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Regional Strategic Framework for Scaling Up the Use of Insecticide-treated Nets



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CONTENTS

	<i>Page</i>
<i>Abbreviations</i>	<i>v</i>
1. INTRODUCTION.....	1
2. ROLE OF ITNs IN SOUTH-EAST ASIA	2
3. ISSUES AND CHALLENGES	3
4. GOAL AND OBJECTIVES.....	4
5. KEY ELEMENTS OF AN ITN STRATEGY	4
5.1 Situation Analysis and Decision-making Criteria for Use of Treated Nets....	4
5.2 Possible Approaches to Scale Up Use of Treated Nets.....	6
5.3 Technical/Institutional Support.....	9
5.4 Advocacy and Capacity Building.....	10
5.5 Building Partnerships and Resource Mobilization.....	11
5.6 Operational and Implementation Research.....	11
5.7 Monitoring and Evaluation.....	12
5.8 Coordination Mechanism	13
6. ROLE OF WHO.....	13
References.....	14

Annexes

1. Netting Materials and Insecticides.....	16
2. Targets and Activities.....	17

ABBREVIATIONS

COMBI	Communication for behavioural impact
GFATM	Global Fund to Fight AIDS, Tuberculosis and Malaria
IMCI	Integrated Management of Childhood Illness
IRS	indoor residual spraying
ITN	insecticide-treated nets
IVM	integrated vector management
KAP	Knowledge, attitude, practice
LLINs	Long lasting insecticidal nets
MCH	Maternal and Child Health
MPS	Making Pregnancy Safer
NGO	nongovernment organization
PHC	primary health centre
RTAG	Regional Technical Advisory Group
SEAR	South-East Asia Region of WHO
WHO	World Health Organization

1. INTRODUCTION

Malaria and other vector-borne diseases such as dengue, filariasis, Japanese encephalitis and visceral leishmaniasis are major contributors to the communicable disease burden in the South-East Asia Region. Malaria occurs in 10 of the 11 countries of the Region except in Maldives. Most malaria cases are classically concentrated in areas poorly served by the health system such as in socio-economically deprived and geographically unreachable areas. The endemicity of malaria varies in different countries of the Region but also between different ecosystems within a country ranging from low risk to moderate/high risk. Malaria alone causes an economic loss of about 3 billion USD annually. Nine countries, except DPR Korea and Nepal, report dengue. Lymphatic filariasis is distributed in all countries except DPR Korea and Maldives. Except Bhutan and DPR Korea all countries in the Region report Japanese encephalitis. Visceral leishmaniasis (kala-azar) is reported in Bangladesh, India and Nepal.

The risk of different communities to vector-borne diseases varies according to their socioeconomic status (e.g. tribes, urban slum dwellers), physiological conditions (e.g. pregnant women, young children), geographical location (e.g. those living in areas with poor access to interventions, and in cross-border areas), occupational exposures (e.g. migrant workers, miners), natural/ environmental hazards (e.g. disease exacerbated by earthquakes, floods, cyclones etc), socio-political disturbances (e.g. refugees), and vector and human behaviour.

Methods that are directed to reduce or eliminate the breeding of vector species, prevent their contact with humans and reduce their numbers and longevity are important interventions against vector-borne diseases. The global strategy for malaria control¹ and the Roll Back Malaria programme in the Region emphasize the implementation of selective and sustainable preventive measures, including vector control.

The current need is to develop, plan and implement an evidence-based “integrated vector management (IVM) strategy” using a range of interventions selectively to control vector-borne diseases. Most interventions can be applied at local level through community and/or inter-sectoral participation. The

interventions should be sustainable and cost-effective. Use of insecticide treated nets (ITNs) can form a major tool in the overall context of an IVM approach for individual and community-wide protection against malaria and other vector-borne diseases. Since malaria is the largest vector-borne disease control programme in the Region with set goals, this document will focus on malaria. When use of ITNs is scaled up for malaria control, it is expected that this will also have impact on other vector borne diseases.

