

Report on the

**Intercountry workshop on scaling up  
insecticide-treated bednet implementation for  
the control of malaria and other vector-borne  
diseases in the Eastern Mediterranean Region**

Abha, Saudi Arabia  
18–20 October 2003



World Health Organization  
Regional Office for the Eastern Mediterranean

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World Health Organization  
Regional Office for the Eastern Mediterranean  
Cairo  
2005

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## 1. INTRODUCTION

Insecticide-treated bednets are an essential component of the integrated vector management strategy for the control of vector-borne diseases in the Eastern Mediterranean Region. In the Region and in countries having a huge burden of vector borne diseases, insecticide-treated bednets are being implemented with the support of ministries of health and nongovernmental organizations. The implementation of insecticide-treated bednets in these key countries is uncoordinated and the coverage and re-impregnation rates are low. There is very little hope that this powerful intervention will have an impact on the burden of vector-borne diseases.

For this reason, the World Health Organization's Regional Office for the Eastern Mediterranean (WHO/EMRO) organized an intercountry workshop on scaling-up insecticide-treated bednets implementation for the control of malaria and other vector-borne diseases in Abha, Saudi Arabia from 18 to 20 October 2003. The objectives of the meeting included reviewing the current status of insecticide-treated bednets implementation for malaria in the Region, adoption of the global insecticide-treated bednets strategy for scaling-up implementation; and assisting countries to develop and finalize national strategic plans for insecticide-treated bednets implementation.

The meeting was attended by WHO staff from the Regional Office, headquarters and country offices and by delegates from Afghanistan, Djibouti, Pakistan, Saudi Arabia, Sudan, Syrian Arab Republic and Yemen. Representatives of Oxfam GB, a nongovernmental organization, and a number of private sector companies (Vestergaard Frandsen, Sumitumo Agro International LTD, Siam Dutch Mosquito Netting Co, Bayer Environmental Science, Arabian Company for Chemical Products) participated in the workshop and exhibited their new products. The meeting programme and list of participants are attached as Annexes 1 and 2, respectively.

The meeting was opened by Dr Hussein A. Gezairy, WHO Regional Director for the Eastern Mediterranean. In his address, Dr Gezairy stressed the role of insecticide-treated bednets in the context of the implementation of the integrated vector management strategy for the control of malaria and other vector-borne diseases in the Region. He emphasized the importance of Member States finalizing their national insecticide-treated bednets strategic plans, as this would not only provide a vision but also assist in resource mobilization. The full text of Dr Gezairy's address is attached as Annex 3. His address was followed by a welcome message from H.E. Dr Hamad Bin Abdullah Almanee, Minister of Health, delivered by Dr Yagoub Y. Al-Mazrou, Deputy Minister of Health, Saudi Arabia. Mr Mohammad A. Al-Ziad, Deputy of Emaret Aseer region, welcomed the participants to Abha and wished them successful deliberations during the workshop. The meeting was co-Chaired by Dr Suleiman Ben Mohammad Al Sagheer (Saudi Arabia) and Dr Lama Jaalouk (Syrian Arab Republic).

Dr Hoda Atta, Regional Adviser, Roll Back Malaria, WHO/EMRO briefed the participants on the objectives of the meeting, the method of work and the expected outcome of the workshop. During the 3-day workshop, all participants and experts

from the various institutions discussed the current status of vector-borne disease burden, prevention and control, globally, regionally and nationally. Facilitators of the workshop supported the countries in finalizing locally, feasible and effective insecticide-treated bednet implementation strategies to enhance coverage and achieve better disease control.

## **2. TECHNICAL PRESENTATIONS**

### **2.1 Scaling-up insecticide-treated bednets in the context of integrated vector management in the Eastern Mediterranean Region**

*Dr Abraham Mnzava*

Vector-borne diseases are a major public health problem in the Region. Around 11% of the global burden of vector-borne disease is found in the Eastern Mediterranean Region, where only 8% of the global population lives. Of these diseases malaria contributes the greatest burden. Other vector-borne diseases include leishmaniasis, lymphatic filariasis, a number of arboviruses (dengue, Rift Valley fever) and onchocerciasis.

Implementation of vector control is faced with a number of challenges. For example, the choice of vector control options is a problem in countries of conflict, of which four in the Region are also endemic for vector-borne disease. Generally implementation of vector control is faced with operational and technical problems such as low coverage rates, untimely application of control measures, products that do not meet WHO specifications, and measures that are not targeting more than one vector-borne disease. There is also weak national capacity in entomological surveillance, including insecticide resistance and vector distribution.

To address the challenges of implementing vector control, the Regional Office recently developed a regional strategic framework on the integrated vector management approach. Integrated vector management is defined as a process of evidence-based decision-making procedures aimed to plan, deliver, monitor and evaluate targeted, cost-effective and sustainable combinations of regulatory and operational vector control measures, with a measurable impact on vector-borne disease transmission risks, adhering to the principles of subsidiarity, intersectorality and partnership. Integrated vector management provides a strategy that can best ensure the continued effectiveness of alternatives, because it does not rely on one control option but combines different methods appropriate to local conditions.

In terms of scaling-up the use of insecticide-treated bednets in the context of integrated vector management, the Region has limited experience with insecticide-treated bednets. Moreover, coverage rates of insecticide-treated bednets is very low therefore, as part of going to scale, clear outcomes are needed, such as increased coverage of insecticide-treated bednets for epidemiological impact as well as increased re-treatment rates and/or the use of long lasting insecticidal nets.

To achieve these outcomes, countries need national strategic plans for insecticide-treated bednets, with clear vision about who is being targeted and how; a goal as to what the strategy will contribute to the reduction in disease burden; an implementation strategy with defined roles for nongovernmental organizations, and public/private partnerships; and coordination at national level through the establishment of a national steering committee to plan, implement and monitor and budgeting for cost. The meeting is convened to finalize such plans, which will provide long-range vision and assist countries in mobilizing additional resources.

## **2.2 Global framework for scaling-up insecticide-treated netting programmes**

*Dr M K Cham*

Insecticide-treated netting materials are a powerful public health tool and can have a substantial impact on malaria and other vector-borne diseases in endemic countries: regular use by young children in Africa can reduce their overall risk of dying by 20%, and the number of clinical malaria episodes by 50%. Promoting insecticide-treated bednets is therefore a key approach to reducing malaria mortality and morbidity.

The strategic framework is intended to help in the implementation and further development of national insecticide-treated bednet strategic plans. It reviews some of the generic issues of financing and distribution, and how limited public sector resources can best provide the maximum possible long-term public health benefits during the integration of public and private sector activities. It offers suggestions and guidance as to how the various partners can better understand their different roles in the overall process, how they can help and avoid hindering the efforts of other partners, and how they can work together in a constructive and complementary fashion.

Short-term additional funding must be used to build a sustainable system that guarantees access to insecticide-treated bednets for the most vulnerable, while exploiting the entrepreneurial spirit and efficiency of the private sector. Planning such a system raises important issues concerning subsidies and the interaction between public and private sectors. The framework examines the lessons learnt from previous insecticide-treated bednets projects, and reviews the broad strategic options for maximizing the health impact of publicly-funded subsidies as well as considering the best way to encourage the growth of a vigorous, competitive private sector.

Well-developed commercial markets are relatively efficient as a means of distribution of insecticide-treated bednets. Experience suggests that buying and selling nets and insecticide supplied through publicly-funded projects is more expensive than through commercial channels. A publicly-funded supply of nets can also inhibit the growth of unsubsidized commercial markets, because people who would have otherwise bought in the free market buy subsidized nets instead.

The framework proposes two key elements for the future: sustained subsidies strictly targeted to vulnerable groups, and a strengthened and expanded commercial market that provides insecticide-treated bednets at the lowest possible prices for the general population. Some of the public sector actions required to bring this about are essentially temporary; others must be sustained in the long term. A national insecticide-treated bednets task force or steering committee, including a variety of public, private and nongovernmental organization partners, can help to facilitate negotiation and coordination in this scaling-up process.

