Climate-driven malaria is a future possibility in Germany

By 2080, parts of Germany could be susceptible to the spread of malaria for up to six months a year, according to new research. The study mapped areas at risk of an outbreak, considering predicted climate change-driven rise in air temperature and data on the spread of malaria.

Globally, air temperature rose by 0.74°C between 1906 and 2005 and is projected to rise up to 6.4°C by 2099, according to the Intergovernmental Panel on Climate Change (IPCC). Climate warming can affect the distribution and the intensity of parasitic diseases that are carried by insects and animals (vector-borne diseases). This is because the parasites that cause the disease usually flourish in increased temperatures where they benefit from accelerated rates of reproduction and development. Malaria is usually thought to be restricted to the tropics and developing countries, but climate change could bring it closer to Europe, especially in countries where it used to be present.

Tertian malaria, a form of malaria, was prevalent in north-western parts of Germany until the 1950s before it was eradicated. The vector itself (the mosquito) is still present and infected people from malarial regions could introduce a new onset of malaria. The study modeled the potential spread of tertian malaria by anopheles mosquitoes during 1991-2020, 2021-2050 and 2051-2080. It used data on the reproduction and development of the mosquito and the malarial parasite. Future temperature projections for Germany at a scale of 1 km² were obtained from two different climate models: Regional Model, Max Planck Institute for Technology (REMO) and Weather Condition-based Regionalisation Method, Climate & Environment Consulting Potsdam (WettReg). The modeling was done for two different IPCC climate scenarios: A1B and B1.

Using current data for 1990-1997, there was no possibility of malarial spread in 1.8 per cent of German territory, mainly in mountainous ranges. 70 per cent of Germany, mainly in coastal regions and foothills, had a window of 3 months when malarial spread was possible. Only 0.8 per cent had a transmission window of 4 months, in the Rhineland and Upper Rhine Valley.

The projected estimates for 2051-2080 showed an increase in the length of time when malaria could spread and in the areas that could experience this. Taking the more extreme scenario (A1B), about 0.2 to 0.7 per cent of Germany would have no possibility of malarial spread, depending on the climate model used. The REMO model predicted a greater spread with 96.5 per cent of Germany experiencing a 4 to 5 month transmission window. The WettReg model was more conservative, with the majority of Germany (88.3 per cent) experiencing a 3 month transmission window.

The researchers do highlight that the models only offer an approximation and not all relevant factors have been included. The predictions focused on changes in air temperature and did not consider other influences, such as distribution of water bodies (which are breeding habitats for mosquitoes) or population density. There may also be interactions between the mosquitoes, parasites and features of the ecosystem, such as rainfall and soil temperature, as well as community hygiene.

Modeling studies, such as this, can help identify areas at risk with the aim of initiating preventative measures, especially if they include the factors mentioned above. They could also be applied to other vector-borne diseases that are dangerous for livestock, such as bluetongue disease.


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