2. ROLE OF ITNs IN SOUTH-EAST ASIA

Use of ITNs has shown a 20% reduction in child mortality from malaria in Africa south of Sahara. In Asia, China and Vietnam have been successfully implementing large-scale programmes of ITNs with community support. In South-East Asia, a number of field trials in different countries have demonstrated the efficacy of ITNs against malaria transmitted by major vector species such as *An. culicifacies*, *An. dirus*, *An. fluviatilis*, *An. minimus* and *An. sundaicus*.²⁻⁸ Community-wide use of ITNs reduced the vector potential, risk of malaria transmission, incidence of uncomplicated/severe cases, paediatric anaemia rate and the splenomegaly rate. A large-scale community randomized trial in India showed that ITNs are as effective as indoor residual spraying with the same pyrethroid that was used for treating nets.⁹ The cost of vector control using mosquito nets treated with a pyrethroid approximates to, or is even less than, that for indoor residual spraying with the same pyrethroid. A limited number of studies have also shown the effectiveness of treated nets and other materials against vectors of dengue, Japanese encephalitis, and kala-azar, as well as collateral benefits against household insects/pests.

From the limited experience on community financing approaches for ITN promotion, it has been observed that major factors limiting coverage and sustainability of use of ITNs in malarious areas are: mainly poor affordability/poverty; non-availability at the sub-regional and local levels of the ITN commodities such as small pyrethroid packaging for re-treatment of nets by individual households and lack of institutional support and education. Where ITNs appear to fail, it is mainly due to human behaviour resulting in improper and inconsistent use of nets, lack of proper education, and climatic conditions.

In the South-East Asia Region, mosquito nets are traditionally used widely. Based on the scientific evidence on ITN efficacy, some countries in

the Region have been implementing the ITN-programme for over 10 years, and in others implementation is catching up steadily. Since re-treatment of nets has always remained a problem, the long-lasting insecticidal nets (LLINs), that do not require re-treatment offer a good option. Overall, it appears that ITNs or LLINs have an important role to play against vector-borne diseases in endemic areas and their use needs to be scaled up.

3. ISSUES AND CHALLENGES

There are several issues regarding operational implementation of the ITN programme. While they vary from country to country, some of the major issues to be considered are: the commercial availability of nettings, ITNs or LLINs at local and sub-regional level; establishing specifications for institutional procurement of nets and their quality control; production of nets especially of LLINs including transfer of LLIN technology; regulation of taxes/tariffs; ensuring availability of insecticide formulations especially in small packaging for single/retail use; preparing a national database on the manufacturers/suppliers of nets and insecticides, providing technical and institutional support including developing local guidelines on (re-)treatment of nets, their use, upkeep, washing, environmental safety and human toxicity. Partnerships within healthcare services, with non-health sectors, NGOs, aid agencies, industry and research organizations are loose at the best. The partnership responsibilities need to be properly planned and implemented. Databases on potential partners and networking with them at the local, regional, national and international levels are required. Advocacy for ITN promotion and resource mobilization in favour of this intervention and generation of awareness among communities and those at risk need significant attention. Development and dissemination of target-oriented information, education and communication material is important.

Other important issues are that countries need to take a policy decision to include ITNs/LLINs in their vector management strategy. It is also necessary for country-specific national ITN scaling up plans to be drawn up and implemented. A major challenge will be in choosing/using effective approaches for scaling up, striking a balance between equity for the poor and sustainability of the commercial market for ITNs. In the IVM strategy, insecticides will be used in ITNs/LLINs, indoor residual spraying, larviciding etc. Since pyrethroid insecticides used in treatment of nets are also used in agriculture, there is therefore the need for regular monitoring of vector

resistance to insecticides to obtain “updated” information on the susceptibility or resistance status of the target vectors.

4. GOAL AND OBJECTIVES

The main purpose of the ITN strategic framework is to advocate, promote, coordinate and monitor scaling up of insecticide-treated nets for use by individuals and communities at risk of malaria and other vector-borne diseases in Member States.

The **goal** of RBM is to prevent mortality and halve morbidity attributable to malaria in the Region by 2010 by scaling up insecticide-treated nets as part of an integrated vector management strategy.

The specific **objectives** of an ITN strategy will depend upon the prevailing circumstances and resources available in the Member Countries but these, *inter alia*, will be:

- To reduce mortality and morbidity from malaria and other vector-borne diseases in populations living under the conditions of moderate/high risk;
- To reduce the risk of malaria and other vector-borne diseases in individuals, in particular the socio-economically poor, geographically unreachable and physiologically vulnerable communities;
- To prevent malaria and other vector-borne diseases in disaster-affected communities as part of emergency relief.

