

New type of bed net could prevent millions of malaria cases, shows research

August 10, 2018

A new type of bed net could prevent millions of cases of malaria, according to new research published in *The Lancet* today (10 August).

The two-year clinical trial in Burkina Faso, West Africa involving 2,000 children showed that the number of cases of clinical malaria was reduced by 12 per cent with the new type of mosquito net compared to the conventional one used normally.

The study resulted from a collaboration of scientists from Durham University (UK), Centre National de Recherche et de Formation sur le Paludisme (Burkina Faso), Liverpool School of Tropical Medicine (UK) and the Swiss Tropical and Public Health Institute (Switzerland).

It found that:

- The number of cases of clinical malaria reduced by 12 per cent with the new type of mosquito net compared to conventional nets.
- Children sleeping under the new bed nets were 52 per cent less likely to be moderately anaemic than those with a conventional net. Malaria anaemia is a major cause of mortality in children under two years old.
- In areas with the new combination bed nets, there was a 51 per cent reduction in risk of a malaria-infective mosquito bite compared to areas with conventional nets.

Blood-seeking malaria mosquitoes (female *Anopheles* mosquitoes) are increasingly becoming resistant to the most common insecticides, called pyrethroids, used to treat traditional bed nets.

Latest figures from the World Health Organisation (WHO) show that after a dramatic decrease in malaria since the start of the millennium, progress has stalled and the number of people infected with malaria is now going up in some areas, with insecticide-resistant vectors as one of the possible causes of this.

The researchers suggest the use of bed nets with a combination of chemicals should be explored for areas where mosquito resistance is a problem.

The new combination nets used in the study contain a pyrethroid insecticide which repels and kills the mosquitoes as well as an insect growth regulator, pyriproxyfen, which shortens the lives of mosquitoes and reduces their ability to reproduce.

In combination, the ingredients on the nets kill more mosquitoes and reduce

the number of infective bites than conventional nets treated only with a pyrethroid.

As it is less likely that mosquitoes become resistant to both chemicals in the combination bed nets, they are considered a better alternative to tackling malaria in areas where mosquitoes have become resistant to the single chemical used in traditional bed nets.

Professor Steve Lindsay, from the Department of Biosciences at Durham University in the UK, said: "This study is important because malaria control in sub-Saharan Africa has stalled, partly because the mosquitoes are adapting and becoming resistant to the pyrethroid insecticides used for treating the old bed nets.

"In our trial in Burkina Faso we tested a new type of net that had a pyrethroid plus an insect growth hormone, which was significantly more protective than the old net type. If we had scaled up our trial to the whole of Burkina Faso we would have reduced the number of malaria cases by 1.2 million.

"Malaria still kills a child every two minutes so we need to keep working to find the best ways to stop this from happening. It is clear that conventional methods used for controlling malaria mosquitoes need to be improved and new additional tools developed."

The latest figures from the World Health Organisation show that in 2016 malaria infected about 216 million people across 91 countries, up five million from the previous year. The disease killed 445,000 which was about the same number as in 2015. The majority of deaths were in children under the age of five in the poorest parts of sub-Saharan Africa.

Burkina Faso, with more than 10 million cases of malaria annually, is one of 20 sub-Saharan countries where malaria increased between 2015 and 2016. Mosquitoes in this area are highly resistant to the traditional insecticide with a dose which is designed to kill 100 per cent of susceptible mosquitoes killing only up to 20 per cent in 2015.

This study is the first clinical trial that has compared a bed net with two active ingredients, a pyrethroid plus an insect growth hormone, against the traditional widely-used nets treated with the pyrethroid insecticide alone.

In this study, conventional bed nets were replaced over time with the new combination nets in 40 rural clusters in Burkina Faso covering 91 villages and involving 1,980 children in 2014 and 2,157 in 2015. The children were aged between six months and five years.

The number of mosquito bites and incidence of clinical malaria in the children in the study were recorded by health clinics and the number of mosquitoes in the houses was tracked through monthly light traps. A number of randomly selected children were visited at home four times and examined clinically for signs of illness. Their blood levels were also tested for possible anaemia.

Principal investigator in the field trial, Dr Alfred B. Tiono, from the Centre National de Recherche et de Formation sur le Paludisme in Burkina Faso, commented: "We have seen our gains in the battle against malaria progressively lost with the emergence and spread of resistant mosquitoes. The results from this trial gave us a new hope.

"This new invaluable tool would enable us to tackle more efficiently this terrible and deadly disease that affects many children. If deployed correctly, we could certainly prevent millions of cases and deaths of malaria. On behalf of our team, we would like to thank our health authorities and the trial participants for helping us towards reaching this major milestone."

Bed nets are crucial to protect people from malaria and the researchers stress that people in affected areas should always sleep under a bed net, whether that is a conventional or a combination type.