

Summary of the Eighth Meeting of the ITFDE (II) October 4, 2005

The Eighth Meeting of the International Task Force for Disease Eradication (ITFDE) was convened at The Carter Center from 9:00am to 4:00pm on October 4, 2005. The Task Force reviewed the use of bed nets for malaria control.

The Task Force members are Dr. Olusoji Adeyi, The World Bank; Sir George Alleyne, Pan American Health Organization (PAHO); Dr. Julie Gerberding, Centers for Disease Control and Prevention (CDC); Dr. David Heymann, World Health Organization (WHO); Dr. Donald Hopkins, The Carter Center (Chair); Dr. Adetokunbo Lucas, Harvard University; Professor David Molyneux, Liverpool School of Tropical Medicine; Dr. Mark Rosenberg, Task Force for Child Survival and Development; Dr. Harrison Spencer, Association of Schools of Public Health; Dr. Pascal Villeneuve, UNICEF; Dr. Dyann Wirth, Harvard School of Public Health, and Dr. Yoichi Yamagata, Japan International Cooperation Agency (JICA). Eight of the Task Force members (Adeyi, Gerberding, Hopkins, Lucas, Molyneux, Rosenberg, Spencer, Yamagata) attended this meeting, and another was represented by an alternate (Dr. Mark Young for Villeneuve). Former US President Jimmy Carter also attended the meeting.

Malaria Control

The presentations on malaria were given by Dr. Keith Carter of the Pan American Health Organization (PAHO), Dr. Christian Lengeler of the Swiss Tropical Institute, Dr. Chris Curtis of the London School of Hygiene and Tropical Medicine, Mr. David McGuire of Academy for Educational Development, and Dr. William Hawley of the Centers for Disease Control and Prevention (CDC).

Malaria is a parasitic disease transmitted by mosquitoes that causes over 300 million clinical cases and more than one million deaths per year, with some 80% of the cases and over 90% of the deaths occurring in sub-Saharan Africa, mostly in rural areas. Mortality is greatest among two especially vulnerable groups: pregnant women and children under the age of five years. In Africa alone, malaria is responsible for an estimated 25%-35% of outpatient visits, 20%-45% of hospital admissions, and 1%-4% reduction in Gross Domestic Product, or economic losses of up to US\$12 billion per year.

The World Health Organization (WHO) established the global Roll Back Malaria (RBM) initiative in 1998, which aims to halve malaria-associated mortality by 2010. An African Summit on Roll Back Malaria that was held in Abuja, Nigeria in 2000 set an interim target to ensure coverage of 60% of persons at risk with preventive and curative interventions by 2005. The past decade has seen some improvements in tools to treat and prevent malaria. Drug treatments based on artemisinin combination therapies are now available for resistant malaria, and the efficacy of insecticide impregnated bed nets to repel or kill the mosquito vector of malaria has been demonstrated. Indoor residual spraying of insecticides has been maintained or revived in a few African countries as another way of controlling the disease. Other important

recent milestones include establishment of The Global Fund to Fight AIDS, Tuberculosis and Malaria in 2002, several other large financial investments or pledges for fighting malaria by The World Bank, the United States Government and other members of the G8, and the Bill & Melinda Gates Foundation. Global awareness of the need to do more about malaria has also increased, and some endemic countries have begun to make significant strides towards better control of the disease. In spite of this renewed interest, however, the latest indications are that the overall malaria situation has worsened in recent years.

This meeting of the ITFDE focused on the role of bed nets in malaria control, because of their importance and potential effectiveness as part of any multi-faceted malaria control program, because of the great emphasis and funding already being directed to bed nets in the recent upsurge in donor efforts to help countries control malaria, and because of potential synergies of bed net distribution and usage for malaria control with programs to control or eliminate some other important diseases. The meeting did not review other components of malaria control strategy, notably chemotherapy, in detail.

Several large-scale trials of insecticide treated nets (ITNs) in Africa have documented an average 18% reduction in overall child mortality among children 1-59 months of age. Rates of anemia are also reduced significantly, and frequency of malaria fevers reduced by 50%. It is estimated that protecting all 80 million African children under five years at risk of malaria with ITNs could prevent 480,000 deaths per year. Studies have also shown that African infants and young children who have been protected from malaria by use of impregnated bed nets do not suffer increased ("re-bound") malaria-related mortality later in life. ITNs reduce, but do not eliminate, biting of occupants (personal protection). In contrast to un-impregnated nets with holes in them, damaged ITNs with holes are still protective. ITNs also provide some protection to others not under a net who sleep in the same room, household or community, depending on the proportion of persons who do use impregnated nets in the same room, household or community (community protection). Although the minimal coverage necessary to achieve a "herd effect" in a community is not clear, the larger the proportion of the population using ITNs the better. Although the use of un-impregnated nets is better than no net at all, treated bed nets (ITNs and long-lasting impregnated bed nets-LLINs) are significantly more effective and therefore should have the major role in current malaria control programs.

