



Heat-related mortality in the Sahel : who is sensitive to short- and long-term heat exposures?

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Background: Despite a growing awareness of Africans' vulnerability to climate change, there is relatively little empirical evidence published about the effects of climate on population health in Africa. Extremes of temperature are well known to be associated with excess mortality, especially in northern climatic settings. Less is known about the sensitivity of African populations to extreme heat, except for heat thresholds that are generally higher in communities closer to the tropics. However, few studies have been able to verify the existence of an effect according to the duration of heat exposure, especially in a Sahelian setting. Our aim is to analyze the differentiated effects of extreme heat on people's health by the duration of exposure and the level of individual vulnerability (age groups). We used data drawn from the Health and Demographic Surveillance System of Niakhar (HDSS-Niakhar), Senegal.

Methods: All the analyzes are based on a comparison between Generalized Estimating Equations (GEE) through Generalized Linear Models (GLM) with natural cubic splines and Generalized Additive Models (GAM). The duration of exposure is addressed through both a daily and a monthly count of deaths, each one being more adapted to one of these two specific models. The monthly count of deaths makes it possible to assess the cumulative effect of heat on mortality over a one-month period. The temperature indicator used is the mean apparent temperature of exposure (including humidity).

Results: Temperature has an effect on mortality in the HDSS-Niakhar for both short- and long-term exposures. When considering the overall population, the GAM model shows a U-type relationship between temperature and mortality over an extended period of exposure, with a temperature threshold of 30 °C. High temperatures are also dangerous in the short term with a threshold of 30.2° C. When the temperature is above the threshold the mortality rate is increased by 3.7%. The vulnerability varies according to age groups and heat exposure. The health of children under 5 is affected by short-term heat exposure. In contrast, elderly people's mortality risk (over 55 years of age) increases for long- and short-term heat exposure.