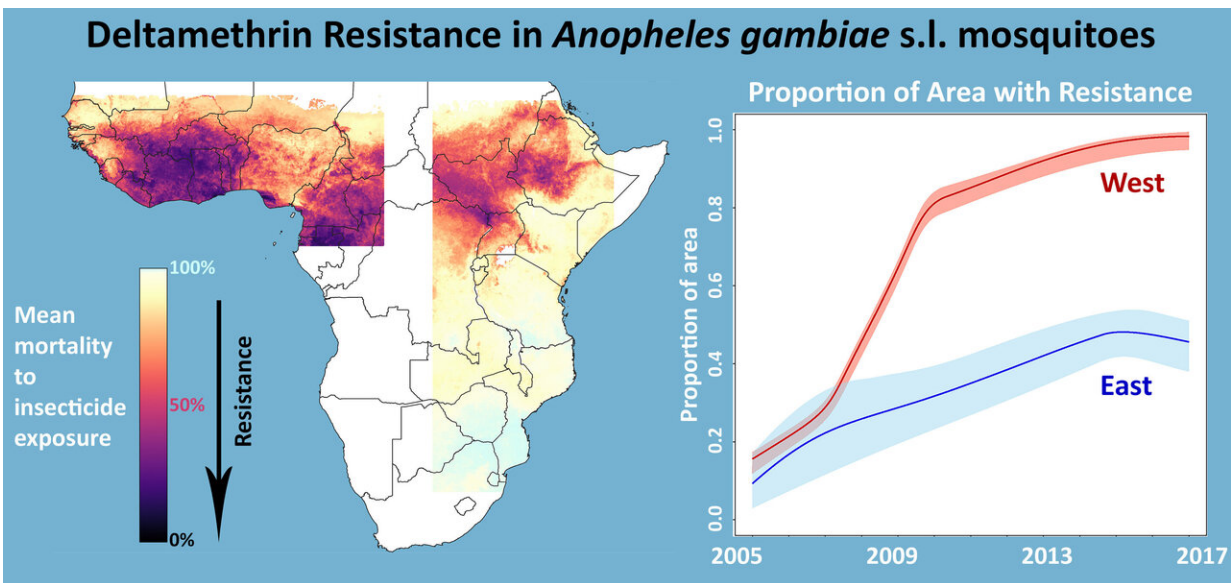


Tracking the spread of mosquito insecticide resistance across Africa

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Deltamethrin Resistance in *Anopheles gambiae* s.l. mosquitoes. Credit: Penelope Hancock

In a step toward better control of the mosquitoes that transmit malaria, researchers have mapped the patterns of insecticide resistance in *Anopheles gambiae* mosquitoes across Africa. The new study, published June 25, 2020 in the open-access journal *PLOS Biology* by Catherine Moyes and Penelope Hancock of the University of Oxford, UK, and collaborators, found that resistance to five mainstream insecticides increased dramatically between 2005 and 2017.

There are more than 400,000 deaths due to malaria worldwide each year, with more than half of all cases occurring in just six countries in Sub-Saharan Africa. In recent years, progress in reducing the burden of malaria in these areas has resulted from expanded mosquito control programs. However, field studies have suggested an increase in [insecticide resistance](#) among the mosquitoes that transmit malaria. This could lead to a decrease in the effectiveness of interventions such as insecticide-treated bednets, which are a mainstay of malaria prevention across the continent.

In the new study, researchers analyzed a published database of information on mosquitoes collected throughout mainland Sub-Saharan Africa between 2005 and 2017. The study looked at 6423 observations across 1466 different locations. They used the data to map and model when and where insecticide resistance had arisen in populations of *Anopheles gambiae* mosquitoes.

In West Africa, resistance to pyrethroids—the only class of insecticides used in all treated bednets—increased drastically over the timeframe. For instance, 15% of West Africa had mosquitoes with resistance to deltamethrin in 2005, but by 2017 this had risen to 98%. In East Africa, resistance to pyrethroids increased to a lesser degree, expanding from 9% to 45% of the region. Similar increases were seen among populations of mosquitoes resistant to DDT, a chemical often used for indoor spraying to kill malaria-transmitting [mosquitoes](#).

"The rapid spread of resistance across large parts of the Sub-Saharan Africa signals an urgent need to quantify the efficacy of different resistance management strategies, and to understand the impact of resistance on malaria transmission and control," the authors say.

"Relationships between [insecticide](#) resistance and malaria prevalence are currently poorly understood, but there is evidence that resistance can reduce the efficacy of standard pyrethroid-treated [bednets] which have

played a key role in achieving reductions in [malaria](#) prevalence in Africa over 2000-2015."

More information: Hancock PA, Hendriks CJM, Tangena J-A, Gibson H, Hemingway J, Coleman M, et al. (2020) Mapping trends in insecticide resistance phenotypes in African malaria vectors. *PLoS Biol* 18(6): e3000633. doi.org/10.1371/journal.pbio.3000633

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