Granger causality between dengue and climatic variables in Colombo, Sri Lanka

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Dengue is a viral infection which is spreading rapidly all over the world as well as in Sri Lanka. The burden of the dengue shown by the number of deaths from the disease annually. Literature shows that there is a strong association between climatic factors with the dengue. This study applied Granger Causality test in order to identify significantly influence climatic variables on reported dengue cases. Data consists with minimum temperature, maximum temperature, rainfall and dengue cases in the Colombo from January 2009 to October 2017. The original series which were not stationary were become stationary after taking seasonal and non-seasonal first differences. Then the stationarity of the final four series were confirmed by applying autocorrelation/partial autocorrelation function, Augmented Dickey-Fuller Test, Phillips-Perron Root Test and KPSS Test. The optimal lag selection in the Granger test was identified using Akaike Information Criterion. In addition to the Granger test, Impulse Response Function and Forecast Error Variance Decomposition were used to study the impact of climatic variables on dengue. Analysis displayed significant correlations of dengue with mentioned variables at 5% significance level. But only the rainfall was granger caused dengue at 5% significance level. Thus, results revealed that even though the variables were correlate, the impact of rainfall on dengue cases was only significant but not the minimum and maximum temperatures; as those are not causing factors for the dengue. Further the impact of rainfall on dengue reaches its peak around 8th week and reaches zero after 20th week. This study provides a platform for identifying influencing variables on dengue which can use to build an effective mathematical/statistical model of the dengue.

Keywords: climatic factors, dengue and granger causality

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