Subsidies must be targeted to achieve the maximum possible health impact. There is an urgent need to identify effective mechanisms and clearly define target groups. Targeting pregnant women in intense transmission areas through antenatal clinics is an attractive option, since protection benefits will later extend to the young child while it sleeps with its mother. The form of the subsidy must also be considered. Separating the subsidy from the goods is preferable since it tends to encourage the development of a healthy commercial insecticide-treated bednets market.

Commercial market growth requires public sector assistance, firstly through the provision of an “enabling environment” (including the removal of taxes and tariffs and streamlined regulation of insecticide products), and secondly through a vigorous campaign of generic demand creation using a variety of approaches and media.

Where the commercial market is not yet well developed, some form of “marketpriming” may be needed. This is a temporary, transitional intervention involving the procurement and distribution of insecticide-treated bednets goods, and aimed at strengthening unsubsidized distribution channels. Market priming must be time-limited, in order to avoid displacing independent commercial activity and creating a system dependent on subsidy. It must be evaluated in terms of its impact on the market as a whole.

The public–private balance may be different for nets and for insecticides. There is a much stronger case for subsidies on insecticide. It may therefore be appropriate to plan a different balance between the public and private sectors for insecticide distribution with a stronger role for subsidy through publicly-funded channels. The introduction of nets pre-treated with long-lasting insecticide treatment is also likely to create new opportunities.

Although previous insecticide-treated bednets projects have yielded valuable lessons, progress towards large-scale coverage has been slow. Many countries now recognize the need for coordinated national programmes rather than local, time-limited projects. This framework deals specifically with the situation in Africa where the majority of the population is at risk of malaria, unlike Asia where malaria risk is localized.



The framework outlined here represents the consensus of the Roll Back Malaria technical support network on insecticide-treated bednets, including representatives of major donors. It concerns broad strategies rather than detailed tactics, reviews the strategic options and makes recommendations based on experience. It is intended for use by country-level Roll Back Malaria partnerships in the implementation and further development of national-level strategies and programmes and as a framework for coordinating the activities of different agencies and sectors. Its approach is pragmatic and its goal to ensure that public health expenditure on insecticide-treated bednets has the maximum possible public health impact, especially among those most vulnerable to malaria.

A shared vision for the future entails that the majority of people exposed to malaria (and other vector-borne diseases) should own and use a net that is either pre-treated with a long-lasting insecticide or is regularly re-treated. The majority of these nets will be purchased in the commercial market. The most vulnerable to malaria will be able to obtain nets at prices that are subsidized by the government, preferably through a system that uses public channels for delivery of the subsidy, but uses commercial distribution channels for delivery of the goods.

The strategic framework and options suggested are not intended to be a rigid prescription for a regional programme or plan of action. Rather, they are intended to guide the further development of national insecticide-treated bednets strategies, and to assist the process of ensuring coordination and complementarity, necessary to maximize the health impact of both public resources and commercial activities.

It is important to acknowledge that there remain important gaps in planning—for example, the medium-term strategic options and methods for ensuring public-private complementarity are reasonably clear in the case of nets and net coverage, but much less so in the case of insecticide treatment and re-treatment.

More generally, there is an urgent need to develop and disseminate indicators for monitoring the implementation of scaling-up programmes, including operational processes, coverage and impact. Useful indicators have already been developed in some cases, such as measuring insecticide-treated bednets coverage and use at household level, and are beginning to be widely used, although the resulting data are not yet thoroughly analysed. In other cases, monitoring tools and appropriate indicators are still being explored. These include indicators for the evaluation of targeting methods, and monitoring commercial market development; in particular the impact of public sector activities such as tax and tariff changes and market priming supplies.

It is therefore anticipated that the framework will continue to evolve, not only as a result of the advent of new technologies (e.g. long-lasting insecticide treatments), but also as more experience and a better understanding is gained of the process of scaling up.

### 2.3 Long-lasting insecticidal nets: current status and programmatic issues

*Pierre F. Guillet*

A long-lasting insecticidal net is one which has been treated at factory level with insecticide either incorporated into or coated around its fibres. It resists multiple washes and the biological activity lasts as long as the net itself (3 to 4 years for polyester nets, 4 to 5 years for polyethylene ones).

From various studies there is converging evidence that after three to five washes insecticide is removed from nets that have been treated by conventional dipping. Under programme conditions, unless nets can be systematically re-treated after three washes as recommended by WHO, the protective efficacy provided by conventionally treated nets might be considerably lower than expected, especially if nets are frequently washed (e.g. once a month).

Recently, preliminary investigations have shown that during dipping, coloured polyester nets may load much less insecticide than white nets, therefore not having the expected level of efficacy or losing their efficacy after even the first wash. This phenomenon is being investigated and until a practical solution is proposed the use of white nets is preferable.

It has recently been shown that polyester, factory pre-treated nets other than long-lasting insecticidal nets have quite variable insecticide dosages, usually much lower than expected (including white nets). WHO is advising programmes to avoid ordering factory pre-treated nets other than long-lasting insecticidal nets.

Long-lasting insecticidal nets offer a practical solution in terms of wash-resistance, safe use of coloured nets and purchase of ready-to-use pre-treated nets, pending fulfilment of specifications. So far, quality-control checks carried out by WHO and the United Nations Children's Fund (UNICEF) with the two long-lasting insecticidal nets either recommended or under testing by WHO have shown excellent compliance to specifications on both insecticide treatment and netting specifications.

**Olyset Net** is a polyethylene net with 2% permethrin incorporated within the fibre. Over time, insecticide migrates to the surface of the yarn, replacing that which has been removed by washing. As migration is a temperature dependent process, exposure of nets to heat after washing (e.g. a few hours in the sun) can accelerate it. After up to 5 years of continuous use in the field, Olyset nets still contain 50% of the original permethrin content. Around 65% of the nets have still the full efficacy as defined by WHO (either 95% knockdown or 80% mortality, respectively, 1 hour and 24 hours after a 3-minute exposure). After 7 years, the permethrin content was still 35% of the original content. No more than 20% of the nets were still effective in killing mosquitoes (based on a 3-minute exposure). However, when these 7 year-old nets were tested in tunnels (free flying mosquitoes having to pass through a holed

netting to reach the bait and take a blood meal), the average mortality was 56.8% and the blood-feeding inhibition as high as 92%.

Olyset nets are effective in providing personal protection against malaria vectors for at least 5 years and its use is recommended by WHO. It is yet unclear to what extent Olyset nets can provide consistently high mortality of mosquitoes throughout this 5-year period, especially if nets are washed frequently or the air temperature is relatively low (slowing down migration of permethrin). Exposing an Olyset net to the sun after washing, as previously recommended by the manufacturer, would certainly increase the killing effect on mosquitoes (accelerating permethrin migration). However, this would not be practical. In addition, it may shorten the duration of the protective efficacy so that it is shorter than the lifespan of the net itself. Therefore, WHO does not recommend heating Olyset nets after washing.

A high mortality rate of vectors would be needed only when the objective of the programme is to achieve community protection through mass impact of the treated nets on the mosquito population. However, it should be stressed that such protection, equivalent to that obtained with indoor residual spraying, can be achieved only if a very high proportion of the human population (e.g. greater than 80%) is effectively protected by nets treated with an insecticide that kills mosquitoes.

*PermaNet* is a polyester net treated with 55 mg/m<sup>2</sup> deltamethrin. Insecticide is diluted in a wash-resistant resin that coats the fibres. PermaNet is claimed to resist 20 standard washes. A first PermaNet was submitted to WHO for evaluation in 2001. However, field results have been variable due to the heterogeneous quality of the product. A new generation, PermaNet 2, was submitted for evaluation in 2003. Results will be reviewed by WHO in December 2003 and recommendations on its use made accordingly. PermaNet is available in white as well as in other colours.

Following WHO suggestions, the company has developed a strict quality control scheme: on every batch undergoes chemical analysis, high-performance liquid chromatography (HPLC) and a wash resistance test. Quality control results are provided to customers with the corresponding batch number labelled on every net. The company offers a free service for follow-up of insecticide concentrations on nets in use. Samples have to be collected by programmes (e.g. after 1 year) and sent to the company for analysis. Based on the actual concentration, a prediction is made on the expected life duration of the treatment and is rapidly sent back to users.

