Insecticide-treated mosquito net interventions

A manual for national control programme managers

World Health Organization

Edited by ROLL BACK MALARIA

WHO/CDS/RBM/2002.45

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Geneva, 2003

Edited by ROLL BACK MALARIA

WHO Library Cataloguing-in-Publication Data

Insecticide-treated mosquito net interventions : a manual for national control programme managers / edited by Roll Back Malaria.

1. Malaria – prevention and control 2. Mosquito control – methods 3. Bedding and linens 4. Marketing of health services
5. Manuals I.Global Partnership to Roll Back Malaria.

ISBN 92 4 159045 9 (NLM Classification : WC 765)

ROLL BACK MALARIA is a global partnership founded by the governments of malaria-afflicted countries, the World Health Organization, the UN Children's Fund, the World Bank and the UN Development Programme. Its objective is to halve the burden of malaria for the world's people by the year 2010 by saving lives, reducing poverty, boosting school attendance and making life better for millions of people living in poor countries, especially in Africa.

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Quality control: Communications team of the WHO Programme on Communicable diseases
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AFRO	WHO Regional Office for Africa
BASICS	Basic Support for Institutionalizing Child Survival
CS	Capsule suspension [insecticide formulation]
DANIDA	Danish International Development Assistance
DFID	Department for International Development (United Kingdom)
DHS	Demographic health survey
DIY	Dip-it-yourself [insecticide kit]
DSS	Demographic surveillance system
EC	Emulsifiable concentrate [insecticide formulation]
EW	Emulsion oil in water [insecticide formulation]
HIS	Health information system
IDP	Internally displaced persons
ITN	Insecticide-treated mosquito net
KAP	Knowledge, attitude and practice [survey]
MARA	Mapping Malaria Risk in Africa
MCH	Mother and child health [clinic]
MoH	Ministry of Health
NGO	Nongovernmental organization
NMCP	National malaria control programme
PATH	Programme for Appropriate Technology in Health (Canada)
PCV	Packed cell volume
PSI	Population Services International
RBM	Roll Back Malaria
SC	Suspension concentrate [insecticide formulation]
UNHCR	Office of the United Nations High Commissioner for Refugees
UNICEF	United Nations Children's Fund
USAID	United States Agency for International Development
WT	Water dispersible tablets [insecticide formulation]
WHO	World Health Organization
WHOPES	WHO Pesticide Evaluation Scheme

Preface

There can be no doubt about the effectiveness of insecticide-treated mosquito nets (ITNs). The results of studies completed in 2000 and 2001 confirm and supplement the findings of the major studies of the 1990s to evaluate the impact of ITNs. The widespread use of ITNs can be expected to reduce all-cause child mortality in malaria endemic areas by about 20%. ITNs must therefore rank on a par with immunisation against common childhood diseases and oral rehydration therapy as a revolutionary intervention that has the potential to dramatically improve child health and contribute to overall development.

However, in contrast to childhood immunisation – where even the poorest countries are able to demonstrate sustainable coverage rates of 70% or more, in spite of the difficulties posed by the need for a cold chain and specially trained staff to administer injections – very few countries have more than 20% of children at risk from malaria sleeping under ITNs. Net coverage is increasing, but if the ambitious goal of having 60% of the at-risk population sleeping under ITNs by 2005 agreed to at the Abuja Summit of 2000 is to be achieved, very signficant efforts need to be made to accelerate the introduction and use of insecticide-treated nets.

This manual attempts to gather together much of the available information, based on the experience of the last 15 years, which is necessary to develop, expand and monitor ITN programmes. It is hoped that the manual will serve as a guide and reference to programme managers in countries, at national and at sub-national level, as well as a resource to workers in civil society organizations and the private sector who will be pivotal in achieving high coverage rates of effectively-treated mosquito nets.

There are several current factors that could help to significantly increase the effective use of treated nets in malaria endemic countries. Firstly, as demand for mosquito nets and insecticides increases, prices are falling. Whereas five years ago it was difficult to find a net for less than the equivalent of US$ 10 anywhere, in many malaria-endemic countries today they can now be purchased by individual families for US$ 5, and in some countries for as little as US$ 3. This reduction is partly due to increased demand and competition, and partly due to the success of global efforts to eliminate taxes and tariffs on nets, netting and insecticides. With an effective life of five years, this makes an ITN a highly cost-effective health investment, no matter who pays.

Secondly, data released and reviewed by an expert committee at the end of 2001 confirm that the technology now exists to produce a mosquito net which is treated with insecticide at manufacture and which will retain its effective mosquito repelling properties for at least four years. The need to periodically re-treat conventional nets by dipping them in insecticide is widely agreed to be a major impediment in implementing effective and sustainable programmes.

Thirdly, the Global Fund to Fight Aids, TB and Malaria has been launched. This fund is expected to help the most needy countries implement effective plans to combat these diseases. It is anticipated that proposals for scaling up the use of ITNs from countries where malaria is a major contributor to child mortality will be well received by the fund. The fund managers will probably be looking for signs of synergy in efforts to tackle the three diseases, so malaria planners would be wise to seek out their counterparts working in AIDS and TB to discuss how efforts to distribute and promote ITNs might be linked with the promotion and distribution of condoms, or with strategies such as DOTS for TB.

Roll Back Malaria genuinely solicits feedback from readers and users which will be used to plan future editions of this work.

David Alnwick
Roll Back Malaria
WHO HQ Geneva
December 2002

Acknowledgements

This manual was written for Roll Back Malaria (RBM) by Jayne Webster, Jo Lines and Jenny Hill, of the Malaria Consortium, a collaborative project of the Liverpool School of Tropical Medicine and London School of Hygiene and Tropical Medicine. The Malaria Consortium is supported financially by the United Kingdom's Department for International Development (DFID), to whom we give our thanks.

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The illustrations are taken or adapted from other relevant malaria publications: *Insecticide-treated net projects: a handbook for managers* (Malaria Consortium, 1999), *Partnerships for change and communication: guidelines for malaria control* (WHO/Malaria Consortium, 1997).

Thanks to June Mehra for permission to reproduce illustrations from Partnerships for change, and for new illustrations produced for this manual. Thanks also to Michel Lavigne for the illustrations from the *Insecticide-treated net projects* handbook.

Introduction

Chapter 1

Introduction

This manual provides guidance on approaches to insecticide-treated mosquito net (ITN) interventions. It is intended mainly for national malaria control programme (NMCP) managers, but it could also be used by nongovernmental organizations (NGOs) and the private sector.

This manual does not attempt to deal with practical aspects of mosquito net treatment (simplified guidelines are currently being prepared by the World Health Organization (WHO). It is intended rather to provide NMCP managers with practical "how to" guidelines to help them to develop:

- **national ITN "going to scale" strategies;**
- **a long-term vision, with short-term programmes contributing towards this vision;**
- **partnerships, with partners contributing their specific areas of skill and expertise.**

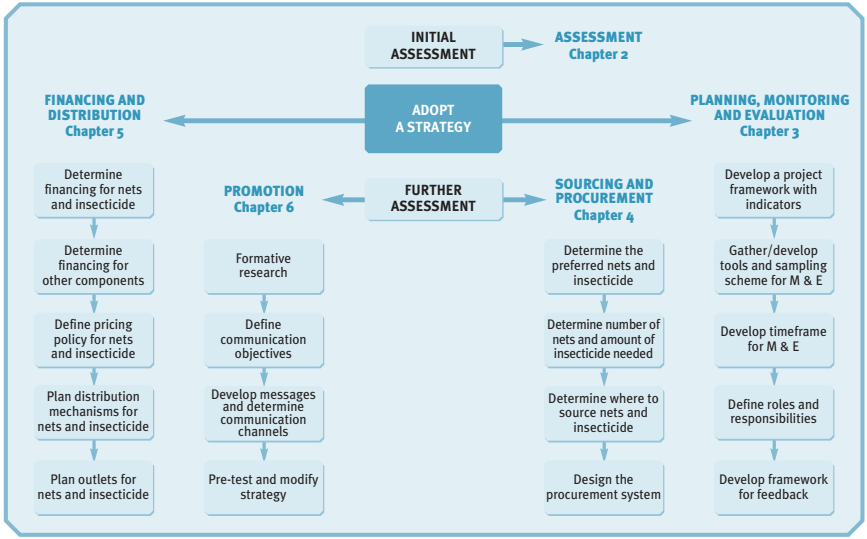
Each chapter covers a different aspect of ITN interventions:

- **Chapter 2** Assessment
- **Chapter 3** Planning, monitoring and evaluation
- **Chapter 4** Sourcing and procurement
- **Chapter 5** Financing and distribution
- **Chapter 6** Promotion
- **Chapter 7** Social marketing

Figure 1 provides an overview of planning ITN interventions and illustrates how these chapters fit together.

This introductory chapter provides an overview of ITN implementation experience, of key aspects of developing national ITN strategies, and of the range of potential approaches to ITN interventions.

Figure 1. Overview of planning ITN interventions



1.1 Implementation experience

Experience over the past 20 years has shown ITNs to be a promising intervention for reducing the risk of malaria infection in areas of both stable and unstable transmission. During this time, ITN implementation has evolved. The main phases, discussed in more detail below, have been:

- private sector sales of untreated nets before the development of ITNs as a new technology;
- ITN efficacy and effectiveness trials;
- early ITN projects;
- moving from projects to programmes ("going to scale").

Many lessons have been learned from this experience, but there is still much to learn. This section highlights successes and constraints and also discusses challenges to going to scale, including financing and pricing, targeting vulnerable groups and promotion.

1.1.1 Nets before ITNs

Before the development of ITNs as a new technology in the mid-1980s, people in many countries were already using nets, mainly to protect themselves against mosquito biting. There are limited data about household coverage with nets prior to the introduction of ITNs, but it is clear that the extent of net usage varied considerably. Pre-existing net usage was very high in some countries, such as the Gambia, and very low in others, such as Mozambique, with levels in most countries falling somewhere between these two extremes.

1.1.2 Efficacy and effectiveness trials

The potential epidemiological advantages and public health benefits of treating nets with insecticide for protection against malaria were recognized in the mid-1980s.

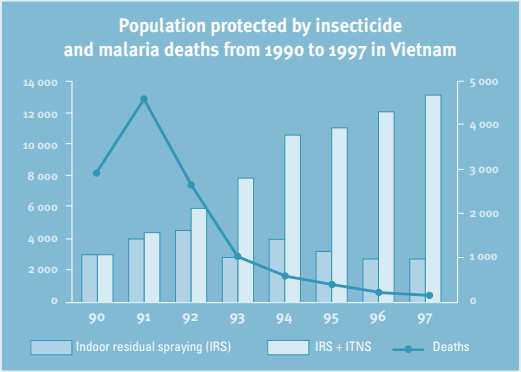
- **Efficacy** is measured as impact under controlled trial, i.e. almost ideal, conditions.
- **Effectiveness** is measured as impact under programme, rather than trial, conditions.

To evaluate the potential of ITNs, **efficacy trials** were carried out in countries with a wide range of transmission intensities in Africa, Asia, Latin America and the Western Pacific. The majority of these trials were randomized-controlled trials, comparing ITN use with no-net use and, less commonly, comparing ITN use with use of untreated nets. The impacts measured have included all-cause child mortality (age 1–59 months), incidence of severe malaria, incidence of uncomplicated malaria episodes, prevalence of parasitaemia, mean haemoglobin level, splenomegaly, and nutritional status.

A Cochrane review[1] concluded that ITNs reduce overall mortality by about 20% in Africa (range 14–29%[2, 3, 4, 5]) and that, for every 1 000 children aged 1–59 months protected by ITNs, about six lives are saved each year. The review also concluded that ITNs reduce clinical episodes of uncomplicated malaria caused by *Plasmodium falciparum* and *Plasmodium vivax* infections by 50%, as well as reducing parasitaemia. The impact on anaemia status, measured as increases in Packed Cell Volume (PCV), is variable.

Having established the efficacy of ITNs under trial conditions, **effectiveness trials** were conducted to evaluate impact under programme conditions.

Figure 2 The relationship between ITNs and malaria mortality: the example of Viet Nam



1 Lengeler C. Insecticide-treated bednets and curtains for malaria control (Cochrane Review). In: *The Cochrane Library*. Oxford: Update Software, 1998:3.

2 Habluetzel A et al. Do insecticide-impregnated curtains reduce all-cause child mortality in Burkina Faso? *Tropical Medicine and International Health*, 1997, 2(9):855–62.

3 Binka F et al. Impact of permethrin inpregnated bednets on child mortality in Kassena-Nankana district, Ghana: a randomised controlled trial. *Tropical Medicine and International Health*, 1996, 1(2):147–54.

4 D'Alessandro U et al. Mortality and morbidity from malaria in Gambian children after introduction of an impregnated bednet programme. Lancet, 1995, 345:479–83.

5 Nevill C et al. Insecticide-treated bednets reduce mortality and severe morbidity from malaria among children on the Kenyan coast. *Tropical Medicine and International Health*, 1996, 1(2):139–46.

Table 1.1 Impact of ITNs on overall mortality, mild malaria disease, parasitaemia and anaemia, measured under programme conditions

Country	Study	Impact (protective efficiency[6])				Source
		Overall mortality	Mild disease (fever and parasitaemia)	Parasitaemia	Anaemia	
Gambia	Longitudinal surveillance	25–40%				D'Alessandro et al. (1995)[7]
Gambia	Case control study	0%	59%[8] 0%[9]			D'Alessandro et al. (1997)[10]
Pakistan	Case control study		78%[11] 69%[12]			Rowland et al. (1997)[13]
United Republic of Tanzania	Cross sectional survey			62%	63%	Abdulla et al. (2001)[14]
United Republic of Tanzania	Case control study	27%[15]				Armstrong Schellenburg et al. (2001)[16]

[6] Impact under operational conditions.

[7] D'Alessandro U et al. Mortality and morbidity from malaria in Gambian children after introduction of an impregnated bednet programme. *Lancet*, 1995, 345:479–83.

[8] Matched with health centre controls.

[9] Matched with village controls.

[10] D'Alessandro U et al. The Gambian National Impregnated Bed Net Programme: evaluation of effectiveness by means of case-control studies. *Transactions of the Royal Society of Tropical Medicine and Hygiene*, 1997, 91:638–642.

