics

July 2025

ABSTRACT

Dengue fever remains a major health problem in tropical and subtropical cities of the world, carrying millions of infections and thousands of deaths each year. This study investigates the dengue transmission in two districts located in Selangor, which is Ulu Langat and Petaling, that are at high risk of dengue. Applying the Susceptible-Infected-Recovered (SIR) epidemiological model, the study aims to solve the SIR model using Euler's method, simulate the transmission and recovery rate and identify the relationship between the abundance of dengue disease and rainfall. Based on the transmission and recovery rate, the dengue cases for year 2025 to 2028 are predicted.
According to the findings, there are different trends in prediction in the two districts between 2025 and 2028. Ulu Langat is expected to show a significant rise in the dengue cases in 2026 and 2027, which will be followed by a slowdown in 2028. On the other hand, Petaling also experiences a growing and increasing trend which are expected to peak in 2026 and start to decline in 2027 and further in 2028. Additionally, there was a significant positive correlation between the rise in rainfall and dengue cases especially during the first weeks of the year, which emphasizes the importance of environmental factors in the spread of the disease. The study, however, also shows that heavy rainfall itself is not enough to maintain long-term outbreaks and this highlights the need of a combination of both the integrated public health measures and management of the environment. This study shows how mathematical modelling can be useful in predicting the patterns of the disease and provided a useful lesson to the agencies of public health in order to maximize the use of their resources to improve the control and prevention of dengue. Further monitoring and flexible public health programs are important in reducing the effects of dengue in these susceptible urban environments.

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