

## Malaria prevention strategies could substantially cut killer bacterial infections, study suggests

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Interventions targeting malaria, such as insecticide-treated bed nets, antimalarial drugs and mosquito control, could substantially reduce cases of bacteraemia, which kill hundreds of thousands of children each year in Africa and worldwide. This is the conclusion of research published today in the *Lancet* and funded by the Wellcome Trust.

Researchers at the KEMRI-Wellcome Trust Research Programme in Kilifi, Kenya, examined two major killer diseases, <u>malaria</u> and bacteraemia, or invasive <u>bacterial disease</u>, which includes severe cases of meningitis, pneumonia and sepsis. They hypothesised that malaria is the <u>driving force</u> behind many of the cases of bacteraemia.

To test their hypothesis, the researchers, led by Dr Anthony Scott from the KEMRI-Wellcome Trust Research Programme and Oxford University, took advantage of a 'genetic antimalarial' in the population – the sickle cell gene – to see if children carrying the gene were less likely to develop bacteraemia than children who do not carry the gene. Scientists have known for many years now that whilst carrying two copies of the sickle cell gene leads to the development of sickle cell disease, carrying just one copy confers strong protection against malaria.

"Our results seemed fairly conclusive: children with 'sickle cell trait', who have a single copy of the sickle cell gene, developed bacteraemia much less frequently than normal children who carried no copies,"



explains Dr Scott. "However, we needed to explore this further. We don't know exactly how children with sickle cell trait are protected against malaria – could it be that the same immune mechanism protects against bacteraemia too? Or does malaria itself lead to bacteraemia?"

To answer this question, the researchers studied the effect of the sickle cell trait in the same population, but after malaria had been brought under control. If sickle cell trait does directly protect against bacteraemia, then children with this condition would be less likely to develop bacteraemia even in the absence of malaria.

In Kilifi, the incidence of admission to hospital with malaria fell almost 90 per cent from 28.5 to 3.45 per 1000 childhood years over the period 1999-2007. This near-eradication of malaria over a decade offered the researchers the opportunity to compare levels of invasive bacterial infections in populations of differing levels of malaria.

The researchers measured rates of bacteraemia over the same period. They found that the rate of admission to hospital with bacteraemia fell by 44 per cent, from 2.59 to 1.45 per 1000 childhood years. The key finding, however, was that among children with sickle cell disease, the protection observed against bacteraemia disappeared as malaria also disappeared.

"We showed that children with sickle cell trait, who have a natural protection against malaria, are also protected against bacteraemia, but only because they are less likely to develop malaria," says Dr Tom Williams, a senior scientist working on the research. "The gene itself is not offering direct protection. This implies very strongly that infection with malaria makes children more susceptible to bacteraemia."

The researchers estimate that, in malaria endemic areas, over half of all cases of bacteraemia can be attributed to infection with Plasmodium



falciparum, the parasite that causes malaria.

Dr Scott adds: "In Kilifi, over one in five children with invasive bacterial infection dies. We have seen great success in tackling malaria and this has had a substantial knock-on effect in reducing cases of <u>pneumonia</u>, meningitis and <u>sepsis</u>. Controlling malaria in Africa should be a priority: doing this will help us prevent childhood deaths caused by malaria but it will have the added benefit of preventing deaths that are caused by invasive bacterial infections."

Combating infectious diseases is one the strategic priorities of the Wellcome Trust. Much of this work is carried out at a local level in regions where disease is endemic. This includes several major overseas programmes, including the KEMRI-Wellcome Trust Research Programme.

Provided by Wellcome Trust

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