

Tanzania study reopens debate on targeting mosquito larvae to control malaria

March 31 2009

Targeting mosquito larval populations may be an effective intervention to help control malaria in urban situations, a study published today suggests. The research, conducted in Dar es Salaam, the largest city in Tanzania, has re-opened the debate on whether malaria can be controlled with larvicides, insecticides which kill mosquitoes in their water-borne larval stages of development.

Malaria is one of the world's deadliest diseases, killing over one million people each year, mainly young children in [Africa](#). It is caused by the [malaria parasite](#), which is transmitted through the bites of [mosquitoes](#).

Governments and NGOs worldwide are making a concerted effort to tackle [malaria](#) and a number of interventions exist to control its spread, including the use of insecticide-treated bed nets (ITNs), sprays and repellents. However, most interventions target adult mosquitoes, which can carry the parasite. Larvicides were used in the early twentieth century, but the successful introduction of the pesticide DDT to kill adult mosquitoes meant that larvicides fell out of favour.

Nowadays, larvicides are available which kill only mosquito larvae and are biological in nature, environmentally friendly and are safe to apply even to drinking water. These products have been used for decades in mosquito programmes all across the northern hemisphere but the major question mark which had limited their use for malaria prevention was whether their implementation could be sustainable and cost-effective in the poorest countries of Africa.

Tanzania has emphasised the widespread use of ITNs as its highest priority for controlling malaria, but recent observations suggest that in urban areas such as Dar es Salaam, mosquitoes tend to bite outdoors, making the nets slightly less effective as a control strategy than in rural areas.

In 2003, the Dar es Salaam City Council established a new Urban Malaria Control Programme which spent 3 years developing new, sustainable and affordable systems for applying microbial larvicides by mobilizing community-based teams of operators. In a pilot study to evaluate this approach, three wards of the city, covering an area of 17km² and 128,000 inhabitants, were treated with the microbial larvicide *Bacillus thuringiensis* var. *israelensis* (Bti) over a one year period.

In a study published today in the open access journal *PLoS One*, an implementation team of almost 300 community-based staff led by Ms Khadija Kannady from the Dar es Salaam City Council, and a supporting team of researchers led by Wellcome Trust Research Career Development Fellow Dr Gerry Killeen, have shown that the use of larvicides to complement existing interventions appears to have had a dramatic effect in reducing malaria risk in the pilot areas.

"Malaria control programmes have traditionally focused on rural areas, where the disease is more prevalent," says Dr Killeen, from the Liverpool School of Tropical Medicine, who is based at the Ifakara Health Institute in Tanzania. "However, it's becoming clear that malaria also poses a problem in towns or cities, where we expect that over half the African population will live by 2030. In fact, it is likely that malaria is easier to control and even eliminate in these areas."

Dr Killeen and his colleagues from the Ifakara Health Institute in Tanzania, as well as Durham University, Harvard University, Swiss

Tropical Institute and the Liverpool School of Tropical Medicine, found that the pilot programme achieved a 72% reduction in the prevalence of malaria infection among young children in Dar es Salaam. This dramatic reduction also proved to be highly cost-effective: an annual cost of less than US\$1 per person protected, compared to US\$2 per year of use of an ITN, typically by more than one person.

The study supports ongoing research in the densely populated rural highlands of western Kenya, which have also shown the effectiveness of using larvicide application as a malaria prevention measure. However, the researchers stress that larvicide is not intended to replace ITNs and other interventions, but rather should be a complementary approach.

"There is no evidence that using larvicide is a substitute for the current front-line interventions," says lead author Dr Yvonne Geissbühler from the Swiss Tropical Institute, Switzerland. "ITNs and indoor residual spraying are, and should remain, the highest priority, but using larvicide may offer a supplementary means to control or even eliminate malaria."

The programme in Dar es Salaam has already been extended to protect over 600,000 people, with lessons learned during this pilot study being translated into major improvements in the delivery system to reduce costs and improve performance. Furthermore, expansion to eventually cover the entire city is being considered at the stakeholders meeting of the US President's Malaria Initiative held in Tanzania this week and the National Malaria Control Programme has now set itself the target of setting up such programmes in five cities by 2013.

Source: Wellcome Trust ([news](#) : [web](#))

Citation: Tanzania study reopens debate on targeting mosquito larvae to control malaria (2009,

March 31) retrieved 3 May 2024 from <https://medicalxpress.com/news/2009-03-tanzania-reopens-debate-mosquito-larvae.html>

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