[11] *Plasmodium falciparum.*

[12] *Plasmodium vivax.*

[13] Rowland M et al. Sustainability of pyrethroid-impregnated bednets for malaria control in Afghan communities. *Bulletin of the World Health Organization*, 1997, 75(1):23–9.

[14] Abdulla S et al. Impact on malaria morbidity of a programme supplying insecticide-treated nets in children aged under 2 years in Tanzania: community cross sectional study. *British Medical Journal*, 2001, 322:270–273.

[15] Reduction in post-neonatal child death. Combined with coverage data, this suggests that ITNs prevented 1 in 20 post-neonatal child deaths. If the effect of untreated nets is taken into account, then this increases to 1 in 10 post-neonatal child deaths prevented.

[16] Armstrong Schellenberg J et al. Effect of large-scale social marketing of insecticide-treated nets on child survival in rural Tanzania. *Lancet*, 2001, 357(21):1241–1247.

Measuring effectiveness is more difficult and methods used have included population-based active surveillance, health-service-based passive surveillance, repeated cross-sectional surveys, and case control studies. Although the results have been varied (see Table 1.1), due in part to different methodologies and choices of control groups, these trials have provided good evidence of the effectiveness of ITNs.

1.1.3 Early ITN projects

ITN projects have been implemented in many countries since the 1980s. These projects, and the degree to which they have been successful, have varied in ways that include:

- rationale for the geographical area of implementation (e.g. organizational mandate, historical presence);
- transmission intensities and vectors in the implementation area;
- indicators for monitoring and evaluation;
- target group or population;
- type and variety of nets and insecticide supplied;
- distribution mechanism for nets and/or insecticide;
- outlet for delivery of nets and/or insecticide;
- pricing policy for nets and insecticide;
- methods used to promote ITNs;

Figure 3. The repellent effect of the insecticide deters mosquitoes from entering the room (1). A treated net provides protection to the people sleeping under it, even if the net is torn or not tucked in completely (2). The insecticide provides some protection to those not sleeping under a net (3)

Source: Chavasse D, Reed C, Attawell K. *Insecticide-treated net projects: a handbook for managers.* Malaria Consortium, 1999.

- number and quality of partnerships between organizations.

Only a few countries, such as China, the Gambia, Solomon Islands and Viet Nam, have implemented ITN interventions on a national scale. China and Viet Nam have focused on treating existing nets rather than distributing nets, and have achieved relatively high rates of re-treatment. The population is responsible for acquiring nets, and the public sector is responsible for treating nets, either at no charge or at highly subsidized prices. The Gambia has also focused on re-treatment, given high levels of pre-existing net usage.

Re-treatment rates were high initially when the service was provided at no charge, but fell dramatically when fees for re-treatment were introduced.

Most ITN projects, however, have been small scale, focusing on a few villages or districts and involving limited collaboration with other organizations or sectors. Small-scale projects have often succeeded in improving coverage with nets and insecticide in project areas, but these projects only cover a small proportion of the total population at risk of malaria. As a result, access to ITNs is still low in most malaria-endemic countries.

1.1.4 Moving from projects to programmes

Since the launch of the Roll Back Malaria (RBM) global partnership in 1998, there has been increasing recognition of the need to go to scale from small projects to programmes that can achieve national coverage with ITNs. There are an estimated 500 million people at risk of malaria in Africa alone. Approximately 250 million nets are required to cover this population and, if a net has an average life span of five years, this means 50 million nets a year are needed to maintain coverage.

Challenges to going to scale include finding the most appropriate way to cover the costs of increasing ITN coverage, while at the same time ensuring that the poorest and most vulnerable are protected (see section 1.3) and that the growth of the commercial market is not undermined (see section 1.2.2).

Cost is a major limiting factor to going to scale. Most malaria-endemic countries in Africa spend only US$ 4 per capita a year on health, equivalent to the average cost of an untreated net in countries where nets are widely available. It would require US$ 200 million a year to provide 50 million nets and a further US$ 25 million a year

to treat these nets with insecticide. This is too costly for users alone or donors (or governments). There are various possible approaches to cost sharing:

- **Both donor and user contribute to each ITN**. Providing marginal subsidies for all ITNs is easy to implement. However, this approach subsidizes those who can afford to pay the full cost of a net and may still exclude the poorest.
- **Donors pay the whole cost of some ITNs and users pay the whole cost of others.** Targeting subsidies is less easy to implement. It must be strictly controlled to prevent "leakage" to the non-target population and the development of an illegal market in no-charge nets.
- **Donors contribute to ITNs for some target groups.** Market segmentation is an approach employed by many social marketing programmes, where nets of different prices are targeted at different socioeconomic groups. Branding is used to target expensive nets at wealthier groups and the profit from these nets is used to "cross-subsidize" lower priced nets for poorer groups.
- **Users pay for nets and donors pay for insecticides, or vice versa**. This is the approach used in China, the Gambia and Viet Nam. The population is responsible for buying their own nets, but the public sector provides subsidized re-treatment. This is easy to implement, but the poorest may be excluded from net ownership.

Chapter 5 provides more information on financing and pricing issues.

As mentioned above, there is **limited experience** with going to scale and national coverage has only been achieved in a few countries, mostly in Asia. As more programmes attempt to go to scale with ITN interventions, it will be important to document the experience and, in particular, to identify difficulties encountered and effective strategies to overcome these difficulties.

1.2 Developing national ITN strategies

Achieving large-scale coverage and overcoming the challenges of going to scale require the development of national ITN strategies. Such strategies can develop a long-term vision for ITNs and help to ensure that all partners work together to achieve this vision. Some countries, such as Ghana, Kenya, Mozambique and the United Republic of Tanzania, have already developed national ITN strategies. Key steps in developing a national ITN strategy include:

- bringing together potential partners;
- assessing the capacity of the commercial sector;
- creating an enabling environment for ITNs;
- establishing partnerships.

1.2.1 Bringing partners together

One of the first steps in developing a national ITN strategy is to identify and bring together the partners that can contribute to the development and implementation of the strategy. It is important that these partners, representing the government, nongovernmental and private sectors, work together to reach consensus on a shared vision for the future of ITNs and that all activities carried out by partner organizations fit within the national ITN strategy.

In many countries there have been many small-scale projects working in isolation. Some have achieved significant levels of coverage with nets, but few have sustained these achievements once project funding and the supply of nets and insecticides ends. A national ITN strategy should aim to look beyond short-term approaches and build consensus on how best to achieve sustainable supply and demand for nets and insecticides.

It is now generally accepted that sustainability will depend on nets, and possibly also insecticide, being distributed to the majority of the population through the commercial sector, with the public sector focusing its resources on the most vulnerable groups. Where consensus is reached that this is the way forward for the national strategy, partners need to agree on how best to create an enabling environment for growth of the commercial sector and how best to identify and target population groups unlikely to be reached by the commercial sector. It is also important to ensure that any current or planned ITN programmes implemented by the public sector or NGOs do not undermine the

growth of the commercial sector.
If possible, such programmes should be designed to complement and support expansion of the commercial market.

1.2.2 Assessing the capacity of the commercial sector

The contribution of the private sector is often underestimated. In many countries, the **commercial market in nets** has supplied substantial numbers of nets. Data from a national survey in the Gambia in 1994[17], for example, found that 51–76% of households owned one or more nets, and a recent review of available data[18] found an average (mean) of 20% of households with one or more non-project nets in 14 countries in Africa, south of the Sahara.

Even in countries where it is assumed that there is no commercial market, nets may be available from retail outlets. The experience of the United Republic of Tanzania shows that a commercial market can develop very rapidly, given the right conditions (see Box 1). In countries where most people do not own nets, it is important to investigate net availability in the commercial market and, if necessary, to catalyse sourcing (see Chapter 4) and distribution (see Chapter 5). Promotion (see Chapter 6) should only begin when nets are available.

Box 1 – The growth of the commercial net market in the United Republic of Tanzania

In 1990 rates of household net coverage were moderate in some areas, such as Dar es Salaam, but low in other areas. The status of the commercial market was similar to that of many other African countries.

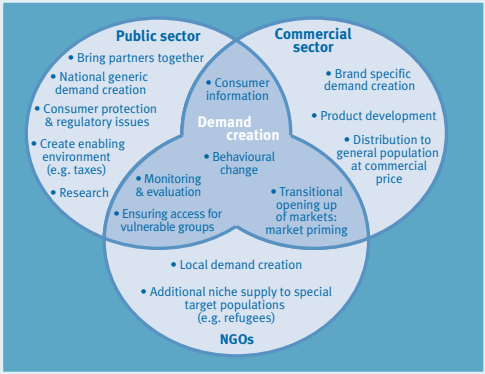
In 1994 one factory began to make moderate quality nets at moderate prices. Today three manufacturers together have the capacity to produce 4 million nets a year. Net sales in the retail sector increased from 200 000 in 1994 to 1 000 000 in 1999 and, also in 1999, 500 000 nets were sold to NGOs.

Competition in the wholesale and retail markets has both improved the quality of nets and reduced prices. The market is now approaching saturation in some urban areas, with coverage at over 70%. This has forced traders to seek new markets in rural areas resulting in significant increases in coverage.

[17] D'Alessandro U et al. Nationwide survey of bednets in rural Gambia. *Bulletin of the World Health Organization*, 1994, 72(3):391–4.

[18] Webster J et al. *Review of household coverage of nets in non-project areas of sub-Saharan Africa*. Malaria Consortium, 2001.

Figure 4 Roles of the public sector, NGOs and the commercial sector in creating an enabling environment



Source: Adapted from an original diagram produced by participants involved in development of the Tanzanian national ITN strategy.

Unlike nets, the commercial market in insecticides for net treatment is almost non-existent. In many countries only a small proportion of nets are treated, and almost all net treatment is carried out by government or NGO programmes or projects. The availability of dip-it-yourself (DIY) insecticide kits for home treatment of nets may lead to the development of a commercial market, although the likely nature and size of this market has yet to be determined.

1.2.3 Creating an enabling environment

There is no standard definition of "an enabling environment" nor are there specific guidelines for creating an enabling environment. This is because the situation and the national strategy will be different in each country, and the action required to create an enabling environment will depend on the current status of the commercial net and insecticide market. However, two important aspects of an enabling environment in every context are taxes and tariffs, and demand creation. The role of the public sector, NGOs and the private sector in creating an enabling environment for sustainable ITN coverage is illustrated in Figure 4.

Reducing taxes and tariffs can catalyse procurement, manufacture and distribution of nets and insecticide, and support expansion of the commercial market. These reductions should apply to netting as well as to ready-made nets, to enable local manufacturers to compete. The need to reduce taxes and tariffs is now widely accepted and, at the African Summit on Roll Back Malaria in Abuja in April 2000, 44 African Heads of States and Governments pledged to: "*improve access to malaria prevention through the reduction of taxes and tariffs for mosquito nets and materials, insecticides, anti-malarial drugs and other recommended goods and services that are needed for malaria control strategies*".

Creating demand for nets and insecticide will also support expansion of the commercial market and catalyse competition within the private sector.

All partners should play a role in demand creation, but in different ways. In countries where national ITN strategies are being planned, it is envisaged that the public sector and NGOs will play a key role in generic demand creation, leaving the commercial sector to supply and distribute nets and insecticide and to promote specific branded products. Chapter 6 provides more information about promotion. The capacity of the private sector, however, for both the manufacture and distribution of nets and insecticide varies considerably between countries and should be assessed before considering a strategy that depends upon capacity in this sector.

The effect of brand-specific advertising, used by some social marketing programmes, on the commercial market is still not clearly understood. Most experience of branding of socially marketed products is through condom programmes. Social marketing of condoms has provided evidence of the "halo effect", where promotion of a specific brand also increases sales of other brands. The evidence for this "halo effect" on sales of nets and insecticide, however, is still inconclusive, because information about the impact of ITN interventions on the commercial net and insecticide market is limited. More information is needed so that countries can make informed decisions about national strategies. Chapter 7 provides more information about social marketing.

Box 1.2 : Public-private partnerships in Ghana

The NMCP opted for a public-private partnership to increase the accessibility and affordability of ITNs in Ghana. An ITN task force was established including representatives from the Ministry of Health (MoH), United Nations Children's Fund (UNICEF), WHO, United States Agency for International Development (USAID), United Kingdom Department for International Development (DFID), Danish International Development Assistance (DANIDA), Programme for Appropriate Technology in Health (PATH) Canada, Basic Support for Institutionalizing Child Survival (BASICS), commercial firms and the Ghana Social Marketing Foundation.

The aim of this task force partnership is to create demand for ITNs and re-treatment of nets, and for this demand to be met by the commercial sector. Challenges identified include:

- increasing awareness of the advantages of using an ITN so that people will be willing to pay the cost;
- encouraging the government to waive taxes through appreciation of the advantages of the population using ITNs;
- expanding the government's health cost exemption policy for under fives to include ITNs;
- increasing the availability, and thereby bringing down the costs, of nets (this is a particular challenge, since Ghana has no local manufacturers of nets, importers need capital to cover their costs, and retailers want nets on credit from importers).

Source: Marfo C. *Presentation at the workshop on the promotion of insecticide-treated nets in the Africa region*. Harare, 6–9 March 2001.

1.2.4 Establishing partnerships

Some countries have established public-private partnerships, between NMCPs or other public sector institutions and the commercial sector, to support going to scale with ITNs.

Ghana, for example, has included public-private partnerships in its national ITN strategy. Useful lessons can be learned from the Ghanaian experience of such partnerships (see Box 1.2).

Effective public-private partnerships depend on the partners having the same purpose, such as increased net sales, even if the reasons for the purpose are different. The reason for the purpose is likely to be different for each partner: public good in the public sector, and commercial profit in the commercial sector.

1.3 Potential approaches to ITN interventions

National strategies can employ one or more of a range of potential approaches to ITN interventions (summarized in Table 1.2), including:

- demand creation;
- sustained subsidies for equity;
- revolving fund;
- social marketing;
- "pump-priming";
- emergency relief.

The choice of approach or approaches will depend on the national context and, in particular, on the status of the commercial market, and on factors to do with institutional policy, epidemiology and population, nets and insecticide, and knowledge and behaviour. Chapter 2 provides information about assessment of these factors.

