

## A Lingering Pest: Malaria in Africa

by Elana Safran

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In Akotokyir, near Cape Coast on the coast of Ghana, children do not die from malaria just because they lack access to treatment. They may die for other reasons. Perhaps a mother prefers to give her child herbal treatments until the fever gets severe. Perhaps she goes to a pharmacy to buy medicine instead of first getting her child diagnosed at the clinic. Maybe the family uses a mosquito net for sleeping, but the child still gets bitten while outside and is too young to have developed some baseline immunity. Or maybe the family is big but lives in a room so small that the heat is too much to use a mosquito net comfortably at night.

Paska, a thirty-year-old mother of two small children who met with the organization TAMTAM in central Uganda last year, understands these factors. She says of malaria, “I didn’t

think malaria was a problem. But now I have children, and I have seen them suffer so much, which proves to me that malaria is a deadly disease. I think everyone wants a net but some cannot afford. When you get used to sleeping under a net, you feel bad sleeping without.”

Compared to trying to sell someone a stove or a pair of shoes, the task of distributing mosquito nets is different. Ultimately, the goal is not only to have people at risk of malaria buying nets, but also to have the same people using them on a daily—or nightly—basis.

Mosquito net usage is particularly important in the prevention of malaria, a disease that infects 243 million and kills 863,000 people a year, 85 percent of them children, according to the World Health Organization’s most recent statistics. By eliminating a link in the chain of transmission—that is, preventing mosquitoes from biting at night—nets are a powerful way to stop the transfer of malaria between people. But what may seem like a simple technology is, in fact, one among many weapons in an evolving arsenal of ways to treat a disease that goes back centuries.

Given working interventions, the challenge is more often applying small-scale lessons learned to a larger group. TAMTAM—Together Against Malaria, Tunapenda Afya na Maisha, which is Swahili that translates to “We love health and living”—is one organization that attempts to do just that, by combining net distribution with operational research on distribution methods. By working closely with policy makers, TAMTAM can ensure that its research focuses on the most practical and effective questions in the field. And in the changing landscape

of a pressing disease, there is no shortage of questions.

### WHAT IS MALARIA AND HOW DOES IT SPREAD?

The malaria parasite is carried by female anopheles mosquitoes, which transmit the parasite to humans when they bite, mostly at night. Treated bed nets—like insecticide-treated bed nets (ITNs) or long-lasting insecticidal nets (LLINs)—act as both a physical and chemical barrier to mosquitoes, protecting not only the user, but also those within the flying radius of a mosquito as well. UNICEF cites that net usage can reduce child mortality rates by up to 20 percent. Considering mosquito nets cost less than seven dollars and can last for five years, they are one of the most effective ways to prevent malaria.

Because the dissemination of malaria requires two parties—mosquitoes and humans—its spread is an ongoing and constant process. The disease is persistently difficult to battle; time and again, new treatments are met with the development of resistance. What the World Health Organization (WHO) recommends now—indoor residual spraying and LLINs for prevention and artemisinin-based combination therapy (ACT) for treatment—represents only the most recent variations in a long line of tools.

### FIGHTING MALARIA: A HISTORY

Despite malaria's long history—texts from ancient Egypt, China, India, Greece, and Rome reference it—the science of prevention and treatment has proven unable to outpace this tricky disease, as it constantly co-evolves with humans. To say that the disease is a challenge, though, is not to say that malaria is impossible to

fight or that we don't have proven ways to prevent and treat it. Multiple steps in the cycle of transmission also mean there are many potential points of contact in larger eradication or prevention efforts, and global initiatives during the past sixty years have attempted to manage the disease through various methods.

The first target in malaria prevention was the mosquitoes themselves. At the beginning of the twentieth century, swamp drainage was thought to be the answer to kill the pests, until it became expensive and destructive to the environment. Soon after followed the spraying of mosquito breeding grounds with DDT (dichlorodiphenyltrichloroethane) in the 1940s, 1950s, and 1960s. DDT was later found to be toxic for animals and plants, but even if it had proven a safe method, mosquitoes had already developed resistance to it.

At the same time, scientists began developing antimalarial drugs. The chloroquine drug for prevention and treatment was introduced in the 1950s but resistant strains of the parasite appeared shortly after. By the 1970s, though malaria had been eradicated in Europe and North America, global incidence of the disease began to rise again.

And so, despite evolving coordinated efforts to reduce malaria, both mosquitoes and the malaria parasite itself have also been evolving to become resistant to these treatments. The need for global coordination remains key through all of these efforts because partial control not only leads to rising incidence of the disease, but also to the spreading of various treatment-resistant strains. Currently, a strain

of malaria that is resistant to ACT—the WHO’s current recommended treatment—has been discovered on the Thai-Cambodian border and may be spreading. That urgency translates into many governments, nongovernmental organizations (NGOs), and international institutions implementing a lot of different policies to fight malaria. In such a multifaceted environment, communication is essential. Organizations that can translate what they have learned for a wider audience are very valuable.

Most recently, the Roll Back Malaria Partnership, launched in 1998 as a global coordinating body, pledged to halve the number of cases and deaths caused by malaria by 2010. The thirty-five countries (thirty in sub-Saharan Africa and five in Asia) that have 98 percent of the total global malaria-related deaths are its top

So while the global health community has seen some victories in the most recent fight against malaria, methodology varies from place to place. What reduces malaria in an island state like Sao Tome and Principe may not work the same way in Rwanda. The challenge for the global health community, then, is this: With so many potential ways to treat malaria, how should we begin to think about which is right for any one family, community, or a donor looking to give support?