5. KEY ELEMENTS OF AN ITN STRATEGY

5.1 Situation Analysis and Decision-making Criteria for Use of Treated Nets

Since pyrethroid-treated nets irritate, repel or kill mosquitoes and other insects, they afford better personal protection from mosquitoes and other insects than untreated plain nets. Thus, they should be used by individuals at risk of malaria. Community-wide use of treated nets with high coverage cause

a mass killing effect on vector population and thereby reduce malaria transmission in the community.

Within the context of an integrated vector management strategy, the decision on the use of treated nets as one of its components will require an analysis of the situation and stratification. This will be based on epidemiological, entomological, environmental and climatic, socio-economic and cultural contexts as well as the available institutional and infrastructural support. The final decision on the extent of implementation will depend on the aim, size and distribution of target groups/population and the resources available.

In the South-East Asia Region, control of malaria in areas under moderate to high risk with endophilic vectors, and for epidemic containment, the recommended action is indoor residual spraying (IRS) with effective insecticides. Although insecticide-treated nets can be used in all malarious situations as well as for personal protection against nuisance mosquitoes and other insects, programmatically these are recommended as a selective vector control intervention at least in the following situations:

- in remote and inaccessible areas where IRS is difficult to organize (whole population under risk);
- in communities where acceptance or programmatic coverage of IRS is low;
- in moderate/high risk areas where malaria vectors show exophily but anthropophily with main biting period coinciding with night sleeping hours;
- in areas with main vectors showing multiple resistance to insecticides other than pyrethroids;
- in endemic areas with community wide traditional use of mosquito nets;
- in vulnerable communities such as children under five years age and pregnant women living in moderate risk areas, or in high risk communities living in low risk areas;
- in disaster-affected communities where housing has been adversely affected and IRS is impractical to apply, and migrant labour camps

or refugees in both situations if ITN use is practicable. An alternative is to consider insecticide-impregnated material used as curtains etc.

Scaling up of insecticide-treated nets should be done in the overall context of a strategy for integrated vector management of vector-borne diseases. At present, there is likely to be greater emphasis on malaria control considering that most Member Countries have received GFATM funding for malaria control where use of ITNs or LLINs form an important component of the anti-malaria strategy.

It would be more useful to strengthen the ITN programme, for example, by use of ITNs/LLINs or net treatment should be scaled up in the areas where these are already being rationally promoted or where mosquito nets are traditionally used by local communities. Environmental management, biological control using fish and biolarvicides, chemical larviciding and legislation are recommended in low risk areas and/or in urban, industrial and port areas where it is more feasible to apply these interventions.

5.2 Possible Approaches to Scale Up Use of Treated Nets

The ITN promotion approaches should be linked with the other strategies for malaria control. Possible approaches to promote treated nets for personal protection and disease control are discussed below.

Promoting ITNs for personal protection

Mosquito nets are traditionally used by a large number of people for protection against nuisance mosquitoes and insects. Treatment of nets further improves their protective efficacy. Therefore, treated nets should be promoted, through mass media and other channels as further discussed below in section 5.4, for use by individuals in homes, especially by pregnant women and young children, children in boarding schools, people with low/no immunity travelling to or working in malarious areas such as for tourism, excursions, explorations, project development work etc.

Country plans should give high importance to widespread adoption of ITNs in units of population to serve as a personal protection measure and for

providing transmission risk reduction. With proper information management, using of data from an efficient surveillance system, it is possible to pinpoint individuals, families or houses at special malaria risk; these could be targeted for provision of ITNs/LLINs.

Scaling up ITNs for disease control

Use of treated nets should be scaled up for disease control as part of an overall integrated vector management strategy. Though for underprivileged communities ITNs may need to be subsidized, emphasis should be on demand creation and growth of the commercial market for long-term sustainability. Thus, one or a mix of the following approaches may be adopted for scaling up ITNs/LLINs in targeted populations depending on country-specific circumstances.

Social marketing: Social marketing¹⁰ by NGOs will initially require creation of demand for ITNs/LLINs or net treatment. Social marketing may include subsidized sale of nets and insecticide, or net sale/treatment on full cost-recovery. Another approach could be establishment of a revolving fund¹¹ for cooperative sustenance of ITNs. This will be done by full cost recovery. These approaches allow the growth of the commercial market and encourage sustainability and are suited to endemic rural areas where communities show willingness to pay and in urban/peri-urban areas where the reach of health services is considered reasonably good.

