Outdoor Electric Mosquito-Killing Apparatuses for Malaria Control in a Hyperendemic Area

To the Editor—The United Nations peacekeepers have been playing a crucial role in the promotion of peace, security, and stability in war-ravaged Liberia since 2003. One of the peacekeeping units is the Chinese level II hospital deployed in Zwedru city. Zwedru, located in the southeastern corner of Liberia, is hyperendemic for malaria with year-round transmission. No seasonal variation of malaria transmission in Zwedru has been reported, but apparently there are more malaria patients in the rainy season than in the dry season, according to the local Martha Tubman Memorial Hospital. Also, among local malaria patients, there is a high rate of mixed infection with \( \geq 2 \) Plasmodium species (20 [65%] of 31 cases represent mixed infection; unpublished data). From the first day of deployment, staff members of the Chinese hospital began to contract malaria. To prevent and control malaria in their own compound, every team of the Chinese hospital, including the Chinese hospital 6th, mainly adopted long-lasting insecticide-treated bed nets, indoor residual spraying, and voluntary chemoprophylaxis. However, many members still became infected with malaria because of malaria mosquito bites. For the Chinese hospital 6th alone, 37 (86%) of 43 members contracted malaria before finishing their 8 months of peacekeeping. In fact, malaria is the number one threat to the health of all the peacekeepers in Zwedru.

Beginning in late April 2008, besides continuing to adopt long-lasting insecticide-treated bed nets, indoor residual spraying, and voluntary chemoprophylaxis, the Chinese hospital 7th attempted a new mosquito vector control strategy of outdoor electric mosquito-killing apparatuses, which were originally called indoor electric housefly killers, that can attract houseflies by emitting ultraviolet light and kill them by a high voltage. Four such apparatuses were installed in a scattered fashion 5 to 6 feet above ground, under the eaves in a courtyard-like patio surrounded by houses, with an area of \( \sim 2000 \) square meters. They were switched on from one hour before dusk until morning. Even though it is specifically noted in the instruction booklets of these apparatuses that they are not suitable for outdoor use, our 8 months of practice demonstrated that they can also attract and kill mosquitoes in the outdoors. A huge number of insects, most of them ants and unknown flies and lots of mosquitoes, were killed each day. The mosquito density in the Chinese compound decreased to a very low level. After 8 months of peacekeeping duty, no member of the Chinese hospital 7th contracted malaria, which was further confirmed by 2 months of medical observation after the mission. Compared with their predecessors, the Chinese hospital 7th did not institute or improve any malaria control measures other than these outdoor apparatuses. Evidently, these outdoor mosquito-killing apparatuses were the main elements that prevented the Chinese hospital 7th from contracting malaria.

Long-lasting insecticide-treated bed nets and indoor residual spraying have been widely accepted for malaria control, but in a hyperendemic area with no region-wide vector control measures, these 2 strategies are still not sufficient for long-term travelers to avoid malaria infection. In this study, the outdoor electric mosquito-killing apparatuses, used in conjunction with existing long-lasting insecticide-treated bed nets and indoor residual spraying, proved successful for malaria control in a relatively confined space. The malaria transmission in tropical African countries is so intense that about 90% of all malaria deaths happen in this area [1]. In the new malaria eradication campaign, tropical African countries should not be neglected. The development of novel vector control tools should be a central aspect of the new eradication strategy. The outdoor electric mosquito-killing apparatus used in this report is cheap, easy to use, and environmentally friendly. At a minimum, it can be used for vector control in communities, companies, or other relatively confined spaces in areas hyperendemic for malaria. It should be noted that, in this case, countless ants and unknown flies were also killed each day, but how the local ecology will be affected cannot be known in a short time. Perhaps the development of a more specific electric mosquito-killing apparatus is a good plan.

Acknowledgments

Potential conflicts of interest. All authors report no conflicts of interest relevant to this article.

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Clinical Infectious Diseases 2009; 49:6480
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