The way of dengue prediction via climate factor; a case study in Jakarta, Indonesia

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Dengue incidence has been increasing dramatically in the last few years. It is indicated that this wide-spread of dengue is due to climate variability and population density in the affected regions. Climate change impacts on ecosystem have been indicated as the main factor in the unpredictability of vector breeding behavior. It is necessary that this climate factor should be well integrated into the dynamical model of dengue outbreak. This paper aims to construct an early warning model for predicting dengue incidence based on rainfall, relative humidity, and dengue incidence data in Jakarta. The data used are dengue data in Jakarta obtained from Jakarta City Health Office and climate data from Meteorology, Climatology and Geophysics Agency (BMKG) in the period 2008-2016. Cross-correlation is used in determining time-lag and analyzing the relationship between rainfall, humidity and dengue incidence. With time-lag multiple regression model which is based on rainfall, temperature, and relative humidity, the approximation of time-dependent dengue incidence constructed. Further improvement is made with correction terms involving one preceding month accumulating dengue incidence. The various models with a combination of factors are analyzed based on the best curve fitting and factor significance. The four best models are obtained and presented as consideration by decision makers. This result can provide early warning dengue incidence quite accurately, which could be used for initial prevention strategy by the health authority.

Keyword: Dengue, climate, correlation, regression