

## Spatial and Temporal Distribution Patterns of Dengue Cases in Colombo District.

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Dengue has become the most versatile virus in latest human history that has caused thousands of deaths all around the globe. It is an epidemic disease caused by a flavivirus transmitted via an *Aedes* mosquito specie. Prediction of numbers of potential casualties allows us to get medically prepared for allocating limited medical resources in outbreak situations. The main objective of the study was to identify whether the previous dengue cases, climatic factors *viz.* temperature and precipitation are major determinants of the current dengue incidents and if so, to develop a cost effective but highly sensitive system based on those relationships to predict the future numbers, as a measure of early preparation. We selected Colombo district which is the highest dengue hot zone of the country. Here we have identified the most affecting lag week terms or lag ranges of serial correlation, temperature as well as precipitation separately and used those lag terms to develop a multivariate regression for prediction with notified cases data and climatic data from 2010-2015. Then we calibrated the sensitivity of model with data of 2016-2017. We have used population demography data and land use data from ecological perspective to spatially locate and compare the severity of the situation. As results we found strong relationship between previous cases, temperature, precipitation and current cases. Through this, we were able to develop a strong and high sensitive prediction model for Colombo district. The weekly values predicted were 99.87% accurate to actual figures with only 0.13% deviation when averaged. It was capable of predicting 6458 cases out of 7104 cases that truly happened from 2016-2017 which was around 91% accurate. Further we identified the dengue hot zones such as Colombo central, Kaduwela and Maharagama at divisional level based on ecological relationships. It is concluded that still weather based models can play a major role in successful dengue forecasting and further, ecological concepts play a major role in understanding the behavior of the vector mosquito.

**Keywords:** dengue, forecasting, ecology, demography, land use