A number of other long-lasting insecticide treated nets are under development. Incorporation of pyrethroids into conventional netting fibres (polyester, polypropylene) will soon facilitate access of many net producers to the long-lasting treatment technologies. Another attractive technology recently developed is treatment kits that can be used in the field by simple dipping and which provide a true wash-resistant treatment. This technology will be extremely useful for the treatment of the many nets currently in use.

The incorporation technology has been applied for the treatment of plastic sheeting used in emergencies. Plastic sheets are the first item provided to refugees. With insecticide incorporated, this sheeting becomes a ready to use tool providing protection against malaria and reducing fly populations during the acute phase of any emergency which lasts usually around 6 months. This product has been tested by WHO under phases one and two and is now under large-scale field testing in Africa. Preliminary results have been very encouraging. A similar technology is being developed to produce films for roof or wall lining used to improve precarious habitats (including slums), providing protection against endophilic vectors and domestic pests in addition to improving domestic comfort. Such a product may supplement or replace insecticide-treated bednets or indoor residual spraying when these tools cannot be used. Long-lasting treatment technologies are also being developed to produce repellent clothing for outdoor personal protection against bloodsucking arthropods.

On the purchase and use of insecticide-treated bednets, control programmes are advised to:

- Stay aware of WHO recommendations (regular updates on long-lasting insecticidal net or technical information on netting materials and insecticides);
- use WHO recommended long-lasting insecticidal net, especially if difficulties in ensuring proper re-treatment rates are anticipated;
- avoid purchase of factory pre-treated nets other than long-lasting insecticidal net;
- purchase non-treated nets with insecticide treatment kit(s) in case long-lasting insecticidal net are not available or are not preferred,
- use insecticide-treated bednets for multi-disease prevention (e.g. malaria plus leishmaniasis or lymphatic filariasis) if possible;
- check, whenever possible, quality of nets and insecticides using WHO specifications;
- ensure regular re-treatment of conventional nets already in use, preferably providing treatment free and, once available, using the new long-lasting dipping treatment kits.

#### **2.4 Implementation of culturally compatible insecticide-treated bednets in Sudan**

*Ms Jane Bean*

In the Upper Nile state of Sudan, malaria transmission is perennial, with seasonal peaks. The Neur population are pastoral nomads who migrate in cattle camps

to water sources during the dry season. Bednet choice is a result of strongly-rooted cultural and practical determinants. *Dumuria*, which is locally made non-transparent cotton net, is mostly preferred by local inhabitants. These nets are multifunctional; in the wet season they are used for protection against mosquito bites and in the dry season they are used as tents, wraps and sheets in the cattle camp.

This type of net gives added privacy, helps protect users from wild animal attacks, keeps out dust, and is durable and portable. The *dumuria* is usually hung and tucked correctly under a sleeping mat.

The effectiveness of culturally compatible *dumuria* as a tool against malaria is low if it is not treated. It is too small to accommodate two adults but will cover one adult and two children, or alternatively three children. When users get up to go outside at night, mosquitoes enter. To overcome this, a trial of three types of insecticide-treated nets was conducted to identify a culturally compatible, insecticide-treated and technically improved bednet for use among the Neur in upper Nile, southern Sudan.

Oxfam GB and partners developed two prototypes that conformed to the identifiable cultural and practical determinants of bednet choice among the Neur. The prototypes were improved technically by insecticide treatment (PermaNet, Olyset) and by exchanging polyester for cotton. Trials were conducted in the context of a community-based information, education and communication (IEC) campaign that maximized community participation by focusing on capacity building and awareness raising using culturally appropriate and participatory methodologies.

The results indicated that 95% preferred 100% polyester insecticide-treated bednets and they were used effectively by more than 90% of the households. The community demonstrated increased informed demand and behaviour that favoured the use of this technology. The IEC campaign maximized community involvement, implemented through a cascade structure using participatory and culturally appropriate methodologies. The nets were exposed to ultraviolet light during the dry season which reduced the efficacy of the insecticide; thus, studies will be carried out using an ultraviolet filter applied during the treatment of nets.

## **2.5 Monitoring access and usage of bednets: the key to results-based programming**

*Asiya Odugleh/WHO Mediterranean Centre for Vulnerability Reduction*

Programme monitoring is a type of evaluation that applies social research to judge and improve programmes. The results inform programme management, strategic planning and resource allocations. Programme monitoring has two main purposes: to improve programmes by identifying those aspects that are working according to plan and those that are in need of mid-course corrections, and to track (and demonstrate) results at the programme or population level. Programme

monitoring should not be confused with impact evaluation, which looks at whether results at the population level can be directly attributed to the programme interventions. Early planning for programme monitoring will help focus priorities, use resources more effectively and make it easier to show results.

Within the Region, Sudan accounts for half of all malaria cases and nearly three quarters of all malaria deaths. Within Sudan, more than a third of all outpatient attendances and up to one third of the annual inpatient attendance is attributable to malaria. Malaria accounts for one-fifth of working days lost, with people spending between US\$ 5.2 and US\$ 17.2 on malaria. Studies show that net ownership, net usage and re-treatment rates are extremely low. At the current rate, it will take 37 years before there are enough insecticide-treated bednets for the most vulnerable groups.

The broad behaviours being promoted are to obtain, use and re-treat bednets with insecticide. This means services must be easily accessible and available and that new habits that address the needs and requirements. Of vulnerable groups must be encouraged in identifying monitoring requirements, it helps to have goals, objectives and activities that are easily monitored. Communication for behavioural impact (COMBI) is a behaviourally focused social-mobilization strategy that Sudan will implement. COMBI applies communication actions to engage individuals and households actively so that they consider recommended behaviours. It creates opportunities for reflection in a variety of “communication settings” while tackling access to insecticide-treated bednets and re-treatment services. The key activities are: administrative mobilization, community mobilization, personal selling (interpersonal communication), advertising and point-of-service promotion. In applying programme monitoring there are three key considerations that are critical:

To plan early and operationalize purpose objectives, link indicators to the programme objectives, link indicators to the programme objectives and link sources of data to the indicators and objectives.

The more clearly defined the achievement objectives the easier it will be to monitor. The focus should be on the behavioural objectives. This will vary between programmes as it is dependent on the country situation. In the case of Sudan, the overall goal is to contribute to a 40% decrease in mortality and morbidity by 2010. They are going to do it (the purpose objectives) by ensuring that three quarters of a million children under the age of five years, and 216 000 pregnant women in 12 states, sleep under insecticide-treated bednets during two periods of time in 2004 and 2005. Steps will also be taken to ensure that nearly a million householders re-treat their bednets at designated “bednet insecticide treatment sites” between June and July 2005 through 48 fixed and 48 mobile “bednet treatment sites”.

Clarity with regard to the objectives helps in formulating outputs which are the results obtained at the programme level through the execution of activities using

programme resources such as training, logistics and management. They also assist in formulating outcomes, the set of intermediate or long-term results expected to occur at the population level due to programme activities and the generation of programme outputs such as an increase in the number of bednets per household, an increase in the number of bednets re-treated and a reduction in under-five fatality rates.

Indicators are variables that measure different aspects of a programme that relate to the inputs, processes, outputs and outcomes. It is important to identify key questions to address and match with the appropriate indicators. The questions must be clearly defined, designated to measure the quantity, quality and cost of each programme area.

The sources of data will vary depending on what is available. There may also be special studies that are required such as monitoring the change in perceptions and knowledge that will affect the behavioural outcomes. There should be several sources of data to cross check results and they should address each of the programme components.

The key challenges facing insecticide-treated bednet programme managers in implementing programme monitoring for access and utilization of insecticide-treated bednets are coordination, management and resources. Insecticide-treated bednet programmes involve multidisciplinary teams, Ministry of Health personnel, research institutions, nongovernmental organizations and United Nation agencies, and the activities and monitoring of these activities need to be coordinated and managed. Programme monitoring will need to be done throughout the implementation period and as data are gathered and analysed at agreed intervals. It is important to have someone who is designated to oversee the monitoring and evaluation component. Resources to enable monitoring and activities should be allocated.