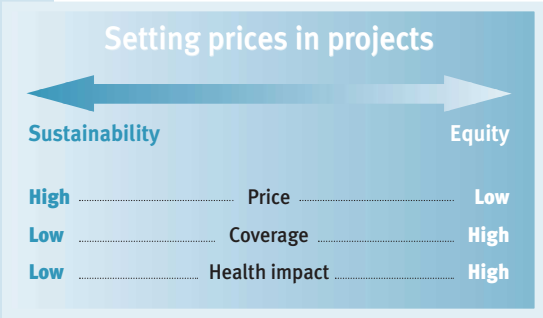
Different approaches may be required for financing, distribution and promotion of nets and insecticide, because supply of and demand for these commodities are often very different. Chapter 5 provides more information on financing and distribution; and Chapter 6 more information on promotion.

1.3.1 Demand creation

A demand creation approach aims to stimulate increased demand in order to stimulate increased supply by the commercial market. There is unlimited scope for scaling up demand creation. The public sector, NGOs and the private sector all have a role to play in creating demand, but in different ways. With this approach, the public sector and NGOs focus on generic demand creation, leaving supply, distribution and brand-specific promotion to the private sector and social marketing programmes.

Demand creation is a medium- to long-term approach, to ensure that any market it helps to develop is sustainable. It can be targeted to specific geographical areas but is not usually targeted to vulnerable groups, because the primary aim is to stimulate growth of a sustainable commercial market.

Figure 5 The balance between equity and sustainability



Source: *Insecticide-treated nets in the 21st century: report of the 2nd international conference on insecticide-treated nets.* Malaria Consortium /WHO/USAID/UNICEF/MoH United Republic of Tanzania, 2000.

1.3.2 Sustained subsidies for equity (targeting vulnerable groups)

A sustained subsidies for equity approach aims to ensure that vulnerable population groups have access to ITNs. The poorest, and those most at risk of malaria, may not be protected if net distribution is left to the commercial sector. While it is easy to identify biologically vulnerable groups, such as children under five and pregnant women, it is more difficult to reach consensus in a community about which households are the poorest. In larger scale programmes, targeting based on biological vulnerability is likely to be more feasible than targeting based on socioeconomic status. Sustained subsidies for equity is a long-term approach. The potential for going to scale is limited by the size of the vulnerable population groups and by available resources. Sustained subsidies for equity can target specific geographical areas, if appropriate.

This approach needs to be carefully planned and controlled to ensure that it complements efforts to expand the commercial market. It requires effective targeting mechanisms to ensure that only

the intended population groups benefit from no-charge or highly subsidized nets and insecticides. Ineffective targeting can subsidize those who do not need it, diverting sales from the commercial market, or lead to the development of an illegal market where people sell nets at a profit.

There is limited experience of tightly controlled targeting of ITNs, with the exception of Malawi and the United Republic of Tanzania, where Population Services International (PSI), a social marketing organization, has been targeting pregnant women with nets that are more highly subsidized than other brands.

Nets provided at no charge by PSI are sold by health workers to antenatal clinic attendees at a subsidized price, and the health workers retain a small commission for each net sold. These subsidized nets are differentiated, by colour and brand, from those sold in the commercial market. Chapter 5 provides more information about targeting vulnerable groups; and Chapter 7 more information about social marketing.

1.3.3 Revolving fund

A revolving fund approach aims to sell nets and insecticides at prices that cover all the costs of an ITN intervention, not just the cost of the nets and insecticides, to replenish and maintain the initial fund.

A revolving fund is a long-term approach. Few programmes, however, have been able to establish revolving funds that are truly sustainable.

The potential for going to scale is limited by the size of the initial fund and sales revenue. Revolving funds can be targeted to specific geographical areas but are not usually targeted to vulnerable groups, because the primary aim is to recover all costs. This approach competes with or may substitute for private sector sales, but will not undermine the market, because nets and insecticides are sold at similar prices.

1.3.4 Social marketing

A social marketing approach aims to increase demand in the commercial market (the "crowding in" or "halo effect") in order to increase sales both of socially marketed branded nets and of non-programme nets. It may also aim to provide subsidized nets and insecticides to socioeconomically or biologically vulnerable population groups. As discussed above (see section 1.3.2) it is more feasible to target biologically vulnerable groups than socioeconomically vulnerable groups, and there has been limited experience with tightly controlled targeting of specific population groups. Social marketing can and has been used to target specific geographical areas, depending on available delivery channels and outlets. Social marketing is a long-term approach. The availability of donor funds, however, limits both the time-scale and potential for going to scale with social marketing.

Although this approach aims to stimulate demand in the commercial market, it has the potential to undermine the private sector because of unequal competition. For example, donor-funded social marketing programmes may benefit from tax and tariff exemption that is not available to commercial suppliers, enabling prices to be set lower than those in the commercial market. Price levels, usually similar to or slightly lower than those in the private sector, depend on the level of cost recovery to be achieved. The evidence about positive or negative impact of social marketing on the growth of the commercial sector is conflicting and more information is needed. Negative impact can be avoided by limiting the duration of social marketing programmes, in the same way as "pump-priming", or by limiting the quantity of nets distributed to a small proportion of those distributed by the retail market. Social marketing can also play a role in demand creation alone, without involvement in distribution of nets and insecticide.

1.3.5 "Pump-priming"

A "pump-priming" approach aims to stimulate demand in the commercial market. New customers are encouraged to buy nets at lower prices than the private sector. The intention is that they will use and like using a net and will buy a replacement when needed from the commercial market, and that their neighbours will also be encouraged to acquire nets. This is a short-term approach. Selling nets at lower prices than the private sector in the medium or long term will undermine the commercial market. Pump-priming can be targeted to specific geographical areas and vulnerable groups.

1.3.6 Emergency relief

An emergency relief approach aims to make nets and insecticides available to refugee and internally displaced populations in complex emergency situations. This is a short-term approach. It can become long term in chronic complex emergencies, however, and ITNs are likely to be a more appropriate intervention in the chronic phase of emergencies. Emergency relief targets the specific geographical areas that people have moved to. It can target biologically vulnerable groups. Targeting socioeconomically vulnerable groups is not likely to be necessary in the acute phase of emergencies but may be desirable in the chronic phase of complex emergencies. The acute phase is defined as the period where crude mortality rate is above one death per 10 000 per day, while the chronic phase is a longer-term situation characterized by some areas remaining in an acute phase while others move towards the post-emergency phase.

Table 1.2 Potential approaches to ITN interventions

	Operational characteristics and indicators						
Approach	Intended **duration** of intervention	Scope for going to scale	**Pricing policy**	Targeting of delivery by **geographical area**	Targeting of delivery by socioeconomic status **(the poor)** and/or by biological vulnerability to malaria **(children under five and pregnant women)**	**Intended impact on commercial market**	**Indicators of operational success**
Demand creation	Medium- to long-term	Unlimited	Market forces	Possible – depends on size/scale of markets and reach of promotion	No	Stimulation of demand	• Commercial sales volumes • % coverage • Cost-effectiveness of demand creation
Sustained subsidies for equity	Long-term	Limited by size of target group	No-charge or low prices	Possible	Essential	Complementary (may stimulate demand in non-target groups)	• % additional coverage in target groups • Effectiveness of targeting (leakage to non-target groups) • Cost per net delivered to target group
Revolving fund	Long-term	Limited by resources	Price must cover all costs (including distribution, handling, administration)	Possible	Usually undesirable – selling to all helps to spread fixed costs, therefore keeping prices down	Competition/ substitution	• Project sales volumes • Financial viability (independence from subsidy) • Cost per net delivered • % coverage
Social marketing	Long-term	Limited by resources	Similar or lower than the commercial market	Possible – depends on delivery channels	Some segmentation possible	Stimulation of demand ("crowding in" or "halo effect")	• Project sales volumes • Commercial sales volumes • % coverage • Cost per net delivered • "Crowding in" versus "crowding-out"
"Pump-priming"	Short-term	Limited by time	Low prices (to encourage take-up) but not too low (to reduce perceived value)	Possible	Possible	Stimulation of demand	• Increased sales in commercial market (usually post-intervention) • Cost effectiveness of demand creation
Emergency relief	Short-term	Limited	No-charge or very low prices (Equity)	Essential	Biological targeting possible, but economic targeting unlikely	Irrelevant	• Number of ITNs delivered • % coverage in target groups

Assessment

Chapter 2

Assessment

It is important to assess the current ITN situation and the factors that determine the choice of strategy before deciding what ITN strategy is appropriate for the country or organization, and before planning a national strategy or a programme.

This chapter describes what needs to be assessed and how to determine what needs to be known.

The most important aspects of assessment are:

- **institutional and policy factors;**
- **malaria epidemiology and population factors;**
- **net and insecticide factors;**
- **knowledge and attitude factors.**

2.1 Institutional and policy factors

The main factors to assess are:

- NMCP mandate and scope – programmatic, geographical, duration;
- policy context – international, national;
- other organizations – NGOs, social marketing programmes;
- commercial sector.

2.1.1 Organizational mandate and scope

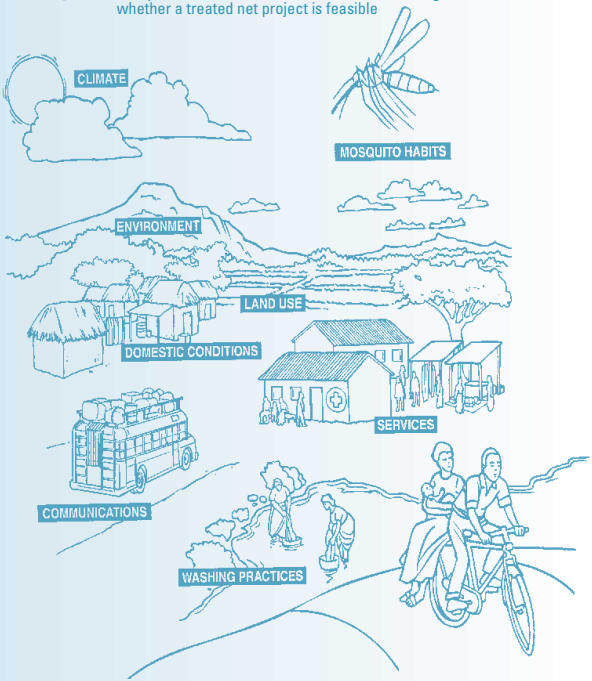
The mandate of the NMCP and of other organizations is the main factor that determines the strategy adopted for ITN interventions. As discussed in Chapter 1, for example, an organization with a mandate that emphasizes poverty and equity is likely to take an approach involving targeting the most vulnerable population groups with no-charge or subsidized ITNs.

Another important strategic issue to consider is geographical scope. For example, the NMCP will have a national mandate, but other organizations, such as NGOs, may focus their efforts in certain regions or districts. The time that an organization intends to devote to ITNs is also an important factor, as some strategies require longer-term intervention than others.

The following questions should be used to help to identify current activity and gaps in implementation:

- What is the mandate of the NMCP and of other organizations in terms of reaching specific target groups, achieving sustainability, ensuring equity?
- What is the geographical scope of the NMCP and other organizations?
- What is the time-scale of ITN interventions by the NMCP or by other organizations?
- How do ITNs fit into the overall policies and strategies of the NMCP?
- How well developed is the commercial market for nets and insecticide?
- Are there any other organizations working on ITNs or related areas with which partnerships may be formed?

Figure 6 Many factors have to be assessed when deciding whether a treated net project is feasible



Source: Chavasse D, Reed C, Attawell K. Insecticide-treated net projects: a handbook for managers. Malaria Consortium, 1999.

2.1.2 International and national context

The national ITN strategy should fit within the international policy and strategic framework. RBM sets out clearly the role of ITNs in malaria control. At national level, approaches adopted by social marketing projects, NGOs and other organizations should function within the national strategy for ITNs.

2.1.3 Other organizations

NMCP managers need to be aware of other organizations that are implementing ITN interventions, what approaches they are using, where they are working, and what impact they have achieved.

Competition should be avoided, unless it is within the private sector. One of the most important functions of the NMCP is to promote collaboration and complementarity of activities.

2.1.4 The commercial market

It is also important to assess the size and penetration of the commercial market in nets and insecticide, since this will determine what role government and other organizations should play, and what measures might be required to support a larger role for the private sector. For example, if the private sector is already providing these commodities, care is needed to ensure that interventions do not undermine the market.

2.2 Malaria epidemiology and population factors

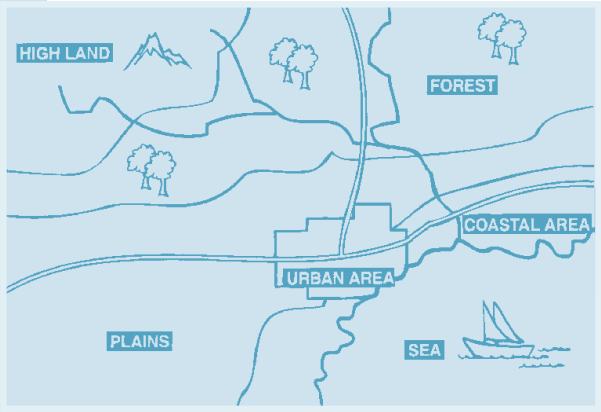
The main factors to assess are:

- malaria – epidemiology, vector species and biology;
- population – demographic data, vulnerable groups, socioeconomic status.

The following questions should be used to help to identify target areas and populations:

- What are the levels of malaria endemicity and transmission in the country?
- Are there variations in endemicity and transmission in different parts of the country?
- Is malaria transmission stable or unstable?
- Will climatic or epidemiological factors affect the feasibility of ITN interventions?
- What is the biology and behaviour of the malaria vectors?
- What is the total population and the distribution of the population?
- What population groups are most vulnerable?
- What is the distribution of vulnerable groups such as children under five and pregnant women?
- Are there refugees or internally displaced persons?
- What is the socioeconomic status of the population?

Figure 7. Making a simple map can help in assessing areas of high malaria transmission



Source: Chavasse D, Reed C, Attawell K. Insecticide-treated net projects: a handbook for managers. Malaria Consortium, 1999.

2.2.1 Malaria epidemiology

Malaria can be divided into four levels of endemicity and transmission, as described in Box 2. Malaria can also be epidemic. Malaria endemicity and transmission levels vary greatly within countries, and there can be considerable differences even within a relatively small area.

