

AIDS and malaria

A vicious circle

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Infection with malaria promotes HIV, and vice versa[Get article background](#)

ONE of the most important organisations designed to combat fatal infectious diseases in poor countries goes by the unwieldy name of the Global Fund to Fight AIDS, Tuberculosis and Malaria. The link between the first two is well established. AIDS does not kill directly. Rather, the damage it does to the immune system opens an individual to other infections that would frequently be fought off by a healthy body. Of these, tuberculosis is one of the most important. Some 12% of deaths of people infected with HIV, the virus that causes AIDS, are from tuberculosis, and, conversely, 16% of tuberculosis deaths are AIDS-related. When the Global Fund was set up, however, many observers saw malaria as a politically convenient bolt-on. The disease kills a lot of people—at least 1m a year, although the exact figure is hard to come by (see [article](#))—but there was little obvious medical connection between it and the other two.

No longer. Over the past few years a number of studies have suggested that those who are infected with HIV are more susceptible to malaria, and that the malarial parasite, in turn, raises the number of virus particles in those with HIV. Now, a study published in *Science* by Laith Abu-Raddad of the University of Washington, in Seattle, and his colleagues has tried to put some numbers on the problem.

The study's starting point is that the number of virus particles in the blood of someone infected with HIV increases about ten-fold during an attack of malaria. This seems to be due, paradoxically, to the immune system's response to the malarial parasite. That response produces proteins called cytokines, which have the perverse effect of encouraging HIV to replicate.

The increase in the number of virus particles is transient, and may do little harm to the individual's own long-term prospects, but it does make him (or her) more likely to pass the infection on during sex. Conversely, the damage HIV does to the immune system means that the malarial parasite can more easily breed unchecked. That means people are more susceptible to infection in the first place, and that more parasites are available to be transmitted from person to person by the mosquitoes that spread them.

Dr Abu-Raddad and his colleagues looked at past studies that have attempted to quantify these observations. They came up with a set of numbers (for example, the increased likelihood of an individual transmitting HIV per act of sexual intercourse when he or she is infected with both the virus and the malarial parasite) that can be plugged into a mathematical model they have developed of how, based on other papers, they think the diseases interact. They then applied the model to Kisumu, a part of Kenya that has a high prevalence of both diseases.

The model suggests the peak of the HIV epidemic in Kisumu is 8% higher than it would have been were there no interaction between the diseases, while the peak level of malaria is 13% higher. Moreover, and in contrast to tuberculosis, where the peak lags seven years behind that of HIV, malaria peaked only one year after the peak of the HIV epidemic.

All of which suggests that the decision to include malaria in the HIV-tuberculosis package that the Global Fund deals with was prescient. It also suggests that the people of Africa, in particular, are in even more trouble than they realised.