Implementation of programme monitoring must be progressive and sustained. It is important to re-visit the section on monitoring and evaluation in the manual for insecticide-treated bednet programme managers and review the monitoring components in national plans. A summary of the Sudan COMBI plan and the suggested monitoring and evaluation framework, with key indicators and sources of data are available.

## 2.6 Operational research: the key to scaling up insecticide-treated bednets in the Region

*Dr Amal Bassil*

The main objective of the Regional Office's operational research programme is to support projects that will decrease the burden of communicable diseases in the Region. It also aims at strengthening the research capacity of the Region's researchers, monitoring and evaluating the implementation of research results by the control programmes of the ministries of health, and disseminating research results. The Small Grants Scheme has expanded considerably since its inception in 1992. This is reflected in an annual increase both in the number of proposals submitted and in the number accepted for funding. During the period 1992–2001, the topics were confined to tropical diseases included in the research agenda of the UNDP/WHO/World Bank Special Programme for Research and Training in Tropical Diseases. In 2002, the scope of the Scheme expanded to cover all communicable diseases.

An annual call for applications is issued which specifies research priorities that reflect the challenges facing disease control. Selection of proposals for funding takes place during a selection committee meeting. Technical support is delivered in proposal development, data management and report writing. The process of results dissemination takes place through the website, <http://www.emro.who.int/tdr> and publications.

Only four projects on impregnated bednets were funded by the Scheme in earlier years. Two were testing the efficacy of insecticide-treated bednets in Sudan and the Syrian Arab Republic for cutaneous leishmaniasis and malaria, respectively. The third project, from Pakistan, was evaluating a social marketing approach for promoting the use of insecticide-treated bednets in rural Islamabad. The fourth project, from the Islamic Republic of Iran, was studying the stability and wash-resistance of locally-made mosquito bednets treated with pyrethroids against malaria vector *Anopheles stephensi*.

Research priorities for insecticide-treated bednets varied according to the stage of the countries implementation of the scaling-up of insecticide-treated bednets strategy. The research priorities presented consisted of studies that would provide baseline information before the initial implementation of the scaling-up of the insecticide-treated bednet strategy for integrated vector control management in the Region. These studies would investigate one or more of the following topics:

- vector biology and behaviour and their relation to bednet use
- net availability
- proportion of population already having nets
- net cost, type used and preferred
- insecticide availability
- proportion of population treating nets



- constraints/determinants of insecticide-treated bednets use and community beliefs regarding insecticide-treated bednets
- ability and willingness to pay assessment for insecticide-treated bednets
- knowledge, attitudes and practice studies to determine what topics promotional messages should focus on and how best to promote insecticide-treated bednets.

Surveys that would assist the scaling-up of insecticide-treated bednet strategies for integrated vector-control management in the Region would investigate one or more of the following topics:

- studies evaluating household coverage
- studies on operational issues of distribution and financing insecticide-treated bednets
- operational factors that might influence the insecticide efficacy
- intervention studies to increase coverage and sustain insecticide-treated bednet use and/or to increase compliance to the use of insecticide-treated bednets
- studies evaluating the effectiveness of insecticide-treated bednets under real life conditions
- identification of sustainable delivery mechanisms for insecticide-treated bednets and for net re-treatment
- testing innovative social marketing strategies to promote insecticide-treated bednets.

## **2.7 Developing new tools for malaria prevention in acute phase complex emergencies**

*Mikkel Vestergaard*

More than one-third of the total annual malaria deaths around the world occur among people affected by complex emergencies. The acute stage of emergencies, when people are at greatest risk, may last for several months. In these situations, where international organizations are the main provider of essential services, the focus is on life-saving operations, and disease-prevention interventions tend to be implemented much later. Resource, time and operational constraints reduce the suitability of available prevention strategies such as insecticide-treated nets and residual spraying normally used for malaria control. Consequently malaria and diarrhoea (transmitted by flies) remain largely unaddressed.

To bridge the gap between the acute phase of the emergency and the time when proper infrastructure is established in a camp to provide longer-term control systems, insecticide-incorporated plastic sheeting has been developed as a dual-function tool providing shelter and malaria prevention.

Using shelter equipment as a malaria control tool has the following advantages:

- Emergency shelter material such as plastic sheeting, tents and blankets are often the first thing on ground, and malaria prevention therefore commences with immediate impact.
- In acute emergency situations when death rates are high, the priorities of the displaced families focus on the most tangible issues related to survival, giving high acceptance and retention to shelter.
- It adds value by providing an increased speed of response and is cost effective, as the malaria prevention tool is incorporated into a product already being sent to the field;

The insecticide-incorporated plastic sheeting was developed in a new type of partnership, involving a private sector company, Vestergaard Frandsen, as the builder of the product, the WHO as the tester of the product and nongovernmental organizations and the Office of the United Nations High Commissioner for Refugees as the user of the product. The concept of bringing the builder, the tester and the user together from the inception of the project created a unique opportunity for an innovative partnership with the potential to change the health management of the displaced.

## **2.8 Social marketing: a strategy for scaling up of insecticide-treated bednets**

*Mikkel Vestergaard*

This presentation focused on the scaling-up of insecticide-treated bednets within the Roll Back Malaria strategic framework through social marketing. The basis for scaling-up of insecticide-treated bednets is a clear vision and an agreed strategy. This is where the global insecticide-treated bednet strategic framework serves as a guide and an inspiration at national level.

At the heart of the global insecticide-treated bednet strategic framework is a very useful model, designed in an attempt to locate the balance between the subsidized intervention, and the development of a commercial market, while serving as a timeline where markets are nurtured and gradually mature from subsidized malaria interventions to accepting insecticide-treated bednets at market value.

Finding the right platform for a national insecticide-treated bednet strategy is challenging. Some countries are ready for semi-commercial programmes, while others need to begin with free distribution or highly subsidized distribution of insecticide-treated bednets, forming the basis for a transitional market for insecticide-treated bednets into a vibrant commercial market. This is where social marketing as a strategy for scaling-up of insecticide-treated bednets comes into the picture.

Whereas a number of social-marketing organizations have embarked on the transition phase in some countries in Africa, the question is whether this strategy is

indeed cost-effective. Information is needed on the effectiveness of this strategy compared to other strategies of distributing and financing insecticide-treated bednets.

## **2.9 Strengthening national vector control capacity**

*Dr Abraham Mnzava*

In the Eastern Mediterranean Region, vector-borne diseases contribute significantly to disease burden. For the prevention and control of these diseases, the Region has substantially relied on the use of insecticides. Although very few countries still use DDT (mainly for diseases outbreak response), in recent months WHO has received requests to use it, suggesting the high potential to revert to DDT.

Indeed countries have shifted to alternative insecticides (mainly pyrethroids) and also to alternative strategies such as the use of insecticide-treated bednets and larvivorous fish. However, their implementation requires coordinated support and strengthening. To achieve this, especially in the context of scaling-up of insecticide-treated bednets at country level, implementation of integrated vector management seems to be the most viable option. To implement this strategy for maximum benefit of limited resources and for the protection of human health and the environment, additional resources are needed.

Jointly with WHO/HQ and the United Nations Environmental Programme (UNEP), the Regional Office has identified the Global Environmental Facility (GEF) as a potential source of funding. Parties and signatories to the Stockholm Convention are eligible for substantial funding to assist them to implement vector control aimed at sustainable reduction and elimination of the reliance of pesticides including DDT. In the Region, a total of 16 countries have signed the Convention, and three have ratified it. In essence the 16 countries are eligible for GEF funding and part of such resources could be used to scale up implementation of insecticide-treated bednets as a key component of integrated vector management.

The process of accessing these funds involves the development of a Concept paper, which was initially shared with UNEP/GEF in Tunis in October with the recommendation to develop a PDF-B proposal (up to one year) for submission in January 2004. The PDF-B proposal of up to US\$ 1 million allows the recipient to prepare a full project proposal of several million dollars depending on the size of the project.