Levels of endemicity and transmission are affected by climate and population factors.

Climate factors include temperature and rainfall. Malaria is usually absent at high altitudes because of low temperatures. The altitude limit for malaria transmission is highest near the equator and decreases as distance from the equator increases. So in an area with different altitudes, there may be high malaria transmission in low-lying plains but no transmission in higher hills and mountains. In many countries, malaria transmission increases during or just after the rainy season, because heavy rainfall increases the number of breeding sites for vectors such as *A. gambiae*. In areas with transmission all year round, there may still be a peak during or just after the rainy season. In contrast, in some parts of South Asia, failure of the rains leads to increased transmission, because vectors such as *A. culcifacies* prefer to breed in shallow water.

Box 2 – Malaria endemicity and transmission

Holoendemic

Areas with perennial high-degree transmission producing considerable immunity in all age groups, particularly adults (parasite rate in infants constantly over 75%).

Hyperendemic

Areas with intense but seasonal transmission where immunity is insufficient to prevent effects of malaria in all age groups (parasite rate in children of 2–9 years old constantly over 50%).

Mesoendemic

Typically found in rural communities with varying intensity of transmission (parasite rate in children of 2–9 years old as a rule 11–50%).

Hypoendemic

Areas with little transmission and malaria does not affect the general population significantly (parasite rate in children of 2–9 years old as a rule less than 10%).

Population factors include patterns of agricultural land use and irrigation, urbanization and economic activity. In parts of Africa, irrigated rice fields provide a good breeding site for *A. gambiae* and malaria transmission will increase if these fields are sited close to population centres. In parts of South Asia, *A. stephensi* has adapted to the urban environment by breeding in water storage tanks.

In areas where malaria is stable, ITNs are likely to have less effect on levels of transmission than in areas of unstable malaria, where they may reduce transmission levels in addition to providing personal protection.

2.2.2 Vector species and biology

Different species of *Anopheles* behave differently in terms of what, when and where they bite, and where they rest after biting. Table 2.1 summarizes the characteristics of some of the main malaria vectors in Africa and Asia. These characteristics can vary between countries and at different times, so it is important to obtain accurate, up-to-date national and local sources of information (see Table 2.2).

Table 2.1 Characteristics of *Anopheles* vectors in Africa and Asia

Anopheles species	Biting site	Biting time	Resting site	Host preference	ITN suitability	Breeding sites
A. gambiae	Indoors	Mainly late	Mainly indoors	Mainly human	+++	Sunlit temporary pools, rice fields
A. arabiensis	Indoors and outdoors	Mainly late	Indoors and outdoors	Human and animal	+	Temporary pools, rice fields
A. melas	Indoors and outdoors	Mainly late	Indoors and outdoors	Human and animal	+	Saltwater lagoons, mangrove swamps
A. merus	Indoors and outdoors	Mainly late	Indoors and outdoors	Mainly animal	+/–	Saltwater lagoons, mangrove swamps
A. funestus	Indoors	Mainly late	Indoors	Mainly human	+++	Semi-permanent and permanent water with vegetation, swamps, slow streams, ditch edges
A. dirus	Indoors and outdoors	Mainly late	Mainly outdoors	Mainly human	+/–	Small shady pools in forest and plantations, footprints, streams, wheel ruts, gem pits, hollow logs, wells
A. minimus	Mainly outdoors	All night	Mainly outdoors	Human and animal	+/–	Streams in forested foothills
A. maculatus	Mainly outdoors	Peak biting 19.00–24.00 hours	Mainly outdoors	Mainly animal	–	Sunlit streams, ponds, tanks, riverbed pools
A. sundaicus	Indoors and outdoors	All night	Indoors and outdoors	Human and animal	+/–	Brackish or salt water near coasts, rock pools, river mouths
A. culicifacies	Indoors and outdoors	Peak biting 21.00–23.00 hours	Mainly indoors	Mainly animal	+/–	Clean and polluted habitats, irrigation ditches rice fields, swamp pools, wells, borrow pits, edges of streams. Prefers breeding sites associated with slight rain

A. stephensi	Indoors and outdoors	Peak biting before 24.00 hours	Indoors	Animal	–	Urban cisterns, wells, gutters, polluted water; rural grassy pools and alongside rivers
A. sacharovi	Indoors and outdoors	All night	Mainly indoors	Human and animal	+/–	Brackish water of marshes, pools and ponds, especially with vegetation. Prefers sunlit habitats
A. pulcherrimus	Indoors and outdoors	Evening and night	Indoors and outdoors	Mainly animal	–	Weedy irrigation channels, marshes, clean stagnant water with or without vegetation, slow moving streams, ditches, rice fields
A. superpictus	Indoors and outdoors	Mainly early evening	Indoors	Mainly animal	–	Prefers flowing waters, such as shallow water over rocky streams, pools in rivers, muddy hill streams and where vegetation is present
A. barbirostris	Indoors and outdoors	All day long	Mainly indoors	Mainly animal, but human in some locations	–	Swamps or ponds with some vegetation. Prefers partial shade. Larvae often occur in shaded corners of rice fields, ditches, earthen wells, sometimes brackish water
A. aconitus	Indoors and outdoors	Peak biting around 24.00 hours	Indoors and outdoors	Human, sometimes animal	+/–	Larvae occur in rice fields, swamps, irrigation ditches, pools, and streams with vegetation. Prefers sunlit habitats
A. subpictus	Indoors and outdoors	Evening feeders	Indoors and outdoors	Human and animal	+/–	Muddy pools near houses, gutters, borrow pits, and brackish water
A. annularis	Mainly outdoors	Evening ending by 23.00 hours	Mainly outdoors	Mainly animal	–	Larvae occur in rain-fed tanks, vegetation and irrigation canals

Source: Adapted and expanded from Mehra, S & Malaria Consortium. *Partnerships for change and communication: guidelines for malaria control.* WHO/Malaria Consortium, 1997.

ITNs are most likely to reduce malaria transmission where malaria vectors:

- bite indoors;
- bite at night when people are asleep;
- rest indoors;
- bite humans preferentially.

2.2.3 Demographic data

The most accurate information available about the total population of the country, its regions and districts, should be obtained from the census or from other sources if the census is out of date. Data should also be collected about the size of vulnerable groups, for example the proportion of the population who are under the age of five years, or pregnant, or with the lowest socioeconomic status.

It is also important to assess what proportion of the population is at risk from stable endemic malaria or from epidemic malaria. The MARA (Mapping Malaria Risk in Africa) web site (see Table 2.2) presents models of malaria distribution and estimates of populations at risk of malaria.

2.2.4 Vulnerable groups

The risk of malaria infection depends on the risk of being bitten by an infected mosquito, which itself depends on levels of transmission and exposure. The risk of infection leading to severe malaria disease depends on a person's immune status and access to treatment. Within populations at risk of malaria, certain groups are particularly at risk of infection – the poor, refugees and internally displaced persons – or of severe disease – children under five and pregnant women.

Children under five years of age have not yet developed protective levels of immunity because they have had limited exposure to malaria. In areas of high transmission, young children are both at high risk of malaria infection and vulnerable to severe malaria disease when infected. This is why children under five are usually one of the main target groups for malaria control interventions.

Pregnant women are also an important target group for malaria control interventions. The protective immunity that adults develop in areas of high or moderate transmission is impaired during pregnancy. In such areas, pregnant women with symptomatic malaria often have severe anaemia, and low birth weight is a common outcome. In areas of low transmission where adults do not develop protective immunity, malaria

infection in pregnancy is associated with severe disease and high maternal and perinatal mortality.

The poor are often at greater risk of infection and of severe disease, because of lack of information about what causes malaria and about how to prevent and treat it, and because measures to prevent and treat malaria are not financially or physically accessible. In addition, the poor have lower immunity because of disease and poor nutrition, and higher exposure because of inadequate housing and drainage.

Refugees, internally displaced persons, and migrant or seasonal workers who move from areas of no transmission or low transmission to highly endemic areas are at particular risk of infection, because they lack protective immunity. Even in countries that are generally highly endemic, urban populations displaced to rural areas, where malaria risk is often higher, are vulnerable. In this situation, all age groups will be at risk of severe malaria. Conversely, non-immune populations in areas of no or low transmission may be at increased risk from an influx of people displaced from a highly endemic area.

Table 2.2 Sources of information

	Source
Institutional and policy factors:	
Organizational scope	Organizational strategy papers and plans, reviews and consultancy reports.
International and national context	RBM strategy, NMCP strategies and plans.
Other organizations	Umbrella organization reports, NGO and other organization reports.
Commercial market	NetMark[19], market research organizations, commercial organizations.
Malaria epidemiology and population factors:	
Malaria epidemiology	MARA, other national-level Geographical Information Systems, NMCP survey data, research institutions and universities, projects and programmes, regional health managers, district health managers.
Vector species and behaviour	NMCP, research institutions and universities, projects and programmes, regional health managers, district health managers.
Vulnerable groups	Census data, MOH, Demographic and Health Survey, reports by organizations such as UNICEF 'The State of the World's Children', The World Health Report, national poverty statistics and Living Conditions Survey, Office of the United Nations High Commissioner for Refugees (UNHCR) reports, NGO reports.
Internet:	
www.mara.org.za	Maps of climatic suitability for the transmission of stable malaria, duration of the transmission season, first and last month of transmission, data on population at risk of stable endemic and epidemic malaria.
www.rbm.who.int	Wide range of information on RBM progress and related malaria issues.
www.unhcr.org	Refugee and internally displaced persons situation in a variety of countries.
www.idpproject.org	Global IDP database of the Norwegian Refugee Council.

[19] NetMark is a public-private partnership for the promotion of a commercially sustainable market for insecticide-treated materials in the Africa region. More information is available from the NetMark web site: http://www.netmarkafrica.org.

2.3 Net and insecticide factors

The main factors to assess are:

- current distribution and use of nets and insecticide;
- types of nets people prefer;
- ability and willingness to pay.

2.3.1 Net and insecticide distribution and use

Methods for finding out about net and insecticide availability and cost and for assessing current use of nets and insecticide, include:

- household survey
- interviews and questionnaires
- focus group discussions
- commercial retail survey
- existing data.

Household surveys can be used to observe what proportion of households has a net, what types of nets are used, and who sleeps under nets. Household surveys can be expensive and time-consuming, but a well-designed randomized survey can provide baseline information about net coverage. This is useful for evaluation, if increasing coverage is an objective of the intervention. Information should be recorded about the size, shape, colour, condition, source, and brand name of nets,

The following questions should be used to help to decide what actions are required by the NMCP to ensure effective distribution of nets and insecticide:

- Are nets available?
- How many people already have a net?
- What proportion of the poor own a net?
- How much do nets cost?
- Are nets available locally for less than US$ 10?
- What types of nets do people currently use?
- What types of nets would they prefer to use?
- Is insecticide available?
- How many people use insecticide to treat their nets?
- What proportion of the poor use insecticide to treat their nets?
- How much does insecticide cost?
- What is the average income?
- How much cash do people have?
- At what times of the year do people have cash?
- What can people afford to pay for nets and insecticide?
- Who cannot afford to pay for nets and insecticide?

and about sleeping habits. It is important that all investigators carrying out the survey record the variables in the same way. For example, they need to be able to recognize the same product as ready-made or stitched and to describe sizes in the same way. The sample of households does not need to be very large, but it must include different groups of people, for example different ethnic groups, who may have different preferences and different sleeping habits.

Interviews and questionnaires can be used to collect information from key informants, such as community leaders or health workers, and from a wider sample of people. Interviewers must take care not to lead the responses of informants. Questionnaires delivered through outlets such as clinics and schools can be used to ask the same questions about net characteristics. Questionnaires completed by respondents rely on the description of the net by the net owner, however, and different individuals may describe the same things in different ways.

Focus group discussions, involving a small group of 6–8 people, can provide useful information about people's attitudes and beliefs. The discussion is facilitated to ensure that all participants are able to voice their opinions. It is important to make sure that the participants are representative of the intended population or target group.

Commercial retail surveys, including retail outlets, hawkers, local tailors who produce nets, and other private sector providers, can provide valuable information about the numbers and types of nets and insecticides sold.

Existing data from other programmes and projects may provide information about current and past distribution of nets and insecticide. Other organizations, such as social marketing projects, may have data about net and insecticide coverage, use and sleeping habits.

Examples of some of the questions that should be used about net and insecticide distribution and use include:

- Are nets available in your local shops or market?
- Do you have a net?
- Where did you buy your net?
- What type of net is it (size, shape, colour)?
- Have you heard about ITNs?
- Are ITNs available in your local shops or market?
- Do you have an ITN?
- How many times has it been re-treated?
- How often do you wash your ITN?

Information about current distribution and use will help to determine the strategies adopted. For example, if most people already have a net, it is not necessary to become involved in net distribution. If net use is low or inconsistent, it may be necessary to develop communication activities to encourage appropriate behaviour. Similarly, if ownership among the poorest is low, targeted subsidies may be required.

If most people do not have nets, however, it is important to find out why. For example, it may be necessary to improve the availability of nets, or to investigate sourcing and procurement to ensure that nets are available at reasonable prices, or to focus on marketing nets. If distribution is necessary, this should be done in a way that avoids adverse effects on the growth of the commercial market, and that limits the scope and duration of public sector distribution.

2.3.2 Net preferences

The nets that people use may be the type they prefer, or the best of the available options, or the only type available. In some settings, lack of choice or dislike of the type of nets available may be one reason why people do not own or use a net.

It is important to assess what type of net people would choose to use, based on a clear understanding of the range of available options. Methods for assessing net preferences include:

- demonstration survey;
- net placement survey;
- existing data.

Demonstration surveys are surveys with structured interviews, where the interviewers demonstrate the range and relative costs of the nets available. This can be carried out at the same time as a household survey, demonstrating net options after assessing current net use.

Net placement surveys are surveys where different types of nets, in a range of colours, sizes and shapes, are given to a sample of community members for a period of time, after which they are asked for their views about the different options.

Existing data from other ITN surveys and programmes may provide information about net preferences.