One important problem associated with the use of ITNs is the low rate of re-treatment after they have been distributed (conventional ITNs require retreatment with insecticide every 6-12 months). Retreatment of deployed ITNs has caused major logistical concerns, but in Vietnam and Eritrea government services successfully provide free ITN retreatment for millions of people. The newer long-lasting impregnated bed nets (LLIN) are preferred to conventional ITN, because they do not need retreatment. Conventional ITNs cost ~US\$2.50 each. LLINs are more costly. WHO has approved two types of LLINs: Olyset® (polyethylene), and Permanet® (polyester); these cost between US\$5.50-6.50. Polyester nets normally last 3-4 years, while polyethylene nets may last up to 8 years.

The second key problem with ITNs is low coverage. Most coverage surveys conducted between 2000 and 2005 show ITN coverage far below the 60% 2005 goal (established by the Abuja Summit) for pregnant women and young children, although a few countries have made

significant progress recently. Many of the nets in use today were purchased through the commercial sector, but the cost to households has been a major barrier to scaling up coverage through the private sector.

Existing public sector primary health care facilities and systems in Africa are generally too weak to accept and sustain any major effort to control malaria, without additional assistance and support. Demonstrated options for public sector distribution of ITNs to date include facility based distribution at antenatal clinics (ANCs) to target pregnant women, and immunization clinics to target mothers and children under one year of age, or community based (mass) ITN distribution integrated with mass immunization (EPI) campaigns, mass drug administration (MDA) of anthelmintics, and/or mass vitamin A supplementation. De-worming by use of broad spectrum anthelmintics has been shown to also reduce significantly children's vulnerability to fatal attacks of malaria, while use of impregnated bed nets helps to prevent lymphatic filariasis—which in rural Africa is usually transmitted by the same anopheline mosquitoes that transmit malaria and is the target of a major global campaign.

Where funding is limited, pregnant women and children under five years should receive priority for ITNs, and should receive them free, or highly subsidized. However, even when this strategy is fully implemented, ITN coverage would only reach the 20% of a country's population that is made up of under 5 year old children and pregnant women (the current interim target is 60% of this 20%). The ITFDE heard, however, that by one estimate it would be possible to provide free ITNs to the entire population of rural sub-Saharan Africa for a cost of only US\$200-350 million per year, although this figure has been challenged by some. Global production capacity of LLINs has been limited, but is expected to rise to about 30 million per year by the end of 2005.

The main strategies for scaling up use of bed nets are 1) to distribute them free of charge, which can allow rapid affordable and equitable coverage of the at risk population, and/or 2) developing market-based demand for bed nets which consumers can purchase commercially, which would theoretically be more sustainable if continued support of donors and governments cannot be relied upon. The latter strategy takes more time to develop because of the need to educate consumers and encourage marketing, manufacture (or importation) and distribution networks. A key issue is whether a predominately commercial approach can reach and maintain the high and equitable coverage needed to have impact on the disease. Up to now, the Rollback Malaria strategy for scaling up use of ITNs calls for short-term subsidies that are gradually replaced by unsubsidized expansion of commercial marketing, production and distribution of bed nets; gradual replacement of external donor funding by domestic funding; and long term targeted subsidies for the most vulnerable groups (currently defined as poor pregnant women and children under five years of age). Beginning in 2000, Tanzania has made substantial, but still incomplete, progress towards improving use of ITNs by pregnant women and young children in a nationwide initiative that includes: 1) a national strategic plan; 2) national coordination of inputs by all relevant national, international, private and public sector partners; 3) the use of vouchers to allow pregnant women to purchase nets at reduced cost, and 4) encouragement of local manufacture of ITNs and LLINs. Mali reportedly has achieved 73% coverage with bed nets nationwide through a combination of both private sector sales and public sector distribution through ANC and EPI, while Togo has undertaken a completely different approach, using the public sector in a nationwide integrated campaign to distribute ITNs, measles and polio vaccines, and an

antihelmintic (albendazole) to young children. Several other countries are using or are planning to use this approach in the coming year. In Zambia, the government has launched a new program in partnership with the Global Fund for AIDS, Tuberculosis and Malaria, RBM, The World Bank, the Bill & Melinda Gates Foundation, and PATH, called the Malaria Control and Evaluation Partnership in Africa (MACEPA), to help support and coordinate rapid simultaneous scale up of multiple malaria intervention strategies, including ITN usage.

It was agreed that cost should never be a barrier to ITN use among populations at risk of malaria. The challenge is for each endemic country and its international partners to determine and implement the most appropriate balance of free, subsidized, and private sector distribution of ITNs to meet its two-fold needs to rapidly reduce suffering and death from malaria, and to sustain the public health impact on malaria over the long term.

