

# The influence of Human Mobility for Dengue Disease transmission in Urban Colombo and bordering areas of Colombo: A Cross Wavelet approach

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## Abstract

Dengue is a major public health problem mainly in tropical and sub-tropical regions around the world. Prevalence of dengue is highest in tropical areas of Asia and the Americas, with 50-100 million estimated cases of dengue fever and 250000-500000 cases of dengue haemorrhagic fever reported yearly worldwide as explosive outbreaks mainly in urban and sub urban areas. (Nildimar et al 2009) The epidemiology and the dynamics of the dengue disease is complex, and climatic fluctuations, social and demographic factors heavily influence its incidence. The virus is mainly transmitted to the humans by a mosquito vector *Aedes Aegypti*. Increases in temperature and precipitation, urbanization can lead to increase mosquito abundance by increasing their development rate, decreasing the length of reproductive cycles, stimulating egg-hatching, and providing sites for egg deposition. Human mobility can also have a direct influence of the dengue transmission since the larger the human mobility and gathering, the larger the contact rates. In this analysis we used three time series data. They are, the weekly dengue cases in Colombo Municipal Council area obtained from Colombo Municipal Council and the weekly dengue cases in bordering sub urban areas to Colombo, the third one is the constructed human mobility index in urban Colombo. First, we performed cross wavelet power spectrum and coherency analysis between the mobility index and the dengue cases in urban Colombo for the year 2011 by using MATLAB. Then we used the same technique to analyse the relationship between the mobility index in Colombo and the reported dengue cases in bordering sub urban areas to Colombo city namely, Dehiwala, Kolonnawa, Kotte and Nugegoda for the same year.

**Keywords:** Cross Wavelet, Wavelet Coherence, Mobility Index, Dengue transmission, urbanization