2.3.3 Ability and willingness to pay

Assessment of ability to pay by the majority of the population or target group is important to determine the price of nets and insecticide, if the interventions will

include distribution of these commodities. Unless nets and insecticide will be provided at no charge, an assessment of what people can afford to pay should be made. To do this, it is necessary to find out about average annual incomes, and seasonality of income and cash availability.

Availability of cash depends on expenditure as well as income. For example, an urban manual labourer may earn a higher daily wage than a rural farmer, but may also have higher living costs – people in urban areas need to buy food, whereas farmers can grow most of their food. Community income and cash availability may also vary by season. For example, rural communities tend to have more money directly after harvest.

The seasonal availability of cash should also be considered when planning the timing of promotional campaigns. Ideally nets should be promoted both when malaria transmission is highest and when people have cash to buy nets. If the time when people have money does not coincide with the malaria season, promotion should be timed to coincide with cash availability.

Assessment of who cannot afford to pay is important if the interventions will include targeting subsidized or no-charge nets and insecticide to the poorest. This will require a more in-depth assessment—through a socioeconomic household survey—to identify those in the community who cannot afford to pay.

Information about willingness to pay is less accurate than information about ability to pay, and less useful in determining price. For example, if a person is asked how much they are willing to pay for something, they are likely to opt for a low value in the hope that this results in the price being set at a low level. Willingness to pay for ITNs also depends on other household priorities and on the level of nuisance biting by mosquitoes. Unlike ability to pay, however, willingness to pay can be influenced by promotional campaigns.

Examples of questions that should be asked about ability and willingness to pay include:

- What is your occupation?
- How many children are there in your household?
- Who controls the household budget?
- Who decides about making household purchases?
- Does this depend on the type of purchase?

The following questions should be used to help to determine what topics promotional messages should focus on and how best to promote ITNs:

- What does the community know about malaria?
- How do people think malaria is transmitted?
- What are people's perceptions about mild malaria? What are their perceptions about severe malaria?
- Who is considered to be vulnerable to malaria?
- How do people assess their own risk of malaria infection?
- What do people know about malaria prevention?
- What are the perceptions about nets among net users?
- What are the perceptions about nets among non-users of nets?

2.4 Knowledge and attitude factors

The main factors to assess are:

- perceptions about malaria, its causes and prevention;
- perceptions about nets, insecticides and ITNs;
- sources of information.

2.4.1 Perceptions about malaria, its causes and prevention

An understanding of perceptions about malaria, its causes and prevention, is important in assessing whether or not the population will see the need for ITNs and be willing to use them. Finding out about people's perceptions is also important in deciding what messages to include in ITN promotional campaigns.

The most common method for finding out about perceptions is a Knowledge, Attitude and Practice (KAP) survey. Other methods include questionnaires, interviews, focus group discussions and review of existing data. Whichever methods are used, input from a social scientist with community knowledge and experience is recommended.

Malaria. An assessment of what people understand about malaria should be made. For example, their understanding of mild, febrile malaria may coincide with the biomedical model of malaria, but their understanding of severe, complicated malaria may be very different. In some countries, cerebral malaria is considered to be a different disease with different causes from uncomplicated malaria.

Malaria transmission. It is important to find out whether or not people understand the role of mosquitoes in malaria transmission, and are aware that not all mosquitoes transmit malaria. People need to know that malaria is transmitted by mosquitoes, if they are to understand the role of ITNs in preventing malaria by preventing mosquito bites.

Risk and vulnerability. It is also important to assess perceptions about individual risk and vulnerable population groups. Even if people have an understanding of the risk of malaria, they may not take steps to protect themselves if they do not see that they are personally at risk. Communities may not always recognize that young children and pregnant women are the most vulnerable to severe malaria disease.

Figure 8 It is important to assess community interest in treated nets and to secure community commitment

Source: Chavasse D, Reed C, Attawell K. *Insecticide-treated net projects: a handbook for managers.* Malaria Consortium, 1999.

Examples of some of the questions that should be used about perceptions of malaria include:

- What are the symptoms of malaria?
- What causes malaria?
- Who is most vulnerable to malaria?
- What do you do to protect yourself from malaria?

2.4.2 Perceptions about nets, insecticides and ITNs

Assessing the perceptions of net users and non-users about nets, insecticides and ITNs is essential to inform the design of promotion and communication activities.

It may be more difficult to identify people who have experience of using ITNs in communities where treatment of nets is not common. It may be possible, however, to find people who have had experience of the effects of insecticide, either through indoor residual spraying campaigns or use of insecticide sprays.

It is important to find out what motivates people to use nets, what prevents people using nets, and whether there are important differences between users and non-users of nets. For example, preventing nuisance biting is often a much stronger motivator for net and ITN use than preventing malaria. Non-use of nets may be related to factors such as gender, social status, education, culture, ethnicity, cost or access.

Questions that should be asked about perceptions about nets and insecticides can be based on the following table of "enabling" and "blocking" perceptions: (see table 2.3)

2.4.3 Sources of information

The final factor to assess is where people obtain information about health issues such as malaria and about commodities such as nets and insecticides.

The key sources of knowledge and influence in the community should be identified because this information will inform the design of communication activities. These sources may include respected individuals, such as community or religious leaders, schools, health clinics and the media. If the media is important, it will be necessary to find out how many people have access to radio, television and printed material, as well as about literacy levels.

Table 2.3 Perceptions that may enable or block the introduction of ITNs

	Enabling perceptions	Blocking perceptions
Perceptions of malaria	• Priority disease • Serious and mild forms exist	• Mild disease with no serious or fatal outcomes
Malaria transmission	• Transmitted by mosquitoes • Transmitted by a particular type of mosquito	• Transmitted in other ways
Existing net use	• Tradition of using nets • Positive perceptions about nets: prevent malaria; allow a good night's sleep; keep out other pests; provide privacy; are decorative	• Negative perceptions about nets: hot and no air circulation; difficult to hang; fire hazard • Use other products, e.g. coils • Use only at certain times of the year • Nets washed frequently
Use of insecticides	• Experience of mosquito and malaria reduction through indoor residual spraying programmes • Use insecticide sprays or other sprays for killing insects within the home	• Toxicity fears
Use of ITNs	• Positive perceptions about ITNs: prevent malaria; allow a good night's sleep; kill bedbugs, fleas, head lice and mosquitoes	• Negative perceptions about ITNs: fear of side-effects (e.g. birth control); dislike of the smell

Planning, monitoring, and evaluation

Chapter 3

Planning, monitoring, and evaluation

After conducting an assessment (see Chapter 2), the next step is planning, both to develop a national strategy and to plan an ITN programme or interventions in more detail. A clear plan will also help decide how to monitor and evaluate the programme or interventions. This chapter outlines the main issues to consider in planning, monitoring and evaluation.

3.1 Planning

The most important aspects of planning are:

- developing a national strategy;
- developing a framework;
- staffing, training and supervision;
- budgeting and funding;
- planning monitoring and evaluation.

3.1.1 Developing a national strategy

The key elements of a national strategy include:

- creating an enabling environment;
- demand creation/promotion – generic/brand specific;
- supply of nets and insecticide;
- distribution of nets and insecticide;
- equity and vulnerable groups;
- regulation – setting standard specifications and registration of products;
- advocacy for removal of taxes and tariffs;
- quality assurance and quality control;
- monitoring and evaluation;
- operational research.

One of the aims of a national strategy is to ensure that the efforts of all partners complement each other and contribute to the same overall vision. In Ghana, Kenya and the United Republic of Tanzania, for example, national strategies are based on consensus about the need to create an enabling environment for the private sector to expand the net market. If there is already a national ITN strategy and a body in place to coordinate implementation of the strategy, the roles of different partners will be defined within the strategy and by the coordinating body. If there is no strategy, one will need to be developed based on the findings of the assessment (see Chapter 2).

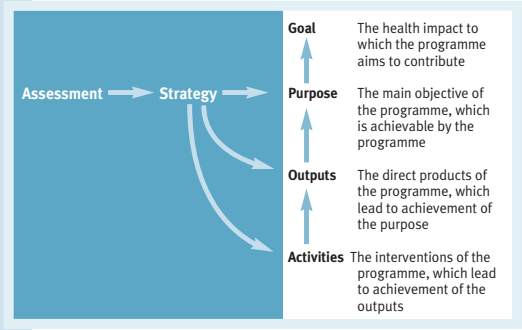
All partners should be involved in:

- reaching consensus on the vision for the future and on the actions needed to achieve this vision;
- assessing the strengths and weaknesses of each partner and seeking their agreement to participate;
- deciding the roles of the various partners in each of the agreed actions (see Table 3.1);
- developing a management structure to coordinate implementation of the strategy.

Table 3.1 Potential roles and responsibilities of different partners

Activity	Possible partners
Assessment	• NMCP/MoH – collecting information on malaria epidemiology and population factors. • Social research organizations – designing community research. • Commercial research organizations – designing and conducting market research.
Sourcing and procurement	• Organizations already procuring nets and/or insecticide. • Organizations with tax-free status, such as donor and UN agencies, particularly if "pump-priming" is the strategy adopted. • The commercial sector (wholesalers and retailers).
Monitoring and evaluation	• NMCP/MoH, NGOs, market research organizations – monitoring. • Local universities, local research agencies, international agencies – evaluation.
Storage and distribution	• NMCP/MoH, hospitals, wholesalers – storage. • Medical supplies distributors, NGOs, the commercial sector (manufacturers, wholesalers, retailers) – distribution.
Demand creation and promotion	• Television and radio, print media. • Advertising agencies. • Social marketing NGOs. • Community drama groups. • MoH health educators.
Training	• MoH, universities, NGOs.
Research	• Local universities, local research agencies, international research organizations.

Figure 9 Developing a project framework, comprising purpose, outputs and activities



3.1.2 Developing a framework

ITN programmes or interventions should be planned to fit within the national strategy. Planning involves defining more specifically what needs to be achieved and how it will be achieved. A logical framework is a useful tool in this planning process. It identifies the goal, purpose, outputs and activities of a programme, the indicators that will be used for monitoring and evaluation, and how these indicators will be measured.

The **goal** is the overall objective that the programme or intervention will contribute towards. For example, the goal of most national ITN strategies and of most ITN programmes is to reduce morbidity and mortality due to malaria in the population, particularly in children under five and pregnant women. The **purpose** is the specific objective of the programme. It is the effect that the programme is intended to achieve. For example, the purpose of many ITN programmes is to increase household ITN coverage in specific target groups. The **outputs** are the direct products of the programme activities. The outputs should lead or contribute to the purpose of the programme.

The **activities** are the specific tasks that the programme will undertake. The outputs and activities will depend on the purpose of the programme.

Table 3.7 provides an example of a logical framework for a social marketing strategy. Examples of indicators are included in section 3.2 on monitoring and evaluation.

3.1.3 Staffing, training, and supervision

Once it has been decided what the programme or intervention will do, an assessment of what staffing, training and supervision is required for each activity should be made.

3.1.4 Budgeting and funding

The next step in planning is to develop a budget. It is important to ensure that all activities are budgeted for. Then it will be necessary to assess whether or not the funding available is sufficient to cover the budget required for the programme or interventions. If additional funding is required, decisions will need to be made about how this will be obtained, including seeking support from donors.

The following questions should be used to help to decide about staffing, training and supervision needs:

- How many staff are required to carry out all the proposed activities?
- How many staff are available for these activities in the different partner organizations?
- Will additional staff be required? By what organizations?
- How many new staff will be needed? What type of skills will they need?
- What training will need to be carried out? What cadres of staff need training? How many staff require training?
- What supervision is needed? For whom? By whom?
- How will supervision be carried out?

Table 3.2 Framework for a monitoring and evaluation plan

	Indicator	Method of measurement	Frequency and timing of measurement	Responsible person
Goal				
Purpose				
Output				
1.				
2.				
3.				
4.				
Activity				
1.				
2.				
3.				
4.				
5.				
6.				
7.				
8.				
9.				

3.1.5 Planning monitoring and evaluation

Once the monitoring and evaluation indicators and methods for measuring these indicators have been decided, using section 3.2, a monitoring and evaluation plan should be developed. The plan should include the timeframe for carrying out activities, with clearly defined roles and responsibilities for data collection, collation and analysis. It should also specify who will be responsible for supervising monitoring and for ensuring that findings are used to modify programme design. The framework in Table 3.2 can be adapted to develop a monitoring and evaluation plan.

3.2 Monitoring and evaluation

The framework for monitoring and evaluation outlined in this section could be applied to any ITN programme. The role of the NMCP in specific monitoring and evaluation activities will depend on the national strategy and the extent to which the NMCP is involved in implementation of specific ITN activities. But all NMCPs, regardless of the extent of their involvement in implementation, are responsible for monitoring and evaluating changes in malaria mortality and morbidity at national level.

The main issues to consider in planning monitoring and evaluation are:

- indicators for monitoring and evaluation;
- methods for measuring indicators.

The following questions should be used to help with planning for monitoring and evaluation:

- What indicators will be used for monitoring and evaluation?
- What information will need to be collected to measure the indicators?
- Is any of this information being collected already?

MONITORING AND EVALUATION

Monitoring is an ongoing process. The purpose of monitoring is to assess whether programme activities are keeping on track and whether changes are taking place. Monitoring can be continuous or periodic. The most important aspect of monitoring is analysing data collected and using the findings to modify activities as necessary.

Evaluation is an overview of a programme up to a certain point in time. The purpose of evaluation is to assess whether the activities are achieving or have achieved the outputs and whether these outputs are likely to achieve or have achieved the purpose. Evaluations are normally carried out during and at the end of programme implementation. Mid-term evaluations can help to identify problems that may prevent a programme achieving its purpose, so that changes can be made to activities and outputs. End of programme evaluations can assess overall success and summarize the lessons learned.

- What tools will be used to measure the indicators?
- Who will collect and collate the information?
- What training and supervision is required?
- How often will monitoring information be collected and analysed?
- How will the findings be used to modify planned activities?
- When will the programme be evaluated? Who will do the evaluating?

Table 3.3 Impact indicators

Reduction in mortality	• Under 5 Crude Death Rate • Under 5 Malaria Mortality Rate • Under 5 Case Fatality Rate for severe malaria in children admitted to hospitals and health centres with inpatient facilities.
Reduction in morbidity	• Under 5 morbidity attributed to malaria (severe and uncomplicated) • Anaemia in pregnant women[20] • Low-birth-weight babies.[20]

[20] These indicators were found useful in recent trials.

