**Possible Impact of climate change on meningitis in northwest Nigeria: an assessment using CMIP5 climate model simulations**


1. Introduction

Meningitis remains a major health burden throughout Sahelian Africa, especially in the heavily-populated northwest Nigeria. Cases exhibit strong sensitivity to intra- and inter-annual climate variability, peaking during the hot and dry boreal spring months, raising concern that future climate change may increase the incidence of meningitis in the region. The region is identified as "hotspot" of climate change (Diffenbaugh and Giorgi, 2012) and is projected to be disproportionately affected due to the vulnerability of the populations. Projecting the potential impact of climate change on meteorologically-sensitive infectious diseases is essential for regions where changes to disease distribution and seasonality may have adverse health impacts.

2. Study Area

The impact of future climate change on meningitis risk in northwest Nigeria is assessed by forcing an empirical model of meningitis (Abdussalam et al. 2013) with monthly simulations from an ensemble of thirteen statistically downscaled global climate model projections from the CMIP5 for RCPs 2.6, 6.0 and 8.5 scenarios, and for two 21st century periods: 2020-2035 and 2060-2075. Seven AOGCM variables were statistically downscaled to each of the three cities (Kano, Sokoto and Gusau) used in the meningitis model development, using gamma method similar to that of Michelangeli et al. (2009), referred to as cumulative distribution function-transform (CDF-1).

3. Data and method

4. List of climate models used

5. Climate models evaluation

6. Climate projections (RCP6.0)

7. Meningitis Projections

8. Sensitivity test for dust (RCP6.0)

9. Conclusions

Temperature increases due to climate change has the potential to significantly increase meningitis cases in both the early and late 21st century, and to increase the length of the meningitis season in the late century.

Annual incidence may increase by 47%/−8%, 64%/+9%, and 99%/−12% for the RCP 2.6, 6.0 and 8.5 scenarios respectively in 2060-2075 with respect to 1990-2005. It is noteworthy that these results represent the potential for increased cases due to climate change, assuming current prevention and treatment strategies remain the same.

10. References


Diffenbaugh, N. S. and F. Giorgi. 2012: Climate change hotspots in the CMIP5 global climate model ensemble. Climate Change, DOI: 10.1007/s10584-012-0570-x