The objectives of the regional project proposal are to:

- reduce the reliance on DDT in countries that still depend on the insecticide for disease vector control through the development and strengthening of alternative control strategies, including pesticide management in agriculture;

- assist countries in meeting the provisions of the Stockholm Convention with regard to minimization of exposures and stockpile accumulation; reporting and developing action plans relevant to the use of Persistent Organic Pollutants for disease vector control;
- prevent the reintroduction of Persistent Organic Pollutants pesticides in public health in countries that are at risk of reverting back to the use of DDT;
- establish institutional arrangements to support integrated vector management on a sustainable and cost-effective basis;
- contribute to the reduction of mortality and morbidity due to malaria and other vector-borne diseases by supporting the implementation of integrated vector management; and
- support enabling activities towards the development of a national action plan on DDT as part of implementation plans on Persistent Organic Pollutants (as specified in Article 7 of the Stockholm Convention).

The scope of the proposed project will include, but not be limited to:

- development of capacity for planning and implementation of integrated vector management.
- integrated vector management option selection based on eco-epidemiological evaluation
- implementation of vector control interventions
- monitoring and impact assessment
- policy and institutional framework
- strengthening of health infrastructures
- pesticides management (including stockpiles and judicious use)
- regional coordination for effective dissemination and sharing of country experiences
- enabling activities on national implementation plans on DDT/vector control and implementation plans on persistent organic pollutants.
- exploring and testing the potential for farmer field-schools on integrated pests and vector management to combine pesticide management for agriculture and health.

The criteria for participation of countries in the proposed project will include:

- party to the Stockholm Convention on Persistent Organic Pollutants (currently 16 countries)
- level of vector-borne disease burden
- current use of persistent organic pollutants pesticides in disease vector control and potential for re-introduction

- level of need for strengthening vector-borne disease control infrastructure, e.g. countries under conflict
- countries experiencing illegal importation/use of persistent organic pollutants, lacking facilities for proper transportation and storage of insecticides, including stockpiles.

### 3 COUNTRY PRESENTATIONS

#### 3.1 Afghanistan

Malaria is the most prevalent communicable disease in the country with an estimated 2–3 million cases in a population currently estimated at 21 million. About 70%–80% of the cases are caused by *Plasmodium vivax* and the rest are due to *Plasmodium falciparum*, *Anopheles stephensi* and *An. culicifacies*. There has been a significant rise in the number of cases during the past two years. This is mainly due to mass population movement and displacement, disruption of health care services due to war and bad security, breakdown of national vector control programmes and, importantly the evolution of drug-resistant *P. falciparum* malaria.

Besides malaria, anthroponotic cutaneous leishmaniasis is another important vector-borne disease transmitted by *Ph. sergenti*, mainly affecting the urban population in eastern, central, northern and western parts of the country. Kabul suffers the most from high rates of cutaneous leishmaniasis in Afghanistan, prevalence surveys conducted in September 2001 showed that 3% of the population had active cutaneous leishmaniasis and that a further 26% has had cutaneous leishmaniasis. Around 71% of the population in most major cities is at risk of leishmaniasis.

Zoonotic cutaneous leishmaniasis transmitted by *Phlebotomus papatasi* is endemic in northern parts of the country, Mazar-e-Sharif and the surrounding area in particular. The Ministry of Public Health and partner nongovernmental organizations are involved in diagnosis and treatment of malaria and leishmaniasis through 14 malaria reference centres and village-level, primary health care facilities across the country.

In the early 1990s, the Ministry of Public Health, in collaboration with WHO and Health Net International, launched a large-scale insecticide-treated bednet implementation programme in highly endemic areas across the country. In the initial stage of the programme, insecticide-treated bednets were evaluated for efficacy against malaria and leishmaniasis. The results were conclusive; 70% of *P. falciparum*, around 40% of *P. vivax* and 67% cutaneous leishmaniasis cases were prevented by using insecticide-treated bednets in target areas.

Family size polyester insecticide-treated bednets have been sold from around 200 outlets run by the Ministry of Public Health, nongovernmental organizations and the private sector since 1993. The current nationwide coverage is above 400 000,

protecting 1.5 million individuals. Bednet related activities comprise: promoting the technique, increasing coverage Ministry of Public Health/nongovernmental organization clinics and Health Net International mobile teams, selling nets and insecticide sachets through the private sector and commercial network, reducing recurrent costs and encouraging community participation in the use and re-treatment of nets.

Nets are sold in the country through a very well controlled implementation mechanism using different pricing schemes under different epidemiological and socioeconomic conditions.

- Highly subsidized nets: epidemic prone, highly endemic areas identified through malariometric surveys are targeted with highly-subsidized nets (US\$ 2).
- Regular sale: nets are sold in areas with low and medium endemicity at US\$ 3.5.
- Branded nets: these different coloured nets are sold at cost in very low or non malarious areas through the commercial network. The price varies between US\$ 5–6.

Epidemic-prone areas, mainly in the eastern region, are targeted with additional control measures besides insecticide-treated bednets:

- larviciding with temephos
- environmental management of accessible and potential mosquito breeding sites
- larvivorous fish (e.g. *Gambusia*)
- blankets (*chador*) impregnation
- cattle sponging with pyrethroid in localities where *Anophele* mosquitoes are highly zoophilic.

Challenges facing the programme are:

- delays in establishing the proposed primary health care system, 60% of the population have limited or no access to formal health care;
- limited mobility of women (as health worker, household decision-maker and patients);
- problems in supplies due to limited road access to many parts of the country;
- low insecticide-treated bednet re-treatment rates due to insecticide shortages;
- absence of private sector participation to expand insecticide-treated bednet sales;
- continued insecurity and political instability in many parts of the country.

### 3.2 Djibouti

Djibouti which is a small country of 600 000 inhabitants was free of malaria in the beginning of the 20th century. The annual caseload was only a few cases mainly,

imported from neighbouring Ethiopia, Eritrea and Somalia. Indigenous cases started to rise in the late 1970s and during recent years the annual caseload increased an estimated number of 60 000–80 000; *P. falciparum* being the main species (98%) affecting Djibouti city. In the Tadjurah and Dikhil districts, *Anopheles arabiensis* is the main vector, posing a malaria threat to 60% of the country's population.

Since 1970s the use of insecticide for residual spraying and larviciding has been the mainstay of vector control programmes. Before 1990, the use of insecticide-treated nets was limited to individual initiatives. In fact, the Department of Epidemiology and Hygiene used to treat untreated nets brought by individuals free of charge.

In 1990, with technical assistance from WHO, the Department of Epidemiology and Public Hygiene carried out its first experience of providing insecticide-treated nets to the population. Initially, several workshops on how to treat nets with insecticides were organized for members of nongovernmental organizations and local associations. Insecticide treated nets were then distributed through nongovernmental organizations and local associations for a nominal price (US\$ 0.06). However, this experience did not last because of lack of follow-up.

In 1999, the Department of Epidemiology and Public Hygiene renewed focus on insecticide treated bednet use for individual malaria prevention through a campaign to sensitize the population in all five districts on the importance of the utilization of insecticide-treated nets.

In addition to the national authorities and WHO, other partners including USAID have assisted the Ministry of Health in promoting the use of insecticide-treated nets. Some nongovernmental organizations have taken the initiative to import insecticide-treated nets and to sell them to the population. However, this experience, although greatly appreciated, was limited to areas in which these nongovernmental organizations were operating.

Currently, the Department of Epidemiology and Public Hygiene is distributing insecticide-treated bednets free of charge in high-risk areas. The proportion of population sleeping under insecticide-treated bednets (including those distributed through the private sector) in high-risk areas is estimated at 10%. It is important to mention that no treated mosquito nets are available on the local market and the costs are about US\$ 8 for single and US\$ 10 for family-sized nets.

### **3.3 Pakistan**

Malaria is an important public health problem in the country claiming a heavy toll on human lives and productivity years. Of the total 140 million population, around 90% are at risk of contracting the disease. The estimated annual caseload is around half a million, of these around 100 000 patients are reporting to diagnostic and

treatment facilities in the public sector. The available incidence data suggests that 30% of the whole caseload is due to *P. falciparum* and the rest are all *P. vivax*. Malaria is highly focal in the country and most of the foci are concentrated in southern North-West Frontier Province (NWFP), Baluchistan and rural Sind, while Punjab is the least endemic. Annual parasite index during 2002 was recorded to be 0.69 cases/1000 population (Punjab 0.2, Sind 0.66, and NWFP 1.04, Federally Administrated Tribal Areas 4.42 and Baluchistan 4.7 cases per 1000 population). *Anopheles culicifacies* and *An. stephensi* are predominant important vectors.