3.2.1 Indicators for monitoring and evaluation

As discussed above, the indicators used for monitoring and evaluation should relate to the programme's goal, purpose, outputs and activities.

• Impact indicators

The **goal** of most ITN programmes is to reduce mortality and morbidity due to malaria, usually by a specific amount. For example, the goal of RBM in Africa is to reduce malaria mortality and morbidity by 50% by the year 2010. Examples of impact indicators, adapted from RBM, are shown in Table 3.3.

The results of field trials have shown that ITNs, if used correctly and consistently, will have an impact on mortality and morbidity due to malaria. For a range of reasons, however, it is difficult to assess the specific contribution of ITN programmes to any reduction in malaria mortality and morbidity. In many countries, populations with the highest burden of malaria disease may not have access to health facilities. In areas where populations do have access to health facilities, people may not use these facilities.

Self-treatment with anti-malarials purchased from pharmacies and shops is often the most common response to uncomplicated malaria. This makes it difficult to obtain an accurate picture of malaria mortality and morbidity. In addition, data collection at hospitals and clinics may be erratic or unreliable and may not be based on a definitive diagnosis of malaria (see Box 3). The catchment areas for an ITN programme and for health facilities may also be different, so data about malaria morbidity and mortality cannot be directly related to the programme. Finally, it is also difficult to control for confounding factors, such as changes in transmission levels or improvements in other health interventions, and for other malaria control interventions, which also impact on malaria morbidity and mortality.

Box 3 – Malaria morbidity and mortality: standardized case definitions for surveillance

Definitions of malaria morbidity and mortality vary, depending upon diagnostic capabilities at different levels of the health system. Whenever possible, malaria case data should be reported by patient age group and parasite species. The following standardized case definitions should be used:

In areas without access to laboratory-based diagnosis

- Case of probable uncomplicated malaria – a patient with signs and/or symptoms of uncomplicated malaria, who receives anti-malarial treatment.
- Case of probable severe malaria – a patient requiring hospitalization for signs and/or symptoms of severe malaria, who receives anti-malarial treatment.
- Probable malaria death – death of a patient who has been diagnosed with probable severe malaria.

In areas with access to laboratory-based diagnosis

- Asymptomatic malaria – laboratory confirmation (by microscopy or immuno-diagnostic test) of parasitaemia in a person with no recent history of signs and/or symptoms of malaria.
- Case of confirmed uncomplicated malaria – a patient with signs and/or symptoms of uncomplicated malaria, who receives anti-malarial treatment, with laboratory confirmation of diagnosis.
- Case of confirmed severe malaria – a person requiring hospitalization for signs and/or symptoms of severe malaria, who receives anti-malarial treatment, with laboratory confirmation of diagnosis.
- Confirmed malaria death – death of a patient who has been diagnosed with severe malaria, with laboratory confirmation of diagnosis.

Source: *RBM framework for monitoring progress and evaluating outcomes and impact*. Geneva, World Health Organization, 2000 (unpublished document WHO/CDS/RBM/2000.25; available on request from Communicable Diseases (CDS) Information Resource Centre, World Health Organization, 1211 Geneva 27, Switzerland).

Figure 10 A sample tool for monitoring net coverage. Measuring household coverage of ITNs is an important indicator in Roll Back Malaria.

Monitoring tool for district health management team
Mosquito net coverage

Project Name: Fictitia Mosquito Net Programme

District: Fictitia

Period: January 2000 to December 2000

Name of village	Total population	Total number of HH	Total ITNs sold	HH with at least one ITN	% HH with ITNs	% population with ITNs
1 Narambu						
2 Bykula						
3 Stona						
4 Chachay						
5 Raulau						
etc.						
Total						

ITN = Insecticide-treated mosquito net, HH = Household
Data to be taken from register of mosquito net sales and (re)treatment

- **Purpose indicators**

The purpose of an ITN programme will depend on the chosen strategy (see Chapter 1) and, in turn, the indicators used for monitoring and evaluation will depend on the purpose (see Table 3.4).

If, for example, the purpose is to increase coverage among the general population or among specific target groups, the indicator used to measure achievement of the purpose will be the percentage of coverage among households or among the specific target groups.

Coverage can be reported in a number of different ways including:

- percentage of households with one or more nets;
- number of nets per net-owning household;
- percentage of under fives sleeping under a net;
- percentage of under fives sleeping under a net in net-owning households;
- percentage of pregnant women sleeping under a net;
- coverage per capita.

The most frequently used indicator of coverage is percentage of households with one or more nets. The choice of indicator will depend on the groups being targeted. In areas of high endemicity, these will be under fives and pregnant women, but in areas of unstable malaria, where all ages are at risk, the target population may be different. The same definition of coverage should be used in baseline surveys and post-programme evaluation. As well as coverage, re-treatment and appropriate use, all programmes should monitor and evaluate access and affordability in order to assess equity.

Table 3.4 Purpose indicators

Strategy	Purpose indicators
Demand creation	• % household coverage with nets • % nets re-treated with insecticide • % households using nets appropriately • % of pregnant women using a treated net
Sustained subsidies for equity	• % coverage in households with target or vulnerable groups • % of households with target or vulnerable groups using nets appropriately
Revolving fund	• % household coverage with nets • % nets re-treated with insecticide • % households using nets appropriately
Social marketing	• % household coverage with nets • % nets re-treated with insecticide • % households using nets appropriately
'Pump-priming'	• % of sales of nets and insecticides in the commercial market
Emergency relief	• % household coverage with nets in target population • % nets re-treated with insecticide in target population • % households using nets appropriately

Table 3.5 Output indicators

Strategy	Output indicators	Means of verification
Demand creation	• % commercial sales volumes	• Retail records
Sustained subsidies for equity	• Effectiveness of targeting (leakage to non-target groups) • Cost per net delivered to target group	• Household survey among target groups • Sales records • Financial accounts
Revolving fund	• Programme sales volumes • Financial viability (independence from subsidy) • Cost per net delivered	• Sales records • Financial accounts • Sales revenue in the revolving fund • Financial accounts
Social marketing	• Programme sales volumes • Commercial sales volumes • Cost per net delivered • "Crowding-in" (increase in non-programme net sales in the commercial market) versus "crowding-out" (decrease in non-programme net sales in the commercial market)	• Programme sales monitoring • Retail records • Financial accounts • Programme sales monitoring • Retail sales records
'Pump-priming'	• Number of nets and quantity of insecticide sold	• Retail sales records
Emergency relief	• Number of ITNs delivered	• Programme records

• **Output indicators**

There is likely to be more variation in **outputs** and indicators to measure these outputs between programmes than at the purpose or goal levels. The outputs and indicators used to monitor and evaluate outputs will depend on the chosen strategy. Table 3.5 includes the output indicators that are considered to be essential for measuring the operational success of each strategy, and the way in which these indicators can be measured.

Defining cost per net delivered

Like coverage, cost per net delivered can be reported in different ways, including:

- Gross cost per net delivered – Where the gross programme cost is divided by the number of nets delivered to give the gross cost per net delivered.
- Adjusted cost per net delivered – Where programmes are involved in other activities, such as promotion, the costs for these other activities and a proportion of overall running costs are subtracted from the gross programme costs. The adjusted programme cost is divided by the number of nets delivered to give the adjusted cost per net delivered. This figure will depend on what proportion of the overall costs is attributed to net distribution and what proportion to other activities.

Programmes are likely to have several outputs, for which additional indicators and means of verification may be needed. For example, an output might be an increase in the proportion of the population or target group who know about ITNs or who know where to obtain an ITN, both of which could be measured using a KAP survey. Another possible output might be an increase in the proportion of the population or target group that can access nets and re-treatment within a reasonable distance, which could be measured by a retail outlet survey.

The most important outputs and activities to monitor include:

- sales of nets and insecticide by the programme and by the commercial market;
- changes in knowledge about malaria and its transmission;
- changes in knowledge about the use of ITNs to prevent malaria;
- changes in the use of ITNs.

• **Activity (process) indicators**

Process indicators are usually used to monitor the performance of programme **activities**. As for purpose and outputs, the activities will be determined by the chosen strategy. If, for example, the strategy used is demand creation using radio spots, at the purpose level an indicator could be an increase in the proportion of the population with knowledge of ITNs; at the output level the related indicator could be the proportion of the population listening to radio messages about ITNs; and at the activity level the process indicators could include the number of radio messages developed and the frequency of play of radio messages.

3.2.2 Methods for measuring indicators

As well as developing indicators to monitor and evaluate the programme's goal, purpose, outputs and activities, decisions should be made about how the information will be collected in order to enable measurement of these indicators. Pre-tested tools should be used for collecting data. If new survey tools or monitoring forms are developed, they should be field-tested before use. Each indicator should be considered separately and the appropriate sampling scheme selected. For example, for indicators such as household coverage

Table 3.6 Data collection tools for impact indicators

Indicator	Operational definition	Data collection tool
Under 5* Crude Death Rate	**Numerator:** Number of deaths of children under 5 per year **Denominator:** Mid-year population of children under 5 in the same year	**Routine:** HIS **Special surveys:** DSS (INDEPTH), DHS, Health facility surveys, Community surveys
Under 5 Malaria Mortality Rate	**Numerator**: Number of deaths in children under 5 attributed to malaria per year **Denominator**: Mid-year population of children under 5 in the same year	**Routine:** HIS **Special surveys:** DSS (INDEPTH), DHS, Health facility surveys, Community surveys
Under 5 Case Fatality Rate for severe malaria in children admitted to hospitals and health centres with inpatient facilities	**Numerator:** Number of deaths attributed to severe malaria in children under 5 admitted as inpatients **Denominator:** Total number of severe malaria cases in children under 5 admitted as inpatients in the same time period	**Routine:** HIS **Special surveys:** Health facility surveys (inpatient surveillance)
Under 5 morbidity attributed to malaria (severe and uncomplicated)	**Numerator:** Number of malaria cases (severe/uncomplicated) in children under 5 **Denominator:** Mid-year population of children under 5 in the same year *OR* **Numerator:** Number of malaria cases (severe/uncomplicated) in children under 5 seen/admitted in health facility **Denominator:** Total number of children under 5 seen/admitted in the health facility in the same time period	**Routine:** HIS **Special surveys:** Community surveys **Routine:** HIS **Special surveys:** Health facility survey

* Indicators, numerators and denominator can also apply to other target or vulnerable groups.

Source: Roll Back Malaria Initiative in the African Region Monitoring and Evaluation Guidelines Draft Harare, 2000; *RBM framework for monitoring progress and evaluating outcomes and impact.* Geneva, World Health Organization, 2000 (unpublished document WHO/CDS/RBM/2000.25; available on request from Communicable Diseases (CDS) Information Resource Centre, World Health Organization, 1211 Geneva 27, Switzerland).

as wide an area as possible should be sampled as there may be outlying areas of very high or very low coverage that would otherwise be missed. For other indicators it may be more appropriate to use more in-depth tools and techniques with a smaller sample in a few sentinel areas.

- **Measuring impact indicators**

As discussed earlier, it is the role of the NMCP to assess reduction in morbidity and mortality due to malaria. The main tools for collecting data related to impact indicators are:

- health information systems,
- health facility surveys,
- demographic surveillance systems, and demographic and health surveys.

Health facility surveys lead to biased sampling, again because they only provide information related to those who attend the facility. Unless the indicator is specifically related to events within facilities, it is recommended that health facility assessment of malaria morbidity and mortality should be accompanied by a community survey.

Demographic Surveillance Systems (DSS), using sentinel sites to monitor trends in morbidity and mortality, are operating in 28 sites in 14 African countries. The DSS network is currently being strengthened to include surveillance of malaria mortality in these sites, and to use a standardized methodology. **Demographic and Health Surveys** (DHS), funded by USAID and implemented by Macro International Inc., have been extended to include a malaria module. This will allow community-based collection of information related to several RBM indicators and to ITNs. For countries without DSS sites, the WHO Regional Office for Africa (AFRO) has developed a modified DHS survey tool, which will provide information that can be used to calculate under five and infant mortality rates.

Ideally, the routine **Health Information System** (HIS) should be used to monitor and evaluate the impact of malaria control interventions. In many countries, however, there are problems with the quality or coverage of data collected through the HIS. As discussed earlier, health facility data underestimate malaria morbidity and mortality, because many people do not have access to or do not use health facilities.

Practical tips

- Keep data collection to a minimum, especially at community level, and use existing systems where possible. Collecting too much information is a waste of time, and long complicated forms will cause confusion and result in inaccurate reports or absence of reports. They can also cause difficulties in data collation.
- Start collecting data as early as possible in the programme, to identify any problems sooner rather than later.

• **Measuring purpose indicators**

The main tools for collecting data related to indicators at **purpose** level (which mainly concerns coverage) are:

- community and household surveys
- demographic and health surveys.

Figure 11 Focus group discussions can help to assess changes in perceptions about nets

Source: Mehra S. *Partnerships for change and communication: guidelines for malaria control.* WHO/Malaria Consortium, 1997. Illustration: J Mehra

Community and household surveys can be designed to assess coverage of nets and frequency of insecticide treatment only, or to also assess changes in KAP. The scope will depend on the purpose of the programme and the resources available. Because community and household surveys are expensive and time-consuming to carry out, they are usually only conducted on a periodic basis and in a limited number of sites. Careful selection of survey sites is therefore very important, and factors to consider when choosing sites include differences between urban and rural areas, proximity to breeding sites and density of mosquitoes (both nuisance biters and *Anopheles*). AFRO has developed sampling guidelines for community surveys of ITN coverage and use (see Box 3.1).

The malaria module included in some of the most recent demographic health surveys in Guinea, Malawi, Rwanda and Uganda will provide information about net coverage on a larger scale.

- **Measuring output and activity indicators**

It should be possible to monitor and evaluate outputs using information that is collected to monitor and evaluate activities.

The level of **programme sales** of nets and insecticides should be carefully monitored. If, for example, sales are low, then the reasons can be investigated and steps taken to overcome problems with supply or demand. Evaluation of programme sales is also an important measure of operational success. Methods for monitoring and evaluating programme sales include programme sales records and financial accounts.