Re-treatment of existing nets owned by the people through the primary health care services: It can be done by a mix of approaches i.e., through community financing of the full cost of insecticide or subsidized/free of charge treatment/supply of insecticide to poor communities. Re-treatment frequency will be six-monthly or yearly depending on the length of malaria transmission in a given area.

ITNs in project areas: Proponents of development projects and industries such as tea estates, oil companies, mines etc. located in malarious areas should similarly consider treating mosquito nets owned by project and catchment populations and distribute them free of charge, or distributing LLINs to vulnerable groups of population without nets.

Targeted and subsidized provision: ITNs and insecticide or LLINs may be given free to targeted communities which are at a greater disadvantage and are prone to a greater risk of malaria because of their physiological, socio-economic, geographical, occupational and environmental conditions. This would require identification of the most vulnerable communities in a given area with a stratified approach to ensure sustained subsidies. Some of the communities targeted for the purpose could be:

- the poorest among the poor living below the poverty line;
- tribes or forest dwelling communities with poor access to health services or interventions (diagnosis, treatment, prevention);
- pregnant women and young children;
- displaced /nomadic communities;
- unreachable populations including cross-border communities.

This would require setting population/household targets for a high level of ITN coverage in place and time (say, $\geq 80\%$). It is considered that free and organized provision of ITNs is not only more efficient in ensuring high sufficiently coverage to achieve a “mass effect” on the village vector population, but is also a more cost-effective use of donor funding. Experiences in an area in Tanzania show that in one day, a team of eight persons can check the number and size of nets required in each house in a village and donate the required 800 nets (C.F. Curtis, personal communication, 2003). Annual re-treatment of $>90\%$ of the nets is quickly provided by pro-active visits to villages by one supervisor bringing free insecticide and working with local health workers.

Funding for such a programme would be a formidable task to be managed through public health resources and might require bilateral/multilateral donor support. By involving health staff and/or NGOs it should be possible to re-treat all nets free of cost in the village/community once a year i.e., just before the beginning of the transmission season but a six monthly treatment might be necessary if the transmission is perennial. Re-treatment of nets is a critical component of a sustainable ITN programme¹². It is an important challenge which limits the impact of the ITN programme. Therefore, strategies are needed to ensure that re-treatment of all or a majority of nets is done satisfactorily.

Provision of ITNs in Complex Emergencies: The vector-borne disease control programme together with the emergency humanitarian relief coordinating agency or NGOs may take the following steps to make treated nets available as part of an integrated strategy to control vector-borne diseases in complex emergencies:

- analyze the situation with respect to vector-borne diseases and identify populations or displaced communities at risk;
- decide on the strategies for management of the disease and preventive measures;
- considering local factors, decide if ITNs/LLINs would make a suitable intervention strategy apart from indoor residual spraying and environmental control;
- arrange for free distribution of ITNs/LLNs based on the actual need and seek support of interested partners/donors for free/subsidized provision of treated nets and their re-treatment;
- identify operational research needs if required; and
- monitor and evaluate.

5.3 Technical/Institutional Support

Technical and/or institutional support might be necessary to:

- conduct rapid KAP studies and adjust or reorient implementation strategy accordingly, for scaling up of community coverage of ITN use in different situations;
- create an enabling environment by regulation of taxes/tariffs;
- encourage local manufacture of nets conforming with WHO or equivalent specifications;
- import standard quality nets and netting material;
- coordinate with emergency relief;
- quality control/assurance including monitoring of implementation of guidelines on safe handling/packaging of insecticides marketed for community use;

- introduction of improved technologies such as the use of long-lasting nets.
- monitor and evaluate the efficacy and impact of ITN uses at both micro- (e.g. individual) and macro-levels, to obtain evidence in support of their wider applications; and
- conduct susceptibility tests on the disease vectors, and bioassay tests on the treated net surfaces, to establish the response of the target vectors to the insecticides, and bio-efficacy of the insecticides applied on the nets respectively.

5.4 Advocacy and Capacity Building

For promotion of ITNs/LLNs for use by individuals and their self-uptake from the commercial market, there is a need to organize advocacy campaigns through the mass media as well as through a communication for behavioural impact (COMBI) approach.⁹⁻¹⁰ Use of treated nets by pregnant women and young children should also be promoted through the PHC/Maternal and Child Health (MCH) clinics, the making pregnancy safer (MPS) programme and integrated management of childhood illnesses (IMCI) in collaboration with RBM,¹³ UNICEF and NGOs.

