

## Modeling Karachi Dengue Outbreak and Exploration of Climate Structure

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**Abstract :** Various studies have reported that global warming causes unstable climate and many serious impact to physical environment and public health. The increasing incidence of dengue incidence is now a priority health issue and become a health burden of Pakistan. In this study it has been investigated that spatial pattern of environment causes the emergence or increasing rate of dengue fever incidence that effects the population and its health. The climatic or environmental structure data and the Dengue Fever (DF) data was processed by coding, editing, tabulating, recoding, restructuring in terms of re-tabulating was carried out, and finally applying different statistical methods, techniques, and procedures for the evaluation. Five climatic variables which we have studied are precipitation (P), Maximum temperature (Mx), Minimum temperature (Mn), Humidity (H) and Wind speed (W) collected from 1980-2012. The dengue cases in Karachi from 2010 to 2012 are reported on weekly basis. Principal component analysis is applied to explore the climatic variables and/or the climatic (structure) which may influence in the increase or decrease in the number of dengue fever cases in Karachi. PC1 for all the period is General atmospheric condition. PC2 for dengue period is contrast between precipitation and wind speed. PC3 is the weighted difference between maximum temperature and wind speed. PC4 for dengue period contrast between maximum and wind speed. Negative binomial and Poisson regression model are used to correlate the dengue fever incidence to climatic variable and principal component score. Relative humidity is estimated to positively influence on the chances of dengue occurrence by 1.71% times. Maximum temperature positively influence on the chances dengue occurrence by 19.48% times. Minimum temperature affects positively on the chances of dengue occurrence by 11.51% times. Wind speed is effecting negatively on the weekly occurrence of dengue fever by 7.41% times.

**Keywords :** principal component analysis, dengue fever, negative binomial regression model, poisson regression model

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