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Predicting dengue incidences using rainfall and temperature

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Dengue fever is a serious illness caused by a virus, which is transmitted through the infected female mosquito, namely *Aedes aegypti* (principal vector) and *Aedes albopictus*, through bites or blood meals on human hosts. Dengue is a major public health problem in most countries in tropical regions and it has spread rapidly in many parts of the world including Sri Lanka. The urban population in Sri Lanka is highly vulnerable while Colombo District is at high risk. This study focuses on the dengue cases reported around Colombo Municipal Council (CMC) in Sri Lanka. The aims of this study are to identify the lags for explanatory variables which are affected the dengue incidence most, and to identify a distribution of weekly dengue cases. The explanatory variables are average rainfall per week, average of the maximum temperature per week and average of the minimum temperature per week. Weekly dengue incidents from January 2009 to October 2017 in CMC were considered. By applying the cross correlation analysis, it showed that the average of the maximum temperature per week and the average rainfall per week have a significant influence to occurrence of dengue cases after 10 weeks their occurrences. Therefore, the best-lags were ten weeks for both weekly average maximum temperature and weekly average rainfall and, best-lag for weekly average minimum temperature was zero. The Negative Binomial regression model was used in this study. The number of dengue cases per week in CMC area followed negative binomial distribution given that the average rainfall and average maximum temperature before 10 weeks. This predictive distribution can be used as an early warning signal so that public health officials can be prepared in advance to minimize the disease burden.

Keywords: Cross-correlation analysis, dengue, early-warning, negative binomial regression