INSECTICIDE-TREATED BED NETS

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Malaria remains one of the world’s most significant health and development problems. More than 2.4 billion of the world’s population residing in 100 countries or territories are at risk of malaria. This results in an estimated 300–500 million clinical cases each year, 90% of which occur in Africa south of the Sahara Desert. In these high-burden areas of Africa, *Plasmodium falciparum*, the most dangerous species of human malaria, causes the great majority of infections. In addition, *Anopheles gambiae*, the most efficient vector of malaria, predominates throughout large areas of the Africa continent. This combination of a highly dangerous pathogen carried from person to person by a highly competent, resilient vector results in at least one million deaths among young African children each year. Malaria also challenges national authorities with a substantial impediment to economic development, costing the region between $3 billion and 12 billion and inhibiting economic growth by as much as 1.3% each year. The strong relationship between malaria and poverty is perhaps best summarized by the observation that where malaria prospers most, human societies prosper least.

During the decade of the 1990s, results from a series of randomized, controlled trials in four areas of stable transmission in Africa showed that impressive gains in the health of young children could be achieved by interfering with human-vector contact through use of insecticide-treated net (ITN) materials. These trials demonstrated that wide-scale use of ITNs in areas of stable malaria could reduce overall child mortality by approximately one-fifth, saving an average of six lives per 1,000 children with an age range of 1–59 months protected each year. In addition, ITN use could halve the number of episodes of clinical malaria and, in the trial conducted in coastal Kenya, a substantial impact of ITN use on cases of severe malaria arriving at the hospital was also seen.

Results from these four studies provided enough evidence to galvanize consensus in the global community that provision of access to ITNs for vulnerable populations in malaria-endemic areas should receive high priority. With the inception of the global partnership to Roll Back Malaria (RBM) in October 1998, ITNs were adopted as one of the key tools for reducing the burden of malaria in areas of stable malaria transmission in Africa. At the Africa Summit on Roll Back Malaria in Abuja, Nigeria in April 2000, heads of state and senior representatives from 44 malaria-afflicted countries in Africa agreed to a goal of providing ITNs to at least 60% of those at risk of malaria, particularly pregnant women and children less than five years of age, by 2005.

If the global community had decided by the end of the last decade that enough evidence was already available to compel the RBM partnership to action, then why was the present trial in western Kenya needed? The four previous trials had been conducted in a range of malaria transmission settings, from low to high but intensely seasonal, and demonstrated a trend to decreasing efficacy with increasing intensity of malaria transmission. This raised concern that an upper limit of malaria transmission intensity may exist above which ITNs will no longer be efficacious, and thus overall cost-effectiveness might not be achieved in such high transmission areas. Despite the confidence placed on the results from these previous trials, the unanswered question of whether the ITNs would be beneficial in an area of intense, perennial transmission has continued to gnaw at the edges of the certainty with which ITN use has been promoted in Africa. In addition, if ITNs work in this setting, will the reduction in mortality be sustainable? In other words, will the beneficial effect be merely temporary, with mortality being postponed to an older age as a result of interference with the natural development of immunity, which occurs through repeated exposure? The following series of 23 articles reports the results of the only randomized controlled trial conducted in an area of intense year-round transmission, a pattern common in areas of Africa south of the Sahara Desert.

Another remaining question is whether and to what extent the impact of ITNs can be augmented by a high level of coverage in a population, since this may provide benefit even for individuals who do not use ITNs by area-wide reductions in malaria vector populations. Will the Abuja target of at least 60% ITN coverage of pregnant women and pre-school children be high enough to produce such area-wide effects, or should efforts to improve coverage be expanded and directed to communities as a whole, including households without pregnant woman or young children? The answer to this is not yet clear, but one social marketing program in an area of high malaria transmission in Tanzania attained coverage of 60% among children less than two years of age and demonstrated clear benefits on reductions in mortality; whether some of this impact resulted from coverage in non-target groups is unknown.

Since the launching of the RBM partnership, what progress has been made in reaching the Abuja target? The United Nations Children’s Fund (UNICEF) and the World Health Organization have recently reviewed data from a series of nationally representative surveys in 29 African countries conducted between 1998 and 2001 that measured, among other variables, coverage of ITNs. The proportion of children less than five years of age sleeping under an ITN was depressingly low, with an overall average of only 2%. It is estimated that to attain the Abuja target for coverage of children less than five years of age and pregnant women, at least US $200 million annually will be required for the next five years. An even greater amount of resource costs will be required to attain the high levels of coverage needed to attain a community-wide effect, since this will necessitate providing ITNs to households where a young child or pregnant woman may not reside.

Achieving the Abuja goal for ITN coverage in 2005 is not an end in itself. The coverage level must be maintained and hopefully surpassed in subsequent years. The challenges in scaling-up and sustaining ITN coverage are not simply fiscal. A culture of ITN use must be established. People living in malaria-endemic areas must come to value and demand ITNs.
High-quality ITNs must be available to them locally and at low cost, and in some cases at subsidized prices or free of charge. Inherent in this challenge is the need to use resources to stimulate market development, as well as to underwrite the cost of schemes to make nets available to the very poor and other vulnerable groups. This will require commitment and the mobilization of resources at all levels, from the family pocketbook to the international organizations. The signs that this can be accomplished are encouraging. Organizations involved in social marketing, along with a number of companies engaged in ITN manufacture and distribution, have demonstrated that demand for ITNs can be stimulated, that many families are willing to pay for ITNs, and that viable markets for their delivery can be developed. To reduce the cost of ITNs and stimulate investment in ITN manufacture and importing, 17 African countries have already reduced or eliminated taxes and tariffs on mosquito nets, netting materials, and insecticides. Countries are also beginning to include malaria as a priority in debt relief programs and poverty reduction strategies. At the global level, significant new resources are becoming available for malaria control through the Global Fund to Fight AIDS, TB and Malaria (GFATM), as well as increasing private and government contributions to malaria control.

The research findings reported in this supplement provide substantial evidence that high coverage of ITNs in areas of intense, perennial malaria transmission will result in remarkable health benefits for affected communities. The prize in reaching the level of coverage called for in the Abuja declaration will be healthier children and pregnant women, fewer child deaths, and improvements in economic development.

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