### USING RESEARCH TO CHANGE POLICY

The way one understands an epidemic determines how it is treated. Hidden in decisions about how to treat malaria are assumptions about the disease itself. Do we focus more on treatment or prevention? Is it more effective to target human behavior or mosquito behavior? Should we prioritize spraying to kill mosquitoes if the spraying also has toxic

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priority. Since the start of the campaign, five high-burden countries and areas have achieved that goal—Eritrea, Rwanda, Sao Tome and Principe, Zambia, and the Zanzibar area in Tanzania. The WHO credits the decreases in the islands of Sao Tome and Principe and Zanzibar to three factors: indoor residual spraying to kill mosquitoes, LLINs to prevent bites at night, and ACT for treatment. Rwanda, in comparison, did not implement widespread spraying; a reduction in malaria cases and deaths resulted from just increasing usage of mosquito nets and proper treatment.

effects on plants and animals? Of course, certain interventions have more bang for the buck.

Development economists are finally doing what scientists in other fields have been doing for generations—using an old technique to battle an even older disease. Running randomized control trials (RCTs) on micro-level interventions like mosquito net distribution help to measure clearly the impact of the intervention. Because RCTs measure impact so precisely, they lend themselves easily to cost-benefit analyses, allowing



“An Orphan Recipient with his guardian grandmother just after receiving a net” © by Flickr user schacon

policy makers to base future decisions on real numbers from experiments in similar places and even compare different programs. Used this way, the questions asked are important if they can be applied to multiple contexts. Research becomes both more interesting and more useful when it is externally valid and moved beyond the comfortable home of an academic journal.

Field research can, for example, help to explain how slight differences in health interventions can lead to very different behavior outcomes. Distributing something for free versus charging a low price may have a huge impact on how individuals use the item. One RCT by economists Pascaline Dupas and Jessica Cohen in 2008 suggested that distributing nets for free, compared to charging a small fee, increased demand for the nets. These results are not completely surprising; when you reduce the price of something, demand is likely to increase. As for the question about usage—the real goal in mosquito net distribution—their

research found that giving out nets for free did not impact usage; when women received free nets, they were not less likely to use them than if they had paid. In other words, distributing nets for free can increase take-up without decreasing usage.

Anecdotal evidence persists in this debate though. Some NGOs firmly believe that distributing free nets does not increase usage because people sell the nets or use them incorrectly. Soft Power Health, a Uganda-based NGO that conducts malaria education and prevention programs, always sells its nets. As founder and director Dr. Jessie Stone says in an interview with National Public Radio, “What we’ve discovered is that if people have to pay a little something for their mosquito net, they are invested in that net. We’ve seen with nets that have been given away in some of the villages that we work in, that those nets that have been given away free are not used and are often just resold for money.” Under this reasoning, it follows that when a family pays for a mosquito net, the family will value it more and will thus use the net correctly and with care.

Another RCT by economist Vivian Hoffmann in 2008 attempted to get to the root of this question by comparing the effects of giving out nets for free to giving people money. Built into the design of the experiment was an opportunity allowing those who received nets to sell the nets for cash and those who received cash to use it to buy nets. But the research showed that very few nets were resold, so that individuals who received nets initially were more likely to use a net than individuals who received money. In particular, young children—the population most at risk of dying from malaria—were more likely to sleep under

a net when their family received a free net compared to money.

The results from the RCTs show that families can pay nothing for a good, but still “value” it (or use it) as much as they would if they paid something small for it. It is an important lesson on how to distribute good-for-you products, especially because production of them is not free. If an organization’s goal is to increase mosquito net usage among at-risk populations, then the best option may be to provide nets for free, as opposed to charging a small price.

interactions with the disease. When these individuals play a role in the research, it is easy to connect the same people to publicized results, so that fast action in implementation is guaranteed.

Last summer, TAMTAM did all of the above in Uganda. While giving out two-thousand free bed nets, the organization also found that having a community health worker join a person in that individual’s house to install the net increased usage of the net itself. As Uganda develops its nationwide malaria action plan, this kind of research is highly relevant to determine the cost of

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#### **TAMTAM’S ROLE IN THE FUTURE OF MALARIA POLICY**

Based on the lessons learned from this new research, TAMTAM attempts to be a connector between the worlds of academia and implementation.

TAMTAM’s two aims are to give out free nets and to perform operational research on distribution methods. Net distribution is often “crowded in” with other health care goods or services, like prenatal visits or enrolling in health insurance.

Distributing nets this way has the added benefit of encouraging take-up of another service as well. In other words, if the health care service isn’t enticing enough, maybe a bed net will be.

Rather than coming from the ivory tower of behavioral economics, research questions about malaria prevention come directly from the policy makers and health care workers who think about how to improve net distribution in their daily

bed nets and the allocation of human resources needed to distribute them. The short timeline on TAMTAM’s research means that the results can be translated into action quickly. Since the research questions are determined in part by the partner organizations doing the distribution, the questions are guaranteed to be relevant and the conclusions useful.

When adding to a body of literature that is already so large, it is important to do so in a targeted way. When an organization like TAMTAM acts fast to find and answer the newest questions in the fight against malaria, we close the gap between the changing disease and treatment methods. Momentum is key in the most recent iteration of this centuries-old fight. As new questions arise—as they inevitably do—the global community needs to have the capacity to quickly get answers.