It is also important to monitor the effects of programmes on **commercial sales** of nets (and to a lesser extent insecticides), especially where strategies of demand creation, social marketing, and "pump-priming" are used. Methods for monitoring commercial sales include surveys of retail outlets. To date, however, few programmes have carried out this type of monitoring and evaluation.

Evaluation of the supply side (e.g. retail audits) should be undertaken separately from evaluation of the demand side (e.g. household surveys), since they measure different types of things among different samples, but the evaluations should be coordinated.

Box 3.1 – AFRO sampling guidelines

Sample size

At least 25–30 households and at least 30 children under five and 25 pregnant women (or other target groups) per community.

Sampling method

Randomly choose a direction by spinning a bottle on the ground at the centre of the community. Proceed in the direction that the bottle is pointing, until you have covered 10 households in your survey. If houses are not in an exact line, follow the approximate direction. If you reach the end of the community before identifying 10 households, go back to the starting point and choose a new direction. If several families live in a house, only interview one family.

Source: *RBM initiative in the African region: monitoring and evaluation guidelines* (draft). Harare, 2000.

Table 3.7 Example of a logical framework for a social marketing strategy[21]

Project structure	Indicators of achievement	How quantified and assessed	Assumptions
Goal Reduce the incidence of malaria and consequent illness and death.			
Purpose To develop feasible, sustainable and tested strategies for increasing availability, ownership and usage of mosquito nets and insecticide for net treatment, suitable for large-scale application.	1. Strategies tested in the project successfully adopted in larger-scale intervention elsewhere. 2. Improvements in access to and use of nets and insecticide. 3. Evidence on the appropriateness of strategies is documented.	1. Proposals, reports and publications from other projects. 2. Coverage surveys; consumption records. 3. Monitoring and evaluation reports, workshops, scientific publications.	An adequate and informative range of strategies is tested; the monitoring process is adequate, at least some of the strategies prove to be feasible, and those which prove to be sustainable in the medium term continue to be so over longer periods.
Outputs 1. Increased demand for nets; and net use regarded as the norm not the exception. 2. Effective insecticide distribution systems, including DIY kits, fixed and mobile net-treatment centres and treatment agents established. 3. Increased knowledge of and demand for insecticide by net owners. 4. Improved access in rural areas to commercially available nets and insecticide. 5. Increased access to nets by vulnerable groups (children, pregnant mothers, poor families) through effective and efficient use of subsidies.	1.1 Increased sales and use of project nets. 1.2 Increased sales and use of commercial nets. 1.3 Increased % households with at least one ITN. 2.1 Use rates of insecticide. 2.2 Users' awareness of the price of net-treatment, and their perceptions of availability. 3. Increased sales and use. 4. Number of commercial outlets and turnover in rural areas. 5. Surveys of fate of nets distributed at subsidized prices.	1. KAP surveys. Focus groups, retail surveys of availability. Project reports, social and economic evaluation reports. 2. Informal interviews, focus groups, exit surveys, sales. 3. KAP surveys. Focus groups, retail surveys of availability. Project and consultants' reports, sales reports. 4. KAP surveys. Focus groups, retail surveys of availability. Project reports, social and economic evaluation reports. 5. Project reports, social and economic evaluation reports.	1. General economic decline could reverse current increasing trend in demand. 2. Net users prove willing to pay for net treatment in one form or another. 3. Demand is not reduced by fears and rumours of insecticide toxicity. 4. General economic decline could reverse current increasing trend in demand. 5. Methods of preventing "leakage" of subsidized nets may fail.

[21] Adapted from PSI *Social marketing of mosquito nets and insecticide for net treatment* project in the United Republic of Tanzania

Sourcing and procurement

Chapter 4

Sourcing and procurement

If ready-made nets are available locally at a price that most people can afford, sourcing and procurement of nets may not be necessary, unless it is intended to target vulnerable groups that are not reached by existing systems.

If the national strategy includes provision of nets and insecticide, decisions about sourcing and procurement of these commodities will need to be made. For the purposes of procurement, it is important to consider nets and insecticide as separate commodities.

This chapter provides an overview of sourcing and procurement issues. It covers:

- **nets,**
- **insecticide,**
- **ordering systems.**

4.1 Nets

The main factors to consider are:

- types of nets,
- quantity of nets,
- sources of nets.

The following questions should be used to help to make decisions about sourcing and procurement of nets:

- What type of nets are people already using? (see Chapter 2)
- What type of nets would people prefer to use? (see Chapter 2)
- Will you make more than one type of net available?
- How many nets will be required to cover the target population or group?
- What sources of nets exist?
- From which of these sources nets be procured?

4.1.1 Types of nets

Types of nets vary in terms of fabric, shape and design, size and colour. It should be decided what type of net will be most appropriate for the target population.

Fabrics commonly used for ITNs include polyester, cotton, cotton-synthetic blends, nylon, polyethylene and polypropylene. These fabrics, which are made into netting or sheeting, vary in absorbency. Polyester is the most popular fabric in many countries, because it is lighter than cotton and absorbs less liquid. Fabrics that absorb less liquid are easier to wring out and reduce the waste of excess insecticide, although heavier, more absorbent fabrics can be left to drip onto plastic sheeting and the excess insecticide reused.

Netting is generally more popular than sheeting, because it is lighter, absorbs less liquid and allows more air movement, although it provides less privacy than cotton sheeting. Most larger ITN programmes use netting produced by commercial manufacturers. Sheeting is more likely to be made by local entrepreneurs and used by small projects.

Different fabrics also vary in strength, mesh size, and flammability. Fabric strength is measured in denier: the higher the number, the stronger the fabric. Fabrics of between 70 and 100 denier are adequate for netting material, but fabrics of less than 70 denier are less suitable because they tear easily and do not last long. Mesh size is measured as the number of holes per square inch: the smaller the number, the larger the hole. Standard mesh sizes for netting are 156 and 196, and both sizes prevent mosquitoes from entering. A mesh size of 156 allows better ventilation because it has larger holes, but more care is needed to ensure that netting with larger holes is treated properly with insecticide. Cotton nets are more flammable than polyester nets, but polyester nets are more dangerous if they catch fire, because they melt causing severe burns on the skin.

The quality of fabric used to make nets varies. It should be decided whether to standardize quality or to make available nets of different quality for different target groups. Standardizing the quality of fabric makes it possible to standardize the insecticide treatment dose. While most people will generally pay a higher price for better quality, however, the poorest may not be able to afford to buy better quality nets.

Pre-treated and long-lasting nets

- Non-long lasting nets and factory pre-treated nets are available but, at present, their use is only recommended for emergencies. In all other circumstances, untreated nets and insecticide should be procured and distributed separately, because of the need to increase understanding of the importance of insecticide treatment.
- Some commercial manufacturers are developing "long-lasting treated" nets where the insecticide remains effective for the life of the net, even after regular washing. This would end the need for net re-treatment with insecticide, reduce insecticide consumption, and potentially increase ITN coverage. However, it is not yet clear how long these nets remain effective under normal day-to-day conditions.

Shape and design of nets vary considerably. The most common shapes are conical (round) and rectangular. Some nets have a border on the hem or skirt. A border makes a net stronger and more durable, but it increases the cost and can also increase the amount of insecticide absorbed. Conical nets are easier to hang up and take down than rectangular nets, take up less space and are useful in smaller houses. But conical nets are usually more expensive, the wire hoop used to hang the net must be removed before

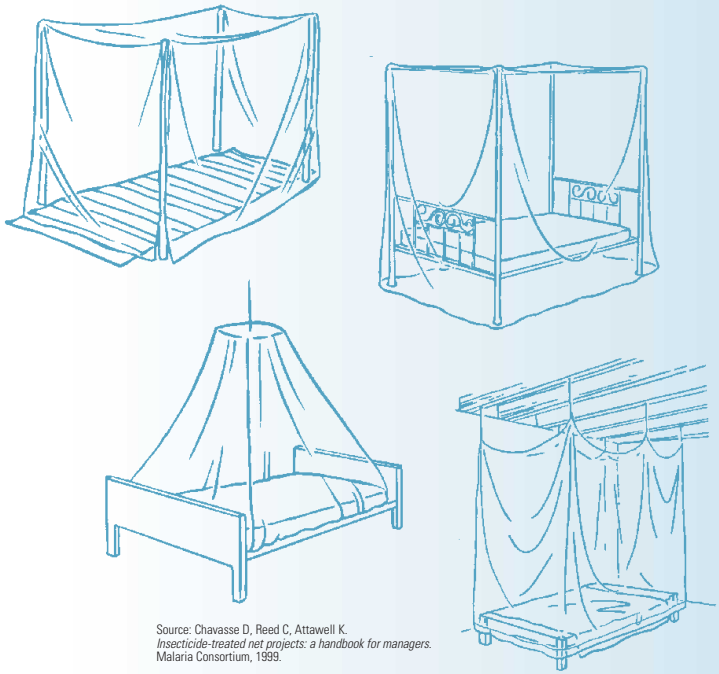
washing, and their smaller size means that there is more chance of being bitten when touching the sides of the net during sleep, unless the net is treated with insecticide. Rectangular nets are lower priced and more spacious, but take up more room and are often perceived to be more suitable for sleeping mats than beds.

Size of net required depends on the bed or mat size and the number of people who will sleep under it. Larger nets require more fabric and insecticide for treatment, which increases the cost, but larger nets also cover more people. It is important to choose a net that is large enough to cover a typical bed or mat without needing to be pulled too tightly. If the net is too small, those sleeping under it are more likely to touch the sides and to be bitten. It is also important to measure bed and mat sizes and to compare these with net sizes.

Do not rely on descriptions such as double or single, because sizes that fit these descriptions vary by country and manufacturer.

The most commonly available net **colours** are white, green and blue. White nets get dirty quickly. They are likely to be washed more frequently than darker coloured nets and, as a result, to require more frequent insecticide treatment. Blue or green nets

Figure 12 Nets are available in a number of different shapes and sizes



Source: Chavasse D, Reed C, Attawell K. *Insecticide-treated net projects: a handbook for managers.* Malaria Consortium, 1999.

are more practical in dusty or smoky environments.

In addition to technical issues, key questions to consider when deciding about net type are:

- What type of nets do people prefer?
- Should more than one type of net be made available?

The type of net or nets procured must meet technical specifications. For example, nets must be of an adequate size to provide protection. It is equally important to procure nets of the size, shape and colour that people want. The findings of the assessment of net use and net preferences (see Chapter 2) should have identified what type of nets people have now and what type they would like to have. If most people would prefer to use the same type of net, then this is the type that should be procured. If there is a wide range of preferences, then the decision about what type of net or nets to procure should also take into consideration other issues, such as cost and availability.

4.1.2 Quantity of nets

The size and sleeping habits of the target population (see Box 4) will determine the number of nets required.

The size of the target population will depend on whether it is intended to cover the whole population or specific population groups, for example, children under five, pregnant women, the poorest socioeconomic groups, or non-immune populations. Use the population data obtained during the assessment (see Chapter 2).

Sleeping habits as well as family size will determine how many nets are required to cover everyone in a household or the most vulnerable in a household. For example, in some cultures mothers sleep with their young children so one net may be sufficient to cover vulnerable groups, but in others where they sleep separately more than one net will be needed. Use the information obtained during the assessment (see Chapter 2) about the sleeping habits of the population and of any specific target groups, such as under fives or pregnant women.

The quantity of nets needed also depends on whether or not nets will be sold to both target and non-target groups or to the target group only. If nets are only sold to the target population there is likely to be some leakage

of nets to those outside the target population, so it will be necessary to procure more than the number of nets required to cover the target population.

4.1.3 Sources of nets

Potential sources of nets include local commercial manufacturers of ready-made nets, small-scale producers of nets, such as local tailors, and commercial manufacturers of ready-made nets and netting outside the country. The most appropriate choice will depend on the sources available and the type and quantity of nets required.

Procurement of ready-made nets from **in-country manufacturers** is simpler and less time-consuming than importing nets or netting, and also supports the national economy. If ready-made nets are manufactured in-country, but are not being marketed effectively, consideration could be given either to promotional activities to create demand and negotiation with private sector distributors and outlets to market the nets, or to promotional activities to create demand together with short-term procurement and distribution of nets to pump-prime the market. If ready-made nets manufactured in-country are not the type that people prefer, the findings about net preferences could be shared with the

Box 4 – Calculating the number or standing crop of nets needed

When the size of the target population has been estimated, calculate the number or "standing crop" of nets needed to cover the target population per year. This is particularly important for longer-term interventions, because nets only last for a maximum of about 5 years and, after this time, they will need replacing. To calculate the standing crop, determine the size of the target population, the average lifetime of a net, and the average number of the target population sleeping under each net.

Example 1. If the target population is 10 000; the average lifetime of a net is assumed to be 5 years, and an average of 2 people are covered by each net: the number of nets needed to cover the target population is 10 000 / 2 = 5 000. The lifetime of a net is 5 years, so 1 000 (5 000 / 5) nets are needed each year to cover the target population.

Example 2. If the total population is 10 000; the target population is pregnant women, who represent 5.5% of the total population; and the average lifetime of a net is assumed to be 5 years: at any one time there will be 10 000 x (5.5 / 100) = 550 pregnant women. 550 nets will be needed, assuming 1 net per pregnant woman. The lifetime of a net is 5 years, so 110 (550 / 5) nets are needed each year to cover the target population.

Note: These calculations assume initial net coverage is nil.

manufacturers. The feasibility and cost of producing nets that meet people's preferences could likewise be explored with the manufacturers.

In some communities, there may be local tailors producing nets on a small scale. Some projects have provided netting, training and equipment for local tailors to sew nets, to increase net availability and generate income. This approach is unlikely to be appropriate for larger scale interventions where rapid coverage of large populations is the objective. In addition, locally tailored nets may be both more expensive and of poorer quality than commercially manufactured nets.

Small-scale tailoring of nets may, however, be appropriate where there is demand for a wide range of net types or where net coverage is already high.

Importing nets or netting may be the only option if nets are not manufactured in-country, or if locally manufactured nets are too expensive or do not meet specifications or are not made in sufficient quantities to meet demand. (The *PATH Canada directory of insecticides and mosquito nets for sub-Saharan Africa*[22] provides information about international net manufacturers.)

