National Institute of Environmental Health Sciences

Environmental exposures and invasive meningococcal disease: An evaluation of effects on varying time scales

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Year: 2009
Journal: American Journal of Epidemiology. 169 (5): 588-595

Abstract:

Invasive meningococcal disease (IMD) is an important cause of meningitis and bacteremia worldwide. Seasonal variation in IMD incidence has long been recognized, but mechanisms responsible for this phenomenon remain poorly understood. The authors sought to evaluate the effect of environmental factors on IMD risk in Philadelphia, Pennsylvania, a major urban center. Associations between monthly weather patterns and IMD incidence were evaluated using multivariable Poisson regression models controlling for seasonal oscillation. Short-term weather effects were identified using a case-crossover approach. Both study designs control for seasonal factors that might otherwise confound the relation between environment and IMD. Incidence displayed significant wintertime seasonality (for oscillation, P < 0.001), and Poisson regression identified elevated monthly risk with increasing relative humidity (per 1% increase, incidence rate ratio Euro Surveillance (Bulletin Europeen Sur Les Maladies Transmissibles; European Communicable Disease Bulletin) 1.04, 95% confidence interval: 1.004, 1.08). Case-crossover methods identified an inverse relation between ultraviolet B radiation index 1-4 days prior to onset and disease risk (odds ratio Euro Surveillance (Bulletin Europeen Sur Les Maladies Transmissibles; European Communicable Disease Bulletin) 0.54, 95% confidence interval: 0.34, 0.85). Extended periods of high humidity and acute changes in ambient ultraviolet B radiation predict IMD occurrence in Philadelphia. The latter effect may be due to decreased pathogen survival or virulence and may explain the wintertime seasonality of IMD in temperate regions of North America.

Source: http://dx.doi.org/10.1093/aje/kwn383

Resource Description

Exposure :

weather or climate related pathway by which climate change affects health

Air Pollution, Meteorological Factors, Meteorological Factors, Precipitation, Solar Radiation, Temperature

Air Pollution: Ozone, Particulate Matter, Other Air Pollution

Air Pollution (other): Lead; SOx

Temperature: Fluctuations

Geographic Feature:

resource focuses on specific type of geography

Urban

Geographic Location:

resource focuses on specific location

United States

Health Impact:

specification of health effect or disease related to climate change exposure

Infectious Disease

Infectious Disease: Airborne Disease

Airborne Disease: Meningitis

Population of Concern: A focus of content

Population of Concern:

populations at particular risk or vulnerability to climate change impacts

Children, Elderly

Resource Type:

format or standard characteristic of resource

Research Article

Timescale:

time period studied

Time Scale Unspecified