General experience shows that ITNs promoted with appropriate education are highly acceptable even to populations that do not traditionally use nets¹². Village health committees⁶, bed net committees¹¹, *mahila mandals* (women's groups)¹⁴ and mid-wives¹⁵ have been found effective in promoting use of ITNs and re-treatment. To scale up coverage and the promotion of the use of ITNs, it is necessary:

- to design and implement behaviourally-focused social mobilization and communication programmes^{16,17} for malaria prevention/control including ITN promotion, dissemination of information on proper use, upkeep, washing and re-treatment of nets, safe handling of insecticides, as well as adoption of healthy behaviours;
- to undertake advocacy for adequate funding support, generating consensus that malaria is an impoverishing disease and its control will improve the quality of life and prevent loss of productivity, pointing out that ITNs will also provide cross-benefits against other vector-borne diseases and nuisance mosquitoes.;

- to have simplified guidelines on ITN implementation at national level; and
- to organize training of anti-malaria and other health personnel on ITN/LLIN technology.

5.5 Building Partnerships and Resource Mobilization

There is a need to prepare a database and network of potential partners at the national and local levels for scaling up ownership and use of ITNs/LLINs, and/or (re)treatment of community-owned nets. Partnerships can be established between vector-borne disease control programme/primary health care and NGOs, local community groups, insecticide/textile industry, bilateral/multilateral donors, agencies in infrastructure development sector working in high risk areas, medium to small hotels/guest houses and so on.

Resources of various welfare programmes, which often complement the goal of improving health, should be integrated. Examples of some of these programmes are:

- healthcare programmes (antenatal clinics/MCH, IMCI, MPS);
- UNICEF-sponsored child care programmes;
- tribal welfare programmes such as the provision for treated nets in boarding schools and re-treatment of nets;
- school health programme;
- medical services of armed/paramilitary forces for use of ITNs; and
- health/development schemes run by development projects for workers and project staff.

Cross-border collaboration should be forged between neighbouring countries for control of malaria together with the control of TB, kala-azar, and HIV/AIDS and workplans should be developed initially in pilot districts.

5.6 Operational and Implementation Research

Scaling up plans in the countries should be preceded by a thorough review of the ITN experiences. This will help develop a better understanding of the

constraints, opportunities and the lessons learnt. It will be necessary to evaluate community compliance of the ITN programme going to scale and measure impact on malaria and other vector-borne diseases. Innovations in long-lasting technology, better formulations of insecticides, improved packaging, any change in the insecticide susceptibility of local malaria vectors and other household pests, new approaches to scale up coverage, evaluation of new advocacy strategies and research on other relevant issues should be encouraged. It would be appropriate to generate baseline data on ITN sale and distribution systems including databases on national/local production of nets and insecticides.

5.7 Monitoring and Evaluation

Depending upon the aim and resources, ITN scaling up programme in the country should set targets and process, outcome and impact indicators. Countries may consider including and expanding the following indicators for monitoring and evaluation of the ITN programme:

- Input indicators
- Process indicators
- Output indicators
- Outcome indicators including indicators to monitor and evaluate partnership efficacy and its sustainability
- Impact indicators

A major concern is that a number of interventions are advocated for malaria control, IVM etc. This includes ITN promotion irrespective of the scale, individual or community etc. It is crucial to establish how much and to what extent each intervention or a specified combination is contributing to overall malaria prevention and control. This is necessary for planning cost-effective interventions.

Targets and activities

Countries need to decide what is the baseline 'universe' against which to measure access of and coverage with ITNs, viz. number of provinces, districts,

PHCs, villages/townships, population, number of households and so on. Some of the important targets and activities for 2005-2010 are suggested in Annex 2. These, and possibly other targets and indicators specific to the ITN use and their efficacy and impact, may be considered.

5.8 Coordination Mechanism

The following coordination mechanisms at national and regional levels are suggested:

At the national level: Constitution of a working group as part of a national task force for Integrated Vector Management, comprising representatives of the potential partners including public/private sectors, NGOs, industry, multilateral/bilateral donor agencies and research organizations, to oversee progress of scaling up of ITNs. Coordinating mechanisms are also needed at peripheral/ field levels i.e. at sub-national level.

At the regional level: The existing Regional Technical Advisory Group on Malaria (RTAG) or its sub-group may periodically review the progress of the implementation of anti-malaria interventions including the use of ITNs/LLINs in the Region.

