

Climate change is affecting disease-carrying mosquitoes and other insects

April 17 2015, by Sarah Craig



Insect-borne diseases—such as malaria, dengue, West Nile and the newly emerging chikungunya—infect a billion people every year; more than a million die each year and many more are disabled. The effects of climate change, according to Edwin Michael, professor of biological sciences and member of the Eck Institute for Global Health at the University of Notre Dame, mean these deadly diseases are no longer reserved for the developing world.

Michael is working with an international team of researchers to project how climate change will affect mosquitoes, flies and ticks that carry diseases afflicting humans. Recently published in a special issue of *Philosophical Transactions B*, a peer-reviewed publication of The Royal

Society, the collective research from this international consortium delivers the bad news that [insect-borne diseases](#) are emerging and, in some regions, having a resurgence. The research highlights and points to the critical need to take into account the interactive, contributory roles that climate, epidemiological, environmental and socioeconomic factors play in [disease](#) transmission when forecasting the future impact of these diseases around the globe.

According to Michael, "There is no easy fix, and the complex problem is getting worse. Different vectors respond differently to changing weather and climate patterns. Human societies also demonstrate variable vulnerability to this change. We, however, now have numerous resources including the mathematical models we have developed as tools to predict, assess risk and map how different vectors and disease patterns are likely to alter due to changing climates."

The spread into regions including Europe and the United States will cause and force significant [public health interventions](#) to address this emerging global problem.

"The results of this research will have real and profound impacts on the mitigation of the spread of mosquito-borne diseases that is currently being exacerbated by climate change," said Robert J. Bernhard, vice president for research at the University of Notre Dame. "I applaud Edwin Michael and his international colleagues for taking on this challenge and look forward to the positive, real-world outcomes of their research."

Mosquitoes are known to be very sensitive to temperature changes and rainfall. Researchers agree that climate changes will affect many, if not all, of these diseases. According to Michael's collaborator, Paul Parham, University of Liverpool, the next step includes determining "the extent to which climate impacts will be important compared to many other

factors that contribute to the risk of becoming infected in certain regions."

Additional findings in the special issue "[Climate change and vector-borne diseases of humans](#)"—compiled by Michael, Parham and other scholars—include:

- Many areas of Europe, including the U.K., could become highly suitable for mosquitoes that transmit dengue and chikungunya over the coming decades.
- The potential for climatic changes to affect the effectiveness, cost-effectiveness and policy decisions of whether to scale up future vector control programs against malaria.
- Evidence that vectors may evolve in under a decade to changes in temperature.
- The need for better data on the links between vectors, diseases they carry and the environment.
- The conclusion that one of the most effective ways of protecting human health against climate change in the long term is to further strengthen current disease control efforts.

Michael said, "We now have a great deal of knowledge and tools for determining how to best protect ourselves from insect-borne diseases. It is up to policymakers to recognize the significant role that [climate change](#) can have in affecting current global efforts to reduce the burden of these diseases and to prevent their emergence in new risk areas. We need to implement the required adaptation and climate-resilient measures in the most cost-effective way. Research support is vital, and with the potential of joint projects between The Eck Institute for Global Health, the Notre Dame Environmental Change Initiative, its Global Adaptation Index (ND-GAIN) and other centers within the University, I expect the University of Notre Dame to play an increasingly important global role in this vital field."

Provided by University of Notre Dame

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