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Penn State researchers receive $10.2 million grant to investigate new method for preventing malaria

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In collaboration with partners in Europe and Africa, researchers at Penn State have received a five-year, $10.2-million grant from the Bill & Melinda Gates Foundation to investigate a new method for preventing the transmission of malaria. The method involves limiting mosquito access to houses by blocking openings and installing "eave tubes" that contain a unique type of insecticide-laced mosquito netting developed by Dutch partner In2Care that kills the insects as they attempt to enter.

"Nearly half of the world's population is at risk of contracting malaria, and according to the most recent World Health Organization report, an estimated 438,000 people died from the disease in 2015," said team leader Matthew Thomas, professor and Huck Scholar in Ecological Entomology, Penn State. "The use of insecticides to control mosquitoes has saved millions of lives, but this tactic is increasingly challenged because mosquitoes quickly evolve resistance to the very limited number of insecticides currently used in public health. The eave tube approach presents a novel strategy to help combat this challenge by simultaneously making houses more mosquito proof and providing a novel way of delivering insecticides, which creates opportunities for using a wider range of insecticidal products."

According to Thomas, African malaria mosquitoes have a strong preference for entering houses at night through eaves -- the gaps between the roofs and the walls of houses. The team's novel eave-tube approach involves blocking the eaves and inserting tubes that act like chimneys to funnel human odors to the exterior of the home.

Attracted to the human odors, mosquitoes enter the tubes and encounter netting that has been treated with a coating that binds insecticidal particles to it. The netting can hold several kinds of powdered insecticides, including biological agents.

"The small amount of insecticide used in the tubes means that it is cheap to treat an entire house," said Thomas. "Furthermore, retreatment is easy, as it requires simple replacement of small pieces of netting within the tubes."

With a $5.6-million grant from the European Union, the collaborative team of researchers already has conducted a proof-of-concept intervention in which they installed eave tubes in more than 1,800 houses in the Kilombero valley in southern Tanzania. The team found that the eave tubes reduced indoor mosquito densities by up to 90 percent.

The new project funded by the Gates Foundation expands on the previous intervention by installing eave tubes in approximately 6,000 homes in villages in Cote d'Ivoire and Tanzania. The researchers will examine householders in these villages and compare them with equivalent control villages that have not been supplied with eave tubes to determine the effect of the intervention on malaria incidence. The team also will test the mosquitoes caught in the villages for insecticide resistance. Finally, the researchers will conduct socio-economic analyses to determine homeowner acceptance and create strategies for implementation across different regions and market sectors.

"Our primary goals for this phase of the project are to demonstrate the health impact of eave tubes, and to build the foundation for commercialization and wide-scale implementation of the tubes," Thomas said. "There has been a marked reduction in malaria burden in many parts of the world over the last 15 years. Keeping this momentum going requires new tools than can be put into place in the short term to help deal with the problem of insecticide resistance. This is what eave tubes offer."

Source:
Penn State