6. ROLE OF WHO

The role of WHO's Regional Office for South-East Asia is critical. It includes the following:

- To provide standards and guidelines;
- To guide, support, and monitor implementation of ITN programmes including scaling up;
- To facilitate productive, technical and scientific collaboration at country and regional levels;
- To help create an enabling environment; and
- To encourage aid agencies, partners and NGOs to help in the implementation of ITN scaling up.

There is a considerable amount of useful research findings on the efficacy, socio-cultural, behavioural aspects etc. of ITN use in countries of Asia and the South-East Asia Region. These have emerged from research including case control studies, etc. It is crucial that actions are promoted to consolidate these observations and translate the findings into action against malaria, and in scaling up the ITN programme. An option would be a regional workshop of researchers, potential ITN implementers, relevant macro-level decision makers including the donor community and industry for finding ways of using these for promoting large-scale implementation and to identify areas for further operational research.

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Annex 1

NETTING MATERIALS AND INSECTICIDES

Mosquito nets

- Any type of mosquito net already owned by households should be treated with a pyrethroid insecticide.
- RBM/WHO has issued specifications for netting materials,¹⁸ which should be considered and promoted.
- Long-lasting insecticidal nets have been recommended for use by WHO.¹⁹

Insecticides

- Insecticides and their formulations as recommended by WHO Pesticide Evaluation Scheme (WHOPES/CPE/CDS/HQ) should be used. Formulations that are water-based and do not contain organic solvents (except for Permethrin 10% EC) are preferred. These are mentioned in the Table below.
- WHO recommendations on safe handling and use of insecticides should be strictly followed.

Table. WHO recommended insecticides for treatment of mosquito nets for malaria vector control

Insecticide	Formulation ¹	Dosage ²
Alpha-cypermethrin	SC 10%	20-40
Cyfluthrin	EW 5%	50
Deltamethrin	SC 1% and WT 25%	15-25
Etofenprox	EW 10%	200
Lambda-cyhalothrin	CS 2.5%	10-15
Permethrin	EC 10%	200-500

¹EC = emulsifiable concentrate; EW = emulsion, oil in water; CS = capsule suspension; SC = suspension concentrate; WT = water dispersible tablet

²Milligrams of active ingredient per square metre of netting

Further details on insecticides for treatment of nets and insecticide-treated materials including long-lasting insecticidal nets can be found on the WHO homepage on the internet at www.rbm.who.int.

Annex 2

TARGETS AND ACTIVITIES

	Activities	Outcome Indicator	2005	2006	2007	2008	2009	2010
1.	Identification of experts to work on the ITN Working Group (WG) at the regional level	ITN-WG becomes functional in SEARO	↑					
2.	Establishment of ITN Working Group (WG) at the national level in Member Countries	National WG becomes functional	↑					
3.	Development of detailed country plan to scale up ITNs/LLINs	Detailed country plan of work developed	↑					
4.	Generation of database on ITN commodities (manufacturers, insecticide industry; their sale/distribution systems)	Baseline database generated	↑					
5.	Identification of potential partners and collaborators at national, regional/district levels	Partnerships become active	↑					
6.	Identification and establishment of cross-border collaboration	Cross-border collaboration becomes functional	↑					
7.	Development of guidelines for use of ITNs/LLINs	1. Guidelines developed by SEARO and disseminated to Member Countries 2. Member Countries produce guidelines in local language	↑					
8.	Incorporation of use of ITNs in national programme as a selective vector-control intervention	ITNs use incorporated in national policy	↑					

Activities	Outcome Indicator	2005	2006	2007	2008	2009	2010
9. Stratification for identification of areas and vulnerable communities for ITN intervention	Population/number of households eligible to receive ITNs		↑				
10. Assessment of capacity development needs of the anti-malaria/VBDC staff related to ITN use	Number of staff trained		↑				
11. Training programme for trainers	Number of trainers trained and Number of health staff trained by them		↑				
12. Development of advocacy/COMBI strategy	Strategy developed		↑				
13. Functioning of COMBI/advocacy	Number/types of tools developed and delivered		↑				
14. Scaling-up of ITN coverage in targeted areas/populations	Proportion of population having access to sleeping under ITN/LLINs			↑	>80%		
	Proportion/number of pregnant women covered by ITN use			↑	>80%		
	Proportion/number of nets/ITNs retreated			↑	>80%		
15. Monitoring and evaluation	Number of evaluations conducted			↑			
16. Reporting system	Number of reports sent to Programme manager/SEARO			↑			