# MODELLING AND FORECASTING DENGUE FEVER INCIDENCE IN MALAYSIA BY INTERPOLATING ENVIRONMENTAL DATA

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**Background and Aims**: In the literature on dengue fever in Southeast Asia, a variety of relationships between disease incidence and environmental factors have been suggested. Environmental factors and climatic conditions are known to strongly influence vector biology, its survival and the transmission of dengue. By linking spatial epidemiological data on disease incidence to environmental data on rainfall, temperature and humidity, this study describes the spatial and temporal patterns of dengue cases in relation to the environment factors and explores methods to predict future dengue outbreaks.
**Methods**: Monthly rainfall, mean temperature and relative humidity data collected at 26 locations in Peninsular Malaysia from 2005-2010 were interpolated to the surface data using the Inverse Distance Weighted (IDW) method in a geographical information system. The interpolated environmental data were then overlayed with dengue incidence data based on districts in Peninsular Malaysia that experiences the two different monsoon patterns. Monthly dengue incidence data and interpolated environmental variables were modelled using the Seasonal Autoregressive Integrated Moving Average (SARIMA) models. The best fit SARIMA models for 2005-2009 were applied to predict and validate dengue incidence in 2010.
**Results**: SARIMA models for different districts were found to have different patterns, with monthly rainfall identified as the only significant predictor of dengue incidence ($\beta$=0.009, t=0.104, p=0.038). The model identified were SARIMA$(1,1,0)(0,0,0)_{12}$ with the Ljung-Box test (Q18=15.205 and p=0.58). There was no significant seasonality pattern identified for the study period.
**Conclusions**: The IDW method is useful in interpolating environmental factors for large areas when climate information is not readily available. The SARIMA model is a valuable tool to model and forecast dengue fever incidence using environmental factors and to assist in developing effective disease prevention strategies.