Importation of nets, however, can be a lengthy process, and adequate lead-time should be allowed between ordering and delivery to ensure that nets are available to meet the demand created. It may be worthwhile investigating whether other organizations are willing to act as procurement agents or whether there is the potential for partnerships that would enable nets to be procured at lower prices.

In addition, the cost of imported nets and netting may be increased by government **taxes and tariffs**, which are intended to generate revenue, protect domestic producers and encourage economic self-reliance. Tariffs are imposed on foreign-produced goods, for example in the form

[22] Obtainable from: PATH Canada, 1 Nicholas Street, Suite 1105 Ottawa, Ontario, Canada KIN 7B7 E-mail: admin@pathcanada.org – Internet: http://www.pathcanada.org

of import duty, fiscal duty, import tax and customs duty. Taxes are domestic consumption charges, for example in the form of sales tax, excise tax, turnover tax and value added tax. At the 2000 Abuja Summit, African leaders pledged to remove taxes and tariffs on nets and insecticides used to treat nets amongst others.

International agencies and NGOs are exempted from taxes on imported goods, which allows them to import nets and netting at low prices and to sell nets at lower prices than the local private sector. There is therefore a danger that importing nets and netting will limit the development of the commercial market, and importing as a short-term option should only be considered until increased demand stimulates the development of viable in-country commercial manufacture.

4.2 Insecticides

The main factors to consider are:

- type of insecticides
- insecticide formulations
- packaging and labelling
- quantity of insecticide
- sources of insecticide
- safety
- efficacy monitoring

The following questions should be used to help to decide about insecticide procurement and sourcing:

- What type of insecticide should be used?
- What is the most appropriate formulation of insecticide?
- What form of packaging should be used?
- What sources of insecticide exist? From which sources will insecticide be procured?
- What safety and efficacy monitoring measures will need to put in place?

Table 4.1 Insecticides recommended for net treatment

Insecticide	Dose (mg/m^2)	Dose for one net* (15m^2)
Deltamethrin (K-Otab) 25% WT[23]	25	1 tablet
Deltamethrin 1% SC[24]	25	40 ml
Lambdacyhalothrin 2.5% CS[25]	15	10 ml
Alphacypermethrin 10% SC	40	6 ml
Cyfluthrin 5% EW[26]	50	15 ml
Etofenprox 10% EW	200	30 ml
Permethrin 10% EC[27]	500	75 ml

* In 0.5 litre of water for any synthetic net and 2 litres of water for any cotton net.

[23] WT = Water dispersible tablet
[24] SC = Suspension concentrate
[25] CS = Capsule Suspension
[26] EW = Emulsion oil in Water
[27] EC = Emulsifiable Concentrate

4.2.1 Type of insecticide

The insecticides recommended for treating mosquito nets are permethrin, etofenprox, and the alphacyano pyrethroids: deltamethrin, lambdacyhalothrin, cyfluthrin and alpha-cypermethrin. These insecticides adhere to all types of fabrics and are effective even in small amounts. Permethrin was the first insecticide to be recommended by WHO for treating nets, and there is more experience with use of permethrin than with other insecticides. Both permethrin and the alphacyano pyrethroids are more insecticidal when used on synthetic fibres than on cotton, so cotton nets need to be treated with higher doses to achieve equivalent insecticidal effect.

The alphacyano pyrethroids are more toxic to insects so they can be used at much lower dosages (15–50mg/m^2) than permethrin (250–500mg/m^2). The recommended doses for treating mosquito nets with commonly used insecticides are given in Table 4.1.

Permethrin will remain effective on a net for approximately 6 months if it is not washed. Washing a permethrin-treated net once will reduce the effectiveness of the insecticide by at least 50%. Alphacyano pyrethroids will remain effective for approximately 6–12 months, even after one or two washings. Alphacyano pyrethroids are more cost-

effective than permethrin, because a lower dosage is required to treat a net and because of greater persistence. Alphacyano pyrethroids are also safer for use in home dipping than permethrin.

4.2.2 Insecticide formulations

The WHO Pesticide Evaluation Scheme (WHOPES) should approve insecticide formulations used for net treatment for public health use. WHOPES uses laboratory and field evaluation to assess insecticide safety, efficacy, ease of use, acceptability and cost-effectiveness. If an insecticide product meets WHOPES standards, quality control and international trade specifications are developed. (see: www.who.int/ctd/whopes)

Insecticides for use on nets are available as emulsifiable concentrates, capsule suspensions, emulsion oil in water, suspension concentrates and water dispersible tablets. These formulations are mixed with a suitable quantity of water to make a solution that will treat a net with the required dose of insecticide. Wettable powder formulations, which have been used for spraying hard surfaces, are not recommended for net treatment because the insecticidal activity wears off quickly. Similarly, agricultural formulations are not recommended for use on mosquito nets as the efficacy and safety of these formulations of insecticides cannot be assured.

In **Emulsifiable Concentrate (EC)** formulations, the insecticide is dissolved in a solvent to give a clear, often yellowish solution that turns milky white when water is added. The only insecticide that is recommended in EC formulation is permethrin. For home treatment of nets, only permethrin 10% EC formulation (with a childproof cap) is recommended, because of concerns about toxic side-effects from skin contact or accidental swallowing. The solvents used in EC formulations have a strong odour, and can also have adverse effects on users and on the environment. Agricultural EC formulations should not be used on nets, because some of these insecticides use very toxic solvents.

In **Capsule Suspension (CS)** formulations, the insecticide is encased in microscopic plastic capsules and suspended as an emulsion in water. CS formulations are less odorous and last longer than EC formulations. Agricultural capsules should not be used because they are not suitable for net treatment.

In **Emulsion oil in Water (EW)** formulations, the insecticide is dissolved in synthetic oil

mixed with water. The fine oil phase droplets result in a high level of adherence to net fibres. In **Suspension Concentrate (SC)** formulations, the active ingredient is in the form of crystalline particles mixed with a solvent. Only water-based SCs are recommended for use on nets. In **Water dispersible Tablets (WT)** formulations, the insecticide is mixed with an inert carrier and moulded into a tablet. A bitter tasting agent is added to discourage children from swallowing the tablets. WT formulations are useful for home net treatment.

4.2.3 Packaging and labelling

Packaging options include 1 litre and autodose bottles, and single treatment sachets, vials and tablets. The most appropriate type of packaging will depend on the approach to delivery and net treatment (see Chapter 5). Individual treatment of nets is recommended, regardless of whether treatment is done at dipping centres, by mobile teams or at home. For this reason, large drums of insecticide are no longer recommended for use in net treatment. Single dose treatments are more expensive because of the costs of packaging, but may be the method of choice for those who prefer to treat their nets at home.

Insecticides usually come in three types of bottles: 1 litre bottle, autodose bottle, and single treatment vials. The **1 litre bottle** is useful in outlets that offer routine treatment and re-treatment services. The required amount of insecticide for the number of nets to be treated can be poured from the bottle into a measuring cylinder.

Autodose squeeze-and-pour bottles are also useful for outlets that offer routine treatment and re-treatment services, and for agents offering a door-to-door dipping service. An adaptation of 1 litre bottles, autodose bottles are easy to use because the bottle measures the correct amount of insecticide for net treatment.

A small graduated chamber is connected to the main bottle by a thin tube. Squeezing the bottle forces liquid up the tube and into the chamber. When the chamber is filled with the amount of insecticide needed to treat a net, the liquid can be emptied into a mixing bowl.

Home treatment kits remove the need for re-treatment by health workers or other trained "dippers". Home treatment using single dose units, available through shops, kiosks, health facilities or other outlets, is becoming more common in some countries, for example, Malawi and the United Republic of Tanzania. One of the advantages of home

treatment kits is that they are in sealed packages, so they are less liable to adulteration.

Single treatment vials are designed for the DIY home treatment market. They should have a childproof cap and include clear, locally appropriate instructions about correct and safe use. Check the packaging of locally produced vials carefully, because some types of plastic absorb the active ingredient from the insecticide solution leaving an ineffective dose.

Sachets are another form of packaging that are appropriate for single net treatment, and are also designed for the DIY home treatment market. Again, appropriate packaging is important, as insecticide may be lost in the seals of foil laminated plastic sachets. Tablets are probably the easiest form of packaging for DIY home treatment of single nets.

Net plus insecticide combination packs, that include an untreated net and a single dose of insecticide to treat the net, are also becoming available. This approach reinforces the idea of the need to treat the net and avoids the need to make two separate purchases.

Clear labelling of insecticide is essential (see Box 4.1). In most countries there are regulations about the minimum information that must be included on insecticide labelling. If the intervention involves repackaging, labelling of the repackaged insecticide must conform to national and WHO regulations.

Instructions for use must also be clear, understandable and locally appropriate, whether kits, tablets, sachets or other packaging are produced locally or internationally. Instructions for products intended to be used for home treatment should be developed in-country with expert advice. Negotiations with manufacturers should ensure that locally developed instructions are included rather than generic instructions.

Box 4.1 – Labelling

- Generic name and/or brand name – generic names end in *thrin*
- Formulation – Emulsifiable Concentrate (EC), Capsule Suspension (CS), Emulsion oil in Water (EW), Suspension Concentrate (SC), Water dispersible Tablets (WT)
- Concentration – refers to the number of grams per 100 ml
- Safety instructions, warnings and symbols – toxic symbols, poison symbols
- Production date – insecticides should usually be used within 2 years of manufacture
- Expiry date – the time when the insecticide will no longer be effective

Box 4.2 – Calculating the amount of insecticide needed

Example 1. Where cyfluthrin 5% EW is the insecticide of choice; 15ml of insecticide is needed to treat each net; the target population is 10 000; an average of 2 people sleep under each net; and the best re-treatment rate expected is 60%.

- 15 x (10 000 Π 2) = 75 000 ml (75 litres) of insecticide is needed to treat nets initially for the whole target population.
- If 60% of the target population re-treat their nets every 6 months, then an additional 75 000 x 60% = 45 000 ml (45 litres) x 2/year = 90 000 ml (90 litres) of insecticide will be required every year.
- The total amount of insecticide required is 165 litres.

4.2.4 Quantity of insecticide

The quantity of insecticides required is determined by the amount needed for initial treatment of nets to cover the target population and the amount needed for regular re-treatment of these nets (see Box 4.2). The frequency of re-treatment depends on the persistence of the insecticide used and how often nets are washed.

4.2.5 Sources of insecticide

Potential sources of insecticide include commercial manufacturers and suppliers within and outside the country. The most appropriate source will depend on the type and quantity of the insecticides required. It is unlikely, however, that the range of insecticides, formulations and packaging described above will be available in most countries.

Obtaining insecticide from **in-country manufacturers or suppliers** is simpler and less time-consuming than importing insecticide, because it is not necessary to deal with import or regulatory procedures. If the packaging of the insecticides available in-country is not appropriate, for example if kits for DIY home treatment are not available,

then repackaging could be considered as an option. Again, this should be negotiated with local manufacturers or suppliers, since repackaging is technically complex and should ideally be undertaken by insecticide manufacturers. Repackaging should only be carried out on licensed premises, which can ensure that staff are adequately protected against toxic hazards, that the resulting product will be properly packaged and labelled, and that the content will conform to relevant quality standards.

Price is often a factor that limits insecticide treatment and re-treatment of nets. It is therefore also important to negotiate the lowest price possible with manufacturers, suppliers and distributors, provided that this does not compromise efficacy or safety. Packaging increases the cost of products for DIY home treatment of single nets, but lower prices can often be negotiated for bulk purchases.

If the insecticides recommended for treating nets are not available, or are not available in appropriate formulations, it may be necessary to **import**. (The *PATH Canada directory of insecticides and mosquito nets for sub-Saharan Africa*[28] provides information about international insecticide manufacturers.) As with nets, taxes and tariffs are also a barrier to the importation of insecticides. The need for WHOPES approval and in-country registration, in addition to normal import procedures, makes importation a complicated and lengthy process. Importing should only be considered as a short-term option, and it is important to start negotiation as soon as possible with local manufacturers and suppliers about the feasibility and costs of supplying suitable insecticide in the formulation and packaging required.

4.2.6 Safety

The active ingredient in insecticides, and the solvents used in some insecticide formulations, can be toxic to humans and the environment. Although there have been no reports of deaths caused by pyrethroid insecticides, it is important to take measures to protect people from harmful effects. It is also important to dispose carefully of insecticide, to protect the environment from harmful effects.

The risk of adverse side-effects depends on the toxicity of the insecticide and the way

Figure 13 Washing nets in a bucket or bowl rather than a stream prevents insecticides contaminating water sources. Wring the net gently – if you wring too hard, you will lose the insecticide. Gloves should be worn when washing or treating nets

Source: Chavasse D, Reed C, Attawell K. *Insecticide-treated net projects: a handbook for managers.* Malaria Consortium, 1999.

[28] Obtainable from: PATH Canada, 1 Nicholas Street, Suite 1105, Ottawa, Ontario, Canada KIN 7B7. Email: admin@pathcanada.org. Web site: http://www.pathcanada.org.

it is handled and used. Those dipping many nets sometimes experience transient symptoms, such as paresthesia (abnormal numbness or tingling). Dipping should be conducted in well-ventilated areas, ideally outside, to avoid the build-up of fumes. Protective clothing, including gloves and protective glasses, should be worn, especially by those dipping large numbers of nets. After insecticide treatment, nets should be left to dry properly before they are used. The risk of adverse side-effects in users of treated nets, however, is minimal.

It is important to avoid contaminating water sources with insecticide. Leftover diluted insecticide, and water in which treated nets have been washed, should be disposed of in a rubbish pit or a pit latrine. Treated nets should not be washed in small rivers, streams or ponds, to avoid contamination of water sources and toxic effects on fish and crustaceans.

Diagnosing and treating pyrethroid poisoning

The risk of poisoning if insecticide is swallowed depends upon the formulation and concentration of the insecticide. Pyrethroids are metabolized by the body, so the effects are acute rather than chronic. The symptoms of poisoning include paresthesia, irritation of the upper respiratory tract, salivation and, occasionally, allergic reactions. If poisoning is suspected, follow Steps 1 to 3:

Step 1. Collect information

To assist a doctor or medical officer to provide appropriate treatment, find out the following:

- name of the insecticide
(keep the bottle or sachet to show the doctor)
- route of exposure • amount consumed
- time of poisoning • reason for poisoning
- emergency information from the product labelling

Step 2. