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## Spatial Correlation Analysis between Particulate Matter 10 (PM10) Hazard and Respiratory Diseases in Chiang Mai Province, Thailand

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**Abstract.** Every year, during dry season, Chiang Mai and other northern provinces of Thailand face the problem of haze which is mainly generated by the burning of agricultural waste and forest fire, contained high percentage of particulate matter. Particulate matter 10 (PM10), being very small in size, can be inhaled easily to the deepest parts of the human lung and throat respiratory functions. Due to this, it increases the risk of respiratory diseases mainly in the case of continuous exposure to this seasonal smog. MODIS aerosol images (MOD04) have been used for four weeks in March 2007 for generating the hazard map by linking to in-situ values of PM10. Simple linear regression model between PM10 and AOD got fair correlation with  $R^2 = 0.7$  and was applied to transform PM10 pattern. The hazard maps showed the dominance of PM10 in northern part of Chiang Mai, especially in second week of March when PM10 level was three to four times higher than standard. The respiratory disease records and public health station of each village were collected from Provincial Public Health Department in Chiang Mai province. There are about 300 public health stations out of 2070 villages; hence Thiessen polygon was created to determine the representative area of each public health station. Within each Thiessen polygon, respiratory disease incident rate (RDIR) was calculated based on the number of patients and population. Global Moran's I was computed for RDIR to explore spatial pattern of diseases through four weeks of March. Moran's I index depicted a cluster pattern of respiratory diseases in 2nd week than other weeks. That made sense for a relationship between PM10 and respiratory diseases infections. In order to examine how PM10 affect the human respiratory system, geographically weighted regression model was used to observe local correlation coefficient between RDIR and PM10 across study area. The result captured a high correlation between respiratory diseases and high level of PM10 in northeast districts of Chiang Mai in second week of March.

[Conference Paper](#) (PDF, 4671 KB)

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