Sporadic cases of cutaneous leishmaniasis were always present in the country. The first major outbreak was reported in 1975 from Multan district in Punjab province with 2500 cases recorded. Until 2000, cases could be found across the country in low numbers. In 2001–2002, the disease suddenly hit back; 11 700 cases were reported from two districts in Sind province and 1200 from a tribal area (Kurrum) in NWFP.

The developmental objectives of the national malaria control programme are to:

- reduce the burden of malaria by 50% by 2010.
- implement all elements of Roll Back Malaria in the whole country by 2006.
- fully integrate malaria, leishmaniasis and other vector-borne disease control programmes.

Although the national malaria control programme has mainly relied on insecticide residual spraying and fogging since the eradication era, during the past couple of years, the national malaria control programme and non governmental organizations in the country have been pilot testing insecticide-treated bednets efficacy and implementation strategies. A considerable reduction in malaria cases was demonstrated and implementation experience gained in pilot areas. The national malaria control programme now plans to gradually phase out indoor residual spraying and start the implementation of insecticide-treated bednets on a larger scale across the country. With the recently pledged financial resources from the Global Fund, the national malaria control programme in collaboration with national, and international nongovernmental organizations and WHO plans to:

- target 23 endemic districts with insecticide-treated nets adopting effective implementation and social marketing strategies.
- achieve 54% coverage during the next 4 years in target districts.
- re-treat 50% of nets being used in target districts.

### **3.4 Saudi Arabia**

Malaria is a major public health problem in Saudi Arabia. The disease is highly focal with foci mainly concentrated in southern and southwestern parts of the country. Gizan, Aseer, Mecca, Al Baha, Qunfoda and Taif are the regions faced with a low to mild degree of malaria transmission each year. *Plasmodium falciparum* is the



predominant species and *Anopheles arabiensis* is the main vector of malaria across the country.

Small-scale malaria control activities were initiated in 1948 by Arab American Oil Company in the eastern part of the country. In 1964 the Government of Saudi Arabia, with support from WHO, initiated an eradication programme and by the 1970s the disease was almost cleared from eastern and northern provinces. During the 1980s, malaria was no longer a major public health problem in western parts of the country and only small-scale residual transmission occurred inside the valleys of Hijaz and Aseer.

In 1998, malaria became a major public health problem in many parts of the country with a total of 31 844 cases from endemic areas, Gizan being the worse-affected region. The malaria control programme intensified its efforts and disease levels started coming down sharply; only 1886 cases were reported from the same areas in 2002.

The national vector-borne disease control programme has been fully integrated within the primary health care system since 1986. The malaria control strategy is generally in line with global Roll Back Malaria strategy.

Besides malaria, many parts of Saudi Arabia face the problem of other vector-borne diseases:

- Cutaneous leishmaniasis is endemic in central, eastern and southern areas of Saudi Arabia with an annual case load of 8000–14 000. Sporadic cases of visceral leishmaniasis (250–300 per year) are found in Gizan, Aseer and Medina Regions.
- Dengue fever, mainly transmitted by *Aedes aegyptii* is endemic in the western parts of Saudi Arabia (Jeddah). During 2003, 6 cases were reported from different regions of the country as compared to 18 cases in 2002.
- An outbreak of Rift Valley fever occurred in the Aseer and Gizan regions in 2000. There were reports of 886 cases with a 10% fatality rate.
- Sporadic cases of cutaneous myiasis being transmitted by the *Fly Cordylobia* were recorded in many Regions, mainly in Aseer, Mecca, Gizan, Al Taif, Nagran and Al Baha. Three cases were reported in 2003 as compared to 30 in 1999.

Highly endemic areas are being targeted with a variety of vector control interventions, mainly:

- larviciding using temephos, pyriproxyfen and diflubenzuron;
- limited biological control with *Bacillus thuringiensis* and larvivorous fish;

- residual spraying with deltamethrin and ICON;
- ultra low volume spraying during malaria transmission season;
- aerial spraying in swampy areas.

Insecticide-treated bednets are being distributed among high risk groups in remote endemic areas where none of the above interventions are implemented. During the past three years, 441 000 single, 320 000 double and 236 000 family-sized insecticide-treated bednets were distributed free-of-charge in highly endemic areas across the country.

The constraints are:

- poor re-impregnation rates due to non compliance;
- lack of multisectoral collaboration;
- no mechanism for monitoring and evaluation;
- no community participation in using nets properly;
- improper health education.

### 3.5 Sudan

Sudan is the country with the most malaria in the Eastern Mediterranean Region with an annual estimated caseload of around 7 million; *Plasmodium falciparum* accounts for above 90% of the total caseload. The degree of endemicity varies from hypo to holo in different parts of the country. Important vectors are *Anopheles gambiae* and *An. funestus*.

Beside malaria, leishmaniasis and lymphatic filariasis are also important vector-borne diseases across the country. Since joining the Roll Back Malaria initiative in 1999, the national malaria administration's main strategic objectives were to:

- develop partnerships among the stake-holders to achieve a sustainable malaria control in the country.
- build capacities for improved timely diagnosis and effective treatment of malaria cases, adopt low-cost and sustainable vector control interventions and establish a mechanism for timely detection of epidemics and its curtailment.

During 2001 and 2002, the national malaria administration focused on improving the quality of diagnosis and treatment, capacity building of malaria related health personnel, disease prevention by indoor residual house spraying and insecticide-treated materials. Operational research for evidence-based programming remained an important component of the programme.

There has been over-reliance on insecticides for residual spraying, fogging and anti-larval interventions during the past years. The national malaria administration has

decided to switch to more sustainable and low-cost interventions by gradually phasing the insecticide out and restricting its use to epidemic situations.

The use of locally made conventional nets in Sudan dates back to pre-eradication era but insecticide-treated nets are relatively new in the country. In 1995 insecticide-treated bednets were pilot-tested for the first time in Sinnar and upper Nile; their uptake and impact on the disease were encouraging.

UNICEF and WHO actively supported implementation of permethrin-treated nets in highly endemic areas. Since April 2001, half a million insecticide-treated bednets have been distributed through the national malaria control programme and partner nongovernmental organizations; however, coverage is still very low at 7%–8%. Nets are not manufactured in Sudan and are mainly imported from Egypt, Islamic Republic of Iran, Kenya, United Republic of Tanzania and Thailand.

The constraints are:

- the implementation of insecticide-treated bednets is considered a public sector activity and the private sector is not willing to accept any responsibility in marketing nets;
- the re-treatment rates are low due to non-compliance;
- the taxes on insecticide-treated bednets have not been fully waived yet despite high-level commitment to removing them.

### **3.6 Syrian Arab Republic**

Malaria has been a low priority disease and of little public health importance in the Syrian Arab Republic. A few sporadic cases are found in communities along the borders with Turkey and Iraq.

Leishmaniasis is the most important vector-borne disease, mainly affects rural Damascus, Al-Hassakeh, Deir El-Zour, Tartous, Edleb, Lattakia, Hama and Aleppo governorates. In 2002, there were 20770 cases of anthroponotic cutaneous leishmaniasis and 828 cases of zoonotic cutaneous leishmaniasis recorded.

Insecticide-treated nets were pilot-tested in the country for the prevention of leishmaniasis in 1994. Although the study could not demonstrate significant impact on the reduction of vector (*Phlebotomus sergenti*) densities, the results showed a sharp consistent reduction in cutaneous leishmaniasis incidence as a result of the use of pyrethroid-treated nets. In the intervention villages the reduction was from 5.1% in the pre-intervention year to 1.2% in the third post-intervention year. In the control area cutaneous leishmaniasis incidence doubled in the post-intervention year from 2.4% to 4.6%.

With the growing burden of vector-borne diseases, the Ministry of Health aims to extend insecticide-treated bednets coverage to 60% of the population in endemic areas by 2007.