A key question is whether malaria endemic countries, or their populations, themselves should pay for their ITNs. In Kenya, Tanzania and Nigeria, manufacture of ITNs and/or LLINs (Tanzania) is currently taking place or is planned in the near future. The ITFDE agreed that in such cases where local manufacturers exist and are *capable of producing quality impregnated bed nets at a competitive price*, they are preferred over imported sources. There is need to consider in this, however, the desirability to maintain efficiency of scale, which would be best served by having a few manufacturers. However, countries in where there is no capacity for local manufacture of ITNs, distribution of imported ITNs free of charge could occur with no risk of suppressing of local industry, although local assembly (sewing) of nets from imported material and commercial distribution of ITNs might be affected. Even where there are one or more local manufacturer(s), immediate distribution of a free ITN purchased by public sector or donor funding could rapidly reach high coverage, while at the same time help develop a culture of bed net usage and thereby enhance demand for (and thus local market supply of) ITNs in the long term. Although free distribution of a product is a well-known and often effective marketing tool, its effect on the marketing of ITNs is unproven. More experience and documentation of the different options for increasing and sustaining use of ITNs would help guide future decisions.

There was brief consideration of the relative merits of ITNs compared with indoor residual spraying (IRS) of insecticides for malaria control. Some studies suggest that efficacy and costs may be similar where coverage is adequate, but LLINs are probably preferable for hard to reach rural areas, for logistical reasons. However, IRS is useful in epidemics or where there is resistance to insecticides used in ITNs.

Conclusions and Recommendations

1. Insecticide Treated Nets (ITNs) are a highly effective preventive component in current RBM malaria control strategy. Improved ITN coverage could potentially prevent the deaths of almost half a million African children per year. Evidence from several careful studies in Africa (Burkina Faso, Gambia, Ghana, Kenya, Tanzania) give confidence that protection of infants and young children from malaria using ITNs does not cause "re-bounce" increase in mortality of those children later in childhood.

2. The current scale of deployment of ITNs by endemic countries and support from the international community is not commensurate with malaria's enormous known adverse medical and economic effects or with the estimated benefits of controlling malaria. Given what we now know about ITNs' cost, effectiveness and benefits, the ITFDE strongly endorses the scale-up of production and distribution of ITNs in order to increase coverage as quickly as possible.
3. Although the ITFDE agrees that initial priority for (free or highly subsidized) ITNs be given to especially vulnerable populations (children under 5 years of age and pregnant women), ITNs should be targeted to the entire population in malarious areas in Africa as the most effective way of reducing transmission with this intervention.
4. There is concern that free distribution of ITNs to entire populations would impede local manufacture and local markets for national ITN private sector development. However, in many African countries ITN manufacturing capacity is limited or non-existent. Where capacity for national manufacture of bed nets of competitive quality and cost exists, initial free distribution may help establish a culture of bed net usage (and hence generate future demand and new markets for bed nets). The ITFDE noted that many market analyses suggest the poorest of the poor (10-20% of the population) are unable to purchase nets.
5. Long-lasting impregnated nets (LLINs) appear to be the preferred type of ITN for controlling malaria, because of the logistical and cost considerations involved in retreatment of conventional ITNs. Some evidence now suggests that LLINs that cost about US\$5.50 may last and be effective for up to 8 years. However, any ITN is preferable to no ITN, and an intact, untreated bed net is preferable to no bed net.
6. Tanzania, Zambia, Eritrea, Malawi and Togo provide evidence which suggests that rapid scale up of ITN usage quickly is possible, and may yield substantial impact on malaria infection and anemia, as well as on infant and under five mortality rates.
7. In most African countries, weak public health infrastructures and national level coordination require strengthening in order to help achieve good ITN coverage, as well as to implement other components of the RBM strategy for malaria control. Integrating ITN distribution with routine or campaign immunizations, mass drug administration (MDA), and/or antenatal clinics are some of the strategies that have been used successfully to rapidly scale up ITN distribution, while simultaneously improving the quality and delivery of public health services.
8. More work needs to be done to develop systems for re-impregnating ITNs once they have been distributed.
9. More operational research to compare the costs, coverage achieved, disease impact, and any reciprocal benefits or adverse effects of adding ITN distribution to EPI, MDA (such as deworming) or other interventions is needed, including assessment of the impact of mass ITN distribution on transmission of other vector borne diseases, such as lymphatic filariasis. The

Program to Eliminate Lymphatic Filariasis is a natural ally of ITN distribution for preventing malaria, especially in sub Saharan Africa where the vectors are predominately *Anopheles gambiae* complex and *Anopheles funestus*.

10. Reliable estimates are needed of the demand for LLINs, including purchase, supply chain and distribution capacity of endemic countries and their partners.
11. Research is also urgently needed to find other insecticides and combinations of insecticides that can be used to impregnate bed nets, given the risk of development of resistance to the current insecticides classes being used on ITNs.