

STATISTICAL

SIGNIFICANCE

Mosquitoes are among the most dangerous animals¹ with respect to their impact on human health. Applying comprehensive prevention strategies is challenging when resources are limited. Statisticians help design studies and use existing data to make recommendations for more sustainable, cost-effective policies.

A DEADLY FOE

The Global Burden

Mosquitoes present a greater danger to humans than a few itchy bites. In fact, mosquitoes transmit diseases that are responsible for millions of human deaths each year². Given increased travel and trade, outbreaks of Zika, malaria, yellow fever, and dengue demand global attention. Dengue incidence alone has increased drastically over the last thirty years with the changing climate putting more than half of the world's population at risk of this potentially fatal disease. In addition to the burden on human health, the disruption caused by outbreaks of mosquito-borne diseases takes an alarming toll on global and national economies.

The Role of Prevention

Prevention is crucial in the fight against mosquito-borne diseases. Historical approaches include behavioral changes, the use of insecticides, and improved sanitation. Recent scientific advancements have made it possible to fundamentally

change the mosquito itself to either decrease its ability to transmit the disease or disrupt its ability to reproduce, suppressing the mosquito population.

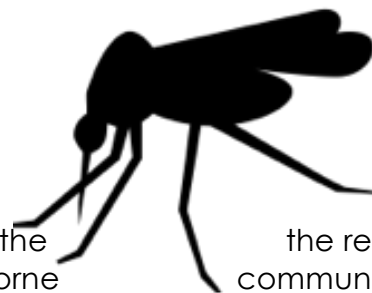
Since resources are limited, policymakers want to predict which approach is best for the health of their community. Statisticians help make this determination.

New Statistical Methods for Better Policy

To determine whether an intervention impacts the threat of mosquito-borne diseases, statisticians often rely on cluster randomized trials (CRTs) since the intervention impacts an entire neighborhood rather than a single individual (e.g. city-wide insecticide spraying). The cost of studying clusters of people rather than individuals can be very expensive. CRTs often require enrolling thousands of individuals who are followed for long periods of time with frequent check-ins to precisely determine changes in disease patterns. As a result, there are very few

CRTs that directly address the concerns of policymakers.

Over the last decade or so, statisticians have found innovative ways to pair information on how individuals engage with healthcare services and existing statistical methods to develop lower cost adaptations of randomized trials. These new approaches decrease the barriers to implementing randomized trials and allow the research community to more accurately determine which methods are most effective in decreasing the incidence of disease. The results produced by these clearer, more efficient statistical methods can then be used to influence policy and save lives.



¹ Believe it or not, mosquitoes are technically animals as they belong to Kingdom Animalia!

² "Mosquito-Borne Diseases." *World Health Organization*, World Health Organization, 17 Oct. 2016, www.who.int/neglected_diseases/vector_ecology/mosquito-borne-diseases/en/