Oral presentation: 207

A geo-spatial analysis of dengue patients and rainfall in Sri Lanka -2017

K. Pathiraja, S. Premadasa, S. Gnanasinghe, L. G. Y. J. G Wadasinghe and V. P. A. Weerasinghe*

Department of Zoology and Environmental Management, Faculty of Science,
University of Kelaniya, Sri Lanka.
*primali@kln.ac.lk

Dengue is one of the most prevalent arthropod borne virus affecting human. There are four serotypes that manifest with similar symptoms and two main vectors identified in Sri Lanka named as *Aedes aegypti* and *Aedes albopictus*. Dengue disease range from mild to dengue hemorrhagic fever. The distribution of dengue vector is varied mostly according to the rainfall. This study evaluates the relationship between percentage dengue patients in each district of Sri Lanka and monthly average rainfall distribution in 2017. Data was analyzed using ArcGIS 10.2 software. In order to get descriptive results, spatial autocorrelation (Moran's I) was carried out. Positive Moran's I shows that the average rainfall data are clustered according to the climatic zones in Sri Lanka and percentage dengue patients' data for February, March, May, June, July and August months are clustered. Hot Spot Analysis was carried out for the clustered months for dengue patients. According to the Hot Spot Analysis the average rainfall distribution of each month of 2017 in Sri Lanka is restricted to specific districts; Hot spots are, Ampara (February), Rathnapura (May, June, July), Rathnapura and Kaluthara (September), Kaluthara (October) and Badulla (December) (99% confidence). Similarly, percentage dengue patients' distribution in 2017 is restricted to specific districts; Hot spots are Trincomalee (February) and Colombo (March) (99% confidence). Ordinary Least Squares (OLS) linear regression was carried out to identify the relationship between the percentage dengue patients and monthly average rainfall. The variable distributions and relationships graphs of each month indicate a positive relationship between average rainfall and percentage dengue patients. Adjusted R^2 in the diagnostic output of each month range between 0.7785 (June) and 0.1674 (February) and indicates that 16.74% - 77.85% of the variation in percentage dengue patients can be explained by average rainfall in 2017. It shows that only rainfall cannot explain the total percentage of dengue patients and that there are other environmental parameters which may contribute. There is a relationship between the percentage of dengue patients in each district and average rainfall distribution which appears to vary. Therefore, further studies should be carried out to identify other environmental parameters on the distribution of dengue such as atmospheric temperature, humidity, wind velocity, intensive farming, urbanization and solid waste disposal practices etc. Using multiple regression, multicollinearity between independent variables can be estimated using Geo statistics. Using environmental parameters, an environmental dengue index can be developed to further relate it with dengue patients' percentage for geo-spatial analysis to develop a model for incidence of dengue in each district in Sri Lanka with varying environmental variables.

Keywords: Dengue, hot spot analysis, rainfall, spatial autocorrelation (Moran's I), Sri Lanka