### 3.7 Yemen

Malaria is the most important public health problem in Yemen with an estimated caseload of 1.5 to 2 million annually. The case fatality rate is 1%. *Plasmodium falciparum* is the predominant species (90%–95%) and *Anopheles arabiensis*, *An. sergenti*, *An. culicifacies* and *An. fluviatilis* are the important vectors. Of the total 18 million population, 60% is at risk of afro-tropical type of malaria, mainly in Socotra Island, Hodeida, Hajja, Ibb, Taiz, Lahj, Mahweet, Dhamar and Hadramout governorates.

The national malaria control programme adopted the Roll Back Malaria initiative in 2000 and concentrated its efforts on strengthening the programmes capacities to cope with the alarmingly increasing malaria burden. During recent years, the programme mainly focused on infrastructure improvement, capacity building of malaria-related health personnel, initiation of drug efficacy pilot studies, development of the malaria reporting and information system, implementation of evidence-based vector control programmes and the introduction of an effective treatment policy.

Vector control through larviciding with temephos, insecticide residual spraying and targeted ultra low volume spraying has been the mainstay of the programme. Limited available data suggest that there is no resistance to the insecticides currently being used.

There is a bednet culture in place in many parts of the country and people in remote villages are using untreated conventional locally made nets to avoid mosquito bites. In 1997, a pilot study with insecticide-treated bednets was conducted in Khamis Bani Saad village, Tihama. The programme failed and the desired objective could not be attained due to improper implementation, management and monitoring of the programme.

Another pilot project with ICONET was launched in January 2002 in Socotra Island with a higher degree of stakeholders involvement, community education, and monitoring of the programme. In the target community, 4650 nets were sold at a subsidized price of US\$ 2. With the existing nets, 77% coverage was achieved. The uptake was very high because of its very high private market price (US\$ 11). The impact of insecticide-treated bednets was assessed through the collection of malaria incidence data from clinics and small-scale cross-sectional prevalence surveys. A significant reduction in the number of malaria cases among villages targeted with insecticide-treated bednets has been observed since the beginning of the project. The national malaria control programme plans to replicate Socotra's experience in other highly endemic and epidemic prone areas in the country.

The constraints are:

- very limited availability of data for planning effective control interventions;
- poor socioeconomic status of population in endemic areas and low purchasing power, resulting in low uptake of nets;
- lack of awareness;
- weak health-care delivery system.

#### **4. SUMMARY OF THE KEY COMPONENTS OF THE NATIONAL STRATEGIC PLANS**

Out of the 7 countries that participated in the meeting, 5 have finalized their national strategic plans: Afghanistan, Djibouti, Saudi Arabia, Sudan and Yemen. The budget component is lacking and it is an aspect that will need to be discussed and agreed upon by all country partners. The other two countries (Pakistan and the Syrian Arab Republic) will have to work with national partners to iron out a few aspects of the strategy. Table 1 summarizes the various components of the strategic plans as presented and discussed during the meeting.

Country	Vector-borne diseases	Insecticide-treated bednet implementation status	Future vision	Strategies	Outcomes	Constraints/challenges
Afghanistan	Malaria Cutaneous leishmaniasis	Around 500 000 nets distributed in endemic areas through partnership between HNI, WHO, NGOs and IMPD	No subsidies for urban areas (sales through commercial market) Subsidized nets for vulnerable groups through NGO and public sector	National Steering Committee for insecticide-treated bednet implementation Strengthening provincial coordination mechanisms	60% of target population covered by 2008 80% re-treatment rates achieved	Insecurity and political instability Limited access to formal health care Logistic barriers Low incentives for public sector workers Limited data Poverty Absence of private sector
Djibouti	Malaria	Distribution of nets started in 1990, re-launched in 1999 (10% population in high risk areas sleeping under nets)	Target population in urban areas will cover through private sector Free distribution through Ministry of Health in rural high risk areas	National steering committee for insecticide treated bednet implementation Strengthening regional coordination mechanisms	60% of target population covered by insecticide-treated bednets 80% pregnant women and below 5s in high risk areas protected by nets	Poverty Logistics Taxes and tariffs Community involvement Involvement of private sector
Pakistan	Malaria Leishmaniasis	Limited to research work only Small scale implementation in NWFP and Sindh Provinces.	Further operational research. 54% of the households in highly endemic districts would have at least one	Implementation through primary health care system Village health workers Nongovernmental organizations and community-based organizations	54% of households in 23 endemic districts will be covered by 2008 50% of nets in target areas will be re-treated	Absence of a well defined system for insecticide treated bednet implementation, social marketing, monitoring and evaluation and procurements

Table 1. Summary of the key elements of the national insecticide-treated bednet implementation strategies

			insecticide treated bednets by 2008.			
Saudi Arabia	Malaria Leishmaniasis Dengue fever Rift Valley fever	Pilot Trial Asir and Gizan  Mass distribution since 2000 (996 000 nets distributed by now)	Free distribution of nets in areas where residual household spray not possible	Establishment of National Steering Committee for insecticide treated bednets implementation  Strengthening Provincial Coordination mechanisms  Improving accessibility of retreatment  Promotion of correct insecticide treated bednets utilization  Strengthening monitoring and evaluation	100% of target population covered by 2005  100% re-treatment rates achieved	Low re-treatment rates Capacity for effective monitoring and evaluation Insufficient awareness Taxes and tariffs
Sudan	Malaria Visceral leishmaniasis Cutaneous leishmaniasis Lymphatic filariasis	Sinnar (Sinnar pilot project) UNICEF distribution in the upper Nile area El Dueim in central Sudan Médicins sans frontières distribution in Gedaref state Over 500 000 nets distributed in target localities	Over 80% of the target population in Sudan sleep under insecticide-treated nets	Partnership between Federal Ministry of Health, private sector, nongovernmental organizations and civil society  Collaboration between insecticide treated bednets Working Group and Country Coordinating Mechanism	80% of the target population covered by 2008  80% re-treatment rates achieved	Insufficient awareness Inadequate penetration of commercial networks Re-treatment

Syrian Arab Republic	Malaria Leishmaniasis	Limited to research work only	Distribution of Long-lasting insecticidal net insecticide-treated bednets at highly subsidized rates and free of charge Free distribution of insecticides for re-treatment Nongovernmental organizations and community will be involved in promotion and distribution in insecticide treated bednets implementation	Subsidies for vulnerable groups National steering committee for insecticide treated bednets implementation Strengthening provincial coordination mechanisms Private sector start up	60% of target population covered by 2007 80% re-treatment rates achieved	Low incentives for public sector workers Poverty Absence of private sector Preference for Indoor Residual House Spraying
Yemen	Malaria Leishmaniasis Dengue and dengue haemorrhagic fever Lymphatic filariasis Rift Valley fever	Pilot Study in Khamis Bin Saad village Socotra Island demonstration project Tihama applied field research programme	Free distribution to pregnant women and children below 5 for 4 years initially, followed by market priming	Multisectoral partnership Establishment of insecticide treated bednet task force Re-treatment by users	80% of target population covered by 2010 80% re-treatment rates achieved	Limited data Weak coordination Social challenges Insufficient awareness Sustainability



## 5. RECOMMENDATIONS

### *Member States*

1. Countries should further discuss the draft strategic plan for consensus building and adoption with their partners.
2. An adequate resource mobilization mechanism should be developed for effective implementation of the national strategic plan.
3. Countries should reduce or waive taxes and tariffs on nets, netting materials and insecticides to improve availability and access by the target population.
4. Countries should use WHO specifications and recommendations in procuring nets and insecticides, as well as WHO guidelines for quality control.
5. The COMBI methodology should be used to increase uptake of insecticide-treated bednets and re-treatment rates.

### *WHO*

6. WHO should support countries in technical and operational aspects as well as resource mobilization for the implementation of the national strategic plans.
7. WHO should support multi-country trials on novel tools to address specific needs where the use of insecticide-treated bednets or other conventional vector control interventions are not appropriate.
8. WHO should establish an appropriate forecasting mechanism to ensure availability of supplies.

**Annex 1****PROGRAMME****Saturday, 18 October 2003**

08:30–09:00	Registration
09:00–09:40	Opening Session Address by Dr Hussein A. Gezairy, Regional Director Message from H.E. the Minister of Health, by Dr Yagoub Y. Al-Mazrou, Assistant Deputy Minister Address of Emaret Aseer Region, by Mr Mohammad A. Al-Zaid, Deputy of Emaret Aseer Region
10:00–10:10	Introduction of participants Nomination of officers Objectives of the meeting and method of work
<i>Scaling up implementation of insecticide-treated bednets: strategic approaches</i>	
10:10–10:20	Implementation of insecticide-treated bednets in the context of integrated vector management in Eastern Mediterranean Region, Dr A. Mnzava
10:20–10:50	An update and critical programme issues and innovative ways of distributing insecticide-treated bednets, Dr P. Guillet
10:50–11:10	Monitoring access and utilization of insecticide-treated bednets – key to results-based programming, Dr A. Odugleh
11:10–11:40	Discussions
<i>Country reports and experiences</i>	
11:40–13:30	Afghanistan, Pakistan, Saudi Arabia and Yemen, Discussions; Djibouti, Somalia, Sudan and Syrian Arab Republic, Discussions
14:30–14:45	Control of cutaneous leishmaniasis in the Syrian Arab Republic using insecticide-treated bednets, Dr L. Jaalouk
14:45–15:00	Discussions
<i>Operational research and social marketing</i>	
15:00–15:20	Operational research on insecticide-treated bednets, Dr A. Bassili
15:20–15:40	Culturally accepted insecticide-treated bednets in southern Sudan, Ms J. Bean
16:00–16:40	Scaling up of insecticide-treated bednets through social marketing/Malaria prevention in acute phase of complex emergency, Mr M. Vestergaard
16:40–17:00	The challenges of meeting local demands for insecticide-treated bednets, Mr Mahmood M. Al-Jarboa
17:00–17:20	Discussions

**Sunday, 19 October 2003**

*Country planning*

- 08:30–09:00 Global framework for scaling up insecticide-treated bednets: challenges and prospects, Dr M. Cham
- 09:00–09:10 Introduction to planning and working groups, Dr A. Mnzava
- 09:10–18:00 Working groups

**Tuesday, 20 October 2003**

*Presentation of country plans and feedback from facilitators*

- 08:30–09:30 Feedback from facilitators on key issues of the plans
- 09:30–10:00 Sudan
- 10:00–10:20 Yemen
- 10:02–10:50 Afghanistan
- 11:20–11:40 Saudi Arabia
- 11:40–12:00 Somalia
- 12:00–12:20 Djibouti
- 12:20–12:40 Pakistan
- 12:40–13:00 Islamic Republic of Iran
- 14:00–14:15 Presentation of CD, Mr A. Moheeb
- 14:15–15:15 Conclusions and recommendations

**Annex 2**

**LIST OF PARTICIPANTS**

**AFGHANISTAN**

Dr Abdul Wasi Asha  
Director of Malaria and Leishmaniasis Control programmes  
Malaria and Parasitic Disease Institute  
Ministry of Public Health  
**Kabul**

Mr Kamal Salih Mustafa  
Technical Officer, RBM  
WHO Representative Office  
**Kabul**

**DJIBOUTI**

Dr Mohamed Ali Kamil  
Director of Prevention and Public Hygiene  
Ministry of Health  
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**Annex 3****ADDRESS BY DR HUSSEIN A. GEZAIRY,  
WHO REGIONAL DIRECTOR FOR THE EASTERN MEDITERRANEAN**

It gives me great pleasure to welcome you all to the Intercountry Workshop on Scaling up Insecticide-Treated Net Implementation for the Control of Malaria and other Vector-borne Diseases in the Eastern Mediterranean Region. The meeting is being held to review the status of implementation of insecticide-treated nets, or ITNs, in the Region and finalize national ITN strategic plans. Let me take this opportunity to thank the Government of Saudi Arabia for hosting this meeting and extend my sincere gratitude to His Excellency Dr Hamad Bin Abdullah Almanee, Minister of Health, for his keen interest and for the excellent support received in organizing this workshop.

I hope that the participants will not only enjoy the generosity of this hospitable community but also be able to benefit from the experience of the Kingdom in malaria control and prevention and more so on the use of ITNs for the control of other vector-borne diseases. You will remember that during the outbreak of Rift Valley fever in 1998, the Kingdom was the first country in the Region that used ITNs on a large scale to respond to the outbreak.

As you are aware, at the beginning of this year, the Regional Office, together with experts and country representatives, developed a Regional Strategic Framework on Integrated Vector Management. This policy document stresses the need for intersectoral collaboration and full utilization of available tools for maximum impact of individual interventions in reducing vector-borne disease risks. Insecticide-treated nets are an important component of such interventions.

You are meeting today in Abha to discuss and finalize national strategic plans for the implementation of ITNs in key countries where malaria and other vector-borne diseases are endemic. These plans, which you will be finalizing this week, form part of national plans on integrated vector management, the development of which involved all national RBM partners in your countries.

As reported elsewhere, some countries in the Region have successfully controlled malaria and other vector-borne diseases through vector control interventions, mainly through insecticide residual spraying of houses. We therefore encourage those countries that still sustain such measures and have skills to implement them to continue to do so. However, such countries may consider the introduction of ITNs in certain specific situations or areas where ITNs may prove more cost-effective than other interventions.

Unfortunately, it has become apparent that not all the countries in the Region can sustain interventions such as insecticide residual spraying of houses. In these countries, there is need to exploit other, equally effective measures that can be implemented using existing health infrastructures. Insecticide-treated nets are one such measure. However, use of insecticide-treated nets will only reduce mortality and morbidity of vector-borne diseases if they are made available and used by every member of the household in targeted area, that is,

when a high coverage rate is attained. The biggest challenge any country or programme implementing ITNs will face is attaining this high coverage rate.

The issue of attaining high coverage rate is further complicated in countries, regions or groups of people who, because of heightened vulnerability due to either poverty, internal strife or biological status, are more affected by vector-borne diseases and do not have access to ITNs. Such people would benefit from highly subsidized nets. We also have people in the community who can afford nets at market price. In this case, the issue is how to devise ways of identifying such groups and targeting them for appropriate distribution mechanisms. Another challenge is maintaining high net re-treatment rates; the availability of WHOPES-approved Long Lasting Insecticidal nets (LLINs) could be the answer to the problem of low re-treatment rates in the long term.

The Regional Office, jointly with WHO/headquarters and other RBM partners, recently developed a global framework to scale up ITNs in disease endemic countries. This document, copies of which you have, provides useful guidelines which countries can use to develop their national strategic plans. The global framework encourages strengthening of partnerships at country level involving both the public and private sectors and nongovernmental organizations. Each of these partners have different roles to play. The public sector provides an enabling environment (removal of taxes and tariffs), nongovernmental organizations can address issues of equity, and the private sector can address issues of social marketing and selling of ITNs. Promotion of ITNs is the responsibility of every partner.

It is also expected that national strategic plans will contain innovative ways of attaining high coverage rates for nets and net re-treatment, and the Regional Office will do what it can to support such initiatives. In this regard, I am making reference to community-based programmes and initiatives such as Basic Development Needs (BDN), which make use of untapped community resources. We must also consider existing health infrastructures, networks and outreach activities, such as the Expanded Programme on Immunization, which can serve as additional distribution channels.

I am pleased with the spectrum of participants in this meeting, which ranges from representatives of the Ministry of Health (malaria and vector control programme managers), local nongovernmental organizations, private sector, international experts and donors. This is indeed a true reflection of what role each of us can play as we scale up use of ITNs in countries of the Region.

National strategic plans for scaling up implementation of ITNs will not only address distribution and financing issues. Operational research, monitoring and evaluation of acceptance and market trends, including monitoring for insecticide resistance, will be crucial. When these plans are finalized, they will provide the vision to scale up ITN use in countries and also help in resource mobilization, as large amounts of resources will be needed. I assure Member States represented here that we will support all efforts to scale up implementation of ITNs in countries of the Eastern Mediterranean Region. I wish you every success and a pleasant stay in this beautiful city of Abha.