



Climate and land use change to affect malaria spread in tropical Africa

A recent study has projected changes in the spread of malaria caused by climate change and climate variability in Africa by including the effect of variations in land use on local climate. It concludes that the risk of malaria epidemics is likely to shift from the north to the south of the Sahel, and to highland areas previously free of the disease.

Many factors influence the spread of malaria, including climate, geography and human interventions. The Intergovernmental Panel on Climate Change (IPCC) suggests that the impact of climate change and climate variability on the spread of malaria will be mixed, i.e. the distribution of the disease is likely to contract in some areas, but will spread in other areas, such as highland locations, as found in East Africa.

Partly conducted under the EU AMMA¹ and QWeCI² projects, this study considered how changes in weather and land use and land cover (LUC) changes affect the environmental conditions necessary for the survival of disease carrying mosquitoes. Human interventions, such as mosquito nets, will also affect malaria's spread, but these were not included in this analysis.

The researchers integrated weather and disease models to assess the risk of malaria in tropical Africa under a range of future climate scenarios up to 2050. The impact of greenhouse gas emissions on temperature and rainfall and fine-scale LUC changes were linked to malaria transmission and infection rates. The novel approach of including future LUC changes with high resolution regional climate models improved the predictability of malaria risk. The effects of local terrain on temperature and rainfall caused by LUC changes (e.g. reduced vegetation due to human activities could reduce evapotranspiration and could lead to a decrease in precipitation), especially in highland territories, could be analysed in greater detail.

The results indicate that, by 2050, the pattern of the disease will be affected by projected changes in temperature and rainfall caused by climate change. In general, a shift towards higher temperatures and significantly decreased rainfall will reduce the spread of malaria in most areas of tropical Africa. Changes in the distribution, range and spread of the disease are likely to be most notable in parts of the Sahel (a narrow strip of land, south of the Sahara desert, spanning North Africa coast to coast), the Horn of Africa (north east Africa) and various highland territories. In the Sahel, decreasing rainfall will significantly reduce the transmission of the disease by 2050, especially north of 15°N where the disease might disappear. However, compared with current conditions, the risk of malarial epidemics shifts southwards and is likely to increase in areas that are currently more densely populated. Note that the rainfall and malaria projections for the Sahel are at present uncertain.

Across the Greater Horn of Africa, significantly increased temperatures and a small increase in rainfall is projected to cause a marked increase of malaria infection across large parts of East Africa. Malaria is likely to spread to higher altitudes in the highland areas, including areas above 2000 m that were previously free of the disease and will turn into epidemic malaria regions. The researchers suggested the infection rate in the 2020s and 2040s is likely to be greatest in the Ethiopian Highlands, Eastern Arc mountains and parts of the Western Rift Valley. By including the impact of land use changes on local climate, an accelerated rainfall decline is projected for West Africa. This will bring forward anticipated climate-induced changes to the spread of malaria to well before 2050. Potential changes in the spread of malaria caused by climate change and variability together with land use changes are important considerations in future planning to combat malaria.

1. AMMA (African Monsoon Multidisciplinary Analysis) was supported by the European Commission under the Sixth Framework Programme. See: <http://www.amma-international.org>

2. QWeCI (Quantifying Weather and Climate Impacts on Health in Developing Countries) is supported by the European Commission under the Seventh Framework Programme. See: <http://www.liv.ac.uk/qwecci>

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