

IMPACT OF CLIMATE FACTORS ON THE DENGUE INCIDENTS IN KURUNEGALA DISTRICT, SRI LANKA

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Dengue fever has become a serious and growing public health concern across Sri Lanka. Climate plays a crucial role in the growth and spread of *Aedes* mosquitoes, the primary vector of dengue. Identifying which climate factors influence mosquito populations and dengue transmission is essential for developing effective prevention and control strategies. This study examines the relationship between climate variables and dengue incidences in Kurunegala, one of the high-risk districts in Sri Lanka, during the period 2013 – 2021. The explanatory variables considered were monthly average rainfall, average wind speed, maximum and minimum temperatures, and average daytime and night-time relative humidity, while the number of dengue incidences was treated as the response variable. Multicollinearity among the explanatory variables was first checked using Variance Inflation Factor (VIF) analysis. A Poisson regression model was initially fitted; but residual deviance indicated over-dispersion. To address this, Quasi-Poisson and Negative Binomial regression models were applied, with model parameters estimated via maximum likelihood. Model adequacy was assessed using residual deviance tests, and the Akaike Information Criterion (AIC) was employed for model selection. The Negative Binomial model performed the best, effectively handling over-dispersion. Results revealed that rainfall and wind speed significantly affected monthly dengue incidence. Rainfall showed a positive association, consistent with the creation of water collections favourable for mosquito breeding. In contrast, higher wind speeds were negatively associated with dengue cases, likely due to the limitation of mosquito movement and transmission. These findings provide valuable insights for predicting dengue outbreaks and developing early warning systems. Incorporating time-lagged rainfall variables could further enhance model accuracy by capturing the delayed effects of rainfall on dengue transmission.

Keywords: Climate factors, Dengue incidence, Negative Binomial Regression, Poisson regression, Quasi-Poisson regression