



Climate and meningitis epidemics onset in West Africa

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Every year Western African countries within the Sahelo-Sudanian band are suffering important meningococcal meningitis disease outbreaks that affect up to 200,000 people, from which mainly young children, in one of the world's poorest region. The timing of the epidemic year, which starts in February and ends late May, and the spatial distribution of disease cases throughout the "Meningitis Belt" strongly indicate of a close linkage between the meningococcal meningitis causative agent life-cycle and climate variability. However mechanisms responsible for the observed patterns are still not clearly identified. By crossing the information on WHO weekly reports of cases and deaths for meningococcal meningitis with atmospheric dataset, the relationship between the seasonal evolution of meningitis cases for Mali, a western African country, and the large-scale atmospheric circulation is here quantified. Regional atmospheric indexes based on surface wind speed show a clear link between population dynamics of the disease and climate: the onset of epidemics and the winter maximum defined by the atmospheric index share the same mean week (6th week of the year), and are highly correlated. This study is the first which provides a clear, quantitative demonstration of the connections that exist between meningococcal meningitis epidemics and regional climate variability in Africa. Moreover, this statistically robust explanation of the meningococcal meningitis dynamics enables the development of an Early Warning Index of Meningitis Epidemics Onset in Western Africa. The development of such Early Warning Index will undoubtedly help nation-wide and international public health institutions and policy-makers to better control this meningococcal meningitis fatal disease within the so-called westwards-eastwards pan African "Meningitis Belt".