Commentary *(The Lancet)*
Bednets and malaria in Africa

Don Mathanga, Malcolm E. Molyneux

Malawi-Liverpool-Wellcome Trust Clinical Research Programme, College of Medicine, University of Malawi, Blantyre, Malawi

Correspondence to: Malcolm E. Molyneux (mmolyneux999@gmail.com)

Many studies have shown that the burden of malaria in a community can be reduced by the use of insecticidetreated nets (ITNs). In Africa, four randomised trials, which had child mortality as the primary endpoint, found a reduction in deaths among children under 5 years of age with the use of ITNs (three trials) or insecticide-treated curtains.[1] Although these results are encouraging, they pose additional questions.

First, can this efficacy (ie, success in the artificial circumstances of a scientific trial) be translated into effectiveness (ie, success when implemented as a healthservice programme)? Most observers believe that neither a government nor an individual can be expected to foot the entire bill for an ITN programme, which must include purchase of nets, distribution, education, and regular reimpregnation. The KINET project in the Ifakara district of Tanzania has promoted the use of ITNs, through social marketing, a partnership between the public sector (educating and subsidising) and the private sector (educating, distributing, and selling, especially through private shops) in a rural population of nearly half a million people. The project has already reported a six-fold increase in ownership of ITNs (from 10% to 61%) and a 60% reduction in the frequency of parasitaemia and of anaemia (haemoglobin < 8 g/dL) in children under 2 years of age.[2]

In today's Lancet, Joanna Armstrong Schellenberg and colleagues describe the impact of the KINET project on survival of children aged 1 month to 5 years. In the area where the project has been in progress for the longest time (3 years), they compared ITN use between 423 children who died and 1911 controls. This analysis revealed a 27% (95% CI 3–45%) increase in child survival among users of ITNs. Potential confounding factors were carefully sought and adjusted for.

This pleasing result needs to be confirmed as the study enlarges and continues. In The Gambia an ITN programme that had substantially decreased child mortality ceased to have this effect when people had to pay for their nets.[3] Whether social marketing has made the difference in Ifakara, or whether people in The Gambia found it difficult to start paying for a commodity they had been receiving free for several years is not known. A challenge for Tanzania now is whether ITN use, promoted through social marketing, can be sustained long term, and whether it can, as planned, be introduced countrywide with comparable success in the absence of a research team to stimulate the social marketing.

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A worrying aspect is that even in Ifakara the necessary re-impregnation of nets has not been achieved by many. Unless permanently impregnated nets can soon be marketed, the benefits of the ITN programme may decline.

Can the Ifakara methods work elsewhere in Africa? Even with the most energetic social marketing, large families–commonly augmented by more children orphaned by the HIV/AIDS epidemic, and therefore needing more nets–earning less than US$1 per day may find even a subsidised ITN price such as $5 per net unaffordable. Cost-effectiveness calculations have suggested that ITNs and childhood vaccinations are of similar value (about US$20 per prevented disabilityadjusted life year in one study).[4] Vaccines are provided free of charge, and a strong case can be made for donors, nongovernmental organisations, and governments to work together to provide free or heavily subsidised ITNs and their retreatment, at least for vulnerable groups such as young children and pregnant women.

A second question for the promoters of ITNs is posed in a hypothesis also in today's Lancet. P G Coleman and colleagues cite malaria as one of the diseases that has reached endemic stability in many populations. This means that in areas of intense transmission most infections do not cause disease. In veterinary infections with endemic stability–for example, east-coast fever in cattle—reducing transmission can lead to an increase in the incidence and severity of disease.

Coleman and colleagues postulate that reducing the force of infection in some human diseases–for example, in malaria by ITNs–might similarly increase the incidence of the disease and its mortality. This possibility was discussed in malaria circles many years ago[5,6] and again came to the fore in the 1990s as ITN studies were in progress.[7,8] A principal argument was about the shape of the curve relating the incidence of severe or fatal malaria to the rate of infection in various endemic populations. Both axes of this graph are difficult to measure accurately, which allows some disagreement about whether mortality (or its surrogate, severe disease) increases with infection pressure, or reaches a plateau, or even falls at high intensities of transmission.

In the latter situation, reducing infection rates–for example, by an ITN programme–could possibly lead to an increase in the frequency of the disease. Most discussants acknowledge that malaria and the partial immunity it engenders are too complex to allow confident predictions about the effects of such an intervention. Most are also of the opinion that, in the absence of other tools to control malaria adequately, ITN programmes should proceed, but that they should be monitored with care over a long time. Monitoring must be conducted in populations subjected to a variety of transmission patterns, so that any adverse consequences (which may differ with the level of endemicity) can be identified and tackled.[9,10]

That opinion is, of course, based on the hope that ITN programmes can be effective as well as efficacious. The

findings in Ifakara are encouraging, and the results of continued monitoring in that and other populations will be awaited with great interest.

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