

UNIVERSITI TEKNOLOGI MARA

**SIMULATION OF AEDES AEGYPTI
POPULATION DYNAMICS BY USING
STAGE-STRUCTURED MATRIX
MODEL RELATED TO RAINFALL
DISTRIBUTION**

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ABSTRACT

Introduction : *Aedes aegypti* is one type of mosquito that spreads dengue disease. This dengue disease can be seen as a threat because it can threaten human life, and it is one of the causes of death in Malaysia. The number of dengue fever remains high in Malaysia, particularly in Shah Alam, where it has resulted in deaths. Years have passed, and there is still no effective medicine or vaccine to treat it. **Research Objectives :** In light of this, this study aims to simulate the growth of *Aedes aegypti* mosquito populations related to rainfall distribution. Before the simulation, the pattern of egg hatching rate will be identified by using rainfall distribution. The simulation reveals a clear correlation between the population of *Aedes aegypti* and the occurrence of dengue cases. **Methodology :** The Lefkovich matrix model, one of the stage-structured matrix models was used to simulate the population of *Aedes aegypti* changes based on rainfall distribution. Mosquitoes go through five stages in their life cycle which is egg, larva, pupa, adult 1, and adult 2. Rainfall distribution was picked as the dependent variable in this research. **Result and Discussion :** Based on the results of this research, the population of *Aedes aegypti* decreases during periods of heavy precipitation and increases during periods of light precipitation. The increment and decrement of the *Aedes aegypti* population depend on the precipitation because, during periods of heavy precipitation, the water level in the container containing mosquito eggs will exceed capacity, resulting in the death of the eggs and a decrease in the population of *Aedes aegypti*. Additionally, the correlation between dengue cases and the population size of *Aedes aegypti* was validated to verify this research. **Conclusion and Recommendations :** In conclusion, the research outcomes have the potential to provide significant contributions in terms of understanding dengue cases in Malaysia and reducing their growth. This research contributes more specifically to the authorities because the authorities can formulate strategies to prevent the increase in dengue in Malaysia. The next researcher should have included additional variables, such as humidity and regions (urban and rural), in order to obtain more precise and reliable results.

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