



Climate Influence on Meningitis Cases in Northwest Nigeria

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Northwest Nigeria is a region with high risk of meningitis. In this study, the influence of climate on the monthly and interannual variability of meningitis incidence was examined. Monthly counts of clinically diagnosed hospital-reported cases of meningitis were collected from three hospitals in northwest Nigeria for the 22-year period spanning 1990-2011. Several models were fitted to aggregated monthly meningitis counts, including generalized additive models and generalized linear models. Explanatory variables included monthly time series of temperatures, humidity, rainfall, wind speed, sunshine and dustiness from weather stations nearest to the hospitals, and a proxy of polysaccharide vaccination efficacy. The effects of other unobserved climatic and non-climatic risk factors that may be related to the disease were collectively accounted as a flexible monthly-varying smooth function of time in the generalized additive models, $s(t)$. Results reveal that the most important explanatory climatic variables are the monthly mean of daily maximum temperature, relative humidity, sunshine and dustiness. Accounting for $s(t)$ in the generalized additive models explains more of the monthly and interannual variability of meningitis compared to those generalized linear models that do not account for such factors. For models with 1-month lagged explanatory variables similar results were found. Promising results from these models suggest the potential to predict meningitis in northwest Nigeria by up to a month to aid decision makers.