

Healthy Outlook Blog

Smelly Socks' Allure for Mosquitoes May Help Swat Malaria

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By Sue Russell | Posted March 29 2012

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In 2008, most of the nearly one million who died from malaria were children living in Africa. Now, promising research shows that improbable-sounding “sock science” could play an important role in ending malaria’s reign of terror.

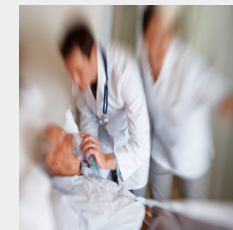


Malaria is one of the globe’s most intransigent killer diseases. And when Dutch scientist [Dr. Bart Knols](#) discovered mosquitoes favored legs and feet by standing naked in a darkened room and observing where he

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was bitten, it seemed important. Knols learned that feet are four times more attractive than other human body parts to the pesky insects, but that when feet are

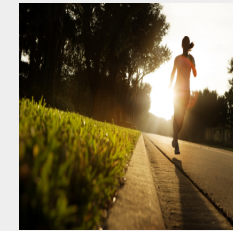
washed, their allure quickly fades.

However, Knols' intriguing discovery languished for fifteen years without practical application. That's when he put his faith in [Fredros Okumu](#), a young Tanzanian keen to utilize this odiferous intelligence in his own malaria research. Okumu is the Principal Investigator of the Outdoor Mosquito Control Project at the Ifakara Health Institute, an international research organization in Tanzania. Currently a Ph.D. candidate at the London School of Hygiene and Tropical Medicine, he has masters' degrees in Medical Parasitology and Geographical Information Systems.

He is only 29 years old but Okumu works with a sense of urgency. "Given that the life expectancy of my country is just about 55," he says, "you can see I have just about 20 years left to serve my society in any meaningful way."

\$100,000 in funding from the [Bill and Melinda Gates Foundation](#) got Okumu and his colleagues started on "sock science" and smell experiments back in 2009. "We purchased synthetic versions of chemicals that we knew human beings naturally emit in sweat, breath, or from their skin surfaces," he says. "What we did first was to constitute a mix of attractants that is more attractive (to mosquitoes) than humans at long range. And this was in itself a very beautiful thing to find."

Okumu also was intent on moving beyond what he calls the "fancy sock science affair" to developing actual public health products. The team hit upon the right blend of eight chemical attractants, then began testing them at varying concentrations. Finally, they found the optimal combination to lure the most malaria mosquitoes into traps where



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they could be killed.

“But, instead of sticking to the lab,” says Okumu, “we went out to the village to do what our Research Group at Ifakara Health Institute does best. We tested this thing against wild, free flying, disease-transmitting mosquitoes. “We constructed and tested physical devices baited with this synthetic mix or dirty socks to check whether we could mimic humans sitting outside houses and whether we could lure and kill these potentially dangerous creatures.”

The researchers also tested the attraction of a human volunteer sleeping beneath a net directly against the stinky synthetic mixture. “And this is when we showed four times more mosquitoes were entering the huts with the synthetic bait than the hut with the human volunteer,” says Okumu.

So far, the results of the team’s [research](#) have been positive. And the focus on outdoor mosquito control strategies is important because, says Okumu, “We now have unequivocal evidence that an increasingly high proportion of malaria transmission is taking place outdoors.”

Recently, the team was awarded \$775,000 by the Bill and Melinda Gates Foundation (BMGF) and [Grand Challenges Canada](#) (GCC) to fund two more years study. “We are extremely happy that we have the ongoing partnership,” says Okumu.

Moving forward, Okumu anticipates the placement of devices around 30m away from the nearest houses, or near identified mosquito-breeding sites. At least 20 devices would be required per 1,000 people, he estimates. And maintenance costs for each device must be at \$4-30 per year to be viable.

Chemicals seem to work better at long range, dirty socks at closer quarters. However, smelly socks and “sock science” might yet win out for all too practical reasons.



Lisa Collier Cool



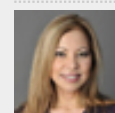
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“We must realize,” Okumu explains, “that our aim is not only to end up with a super-attractive lure, but also a cost-effective one. So if we have a moderately attractive sock that we can obtain easily and fairly cheaply, then that will be the winner.”

Okumu hopes that his team’s devices will become a mainstay in the outdoor mosquito control arsenal. There is much to learn, he admits. “It’s still more like shooting a space-borne missile using a handheld gun,” he says. “Nevertheless, we believe that for the first time we have an opportunity to start actively working on outdoor mosquito control as a complementary method alongside nets and insecticide sprays. And with the BMGF and GCC support, the hurdles are a lot fewer and a lot lower.”

Encouragingly, Okumu says computer modeling also suggests that combining insecticide-treated nets with his team’s devices “can indeed drive malaria transmission lower than the thresholds that we will need to reach in order to consider malaria elimination a real possibility in many areas. And this is true for most epidemiological scenarios representative of Africa.”

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