

# Climate change could have direct consequences on malaria transmission in Africa

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The slowdown in global warming that was observed at the end of last century was reflected by a decrease in malaria transmission in the

Ethiopian highlands, according to a study led by the Barcelona Institute for Global Health (ISGlobal) and the University of Chicago. The results, published in *Nature Communications*, underscore the close connection between climate and health.

For several years, there has been a heated debate on the impact of [global warming](#) on [malaria](#) incidence. It is believed that the largest effect could occur in the highlands, where lower temperatures limit vector abundance, leading to intermittent and seasonal [disease](#) outbreaks. "We see that malaria epidemiology in these areas is strongly under [climate control](#) at all scales (months, years and even decades), which settles once and for all the debate on whether climate change is affecting or not the dynamics of malaria in Africa," says Xavier Rodó, Head of the Climate and Health Programme at ISGlobal and first author of the study.

At the turn of the century, a clear decrease in malaria incidence was observed in East Africa. This decline could be simply the result of disease control measures, or could reflect the temporary slowdown in increase in global mean surface temperature, a phenomenon that was observed between 1998 and 2005.

To answer this question, Rodó and colleagues focused on the region of Oromia in Ethiopia, a densely populated highland between 1,600 and 2,500 m above sea level. This region presents the advantage of having complete records of annual cases of malaria caused by both *P. falciparum* and *P. vivax* parasites between 1968 and 2007, and that public health interventions to control the disease were not reinforced in the region until 2004. This allows to separate the effect of climate from the effect of disease control measures for two parasites that are known to respond differently to climate.

Using mathematical modeling, the research team analyzed the association between malaria cases, [regional climate](#) (local temperatures

and rainfall) and global climate (in particular the effect of El Niño and the Pacific Decadal Oscillation on the Pacific Ocean). The results show that the variation in malaria cases correlates extremely well with changes in regional temperatures: the regional decline in temperatures linked to the slowdown in [climate change](#) coincided with the reduction in malaria cases observed from 2000, five years before disease control measures were reinforced. This decline in cases coincided with the slowdown in the increase of global surface temperature, as a result of the El Niño and the Pacific Decadal Oscillation. The analysis shows there is a "chain of effects" from global climate variability to regional temperature variations in East Africa, which translates into new malaria cases in the Ethiopian highlands.

"The coupling between disease dynamics and climate conditions is so strong that it is evident at multiple temporal scales, from seasonality to multiannual cycles to decadal trends. Malaria incidence not only tracked changes in temperature, which we had demonstrated before, but also in the decrease at the turn of the century, the focus of this work," says Mercedes Pascual, researcher at the University of Chicago and last author of the study.

Rodó says, "The evidence that the slowdown in warming influenced [malaria transmission](#) demonstrates the strong coupling between disease and climate." These results also emphasize the value of considering [climate](#) conditions when evaluating public health interventions aimed at disease control, and of integrating them into early warning systems.

**More information:** Rodó X, Martinez PP, Siraj A and Pascual M. Malaria trends in Ethiopian highlands track the 2000 'slowdown' in global warming. *Nature Communications*. 10 March 2021. [DOI: 10.1038/s41467-021-21815-y](#) , [www.nature.com/articles/s41467-021-21815-y](http://www.nature.com/articles/s41467-021-21815-y).

Provided by Barcelona Institute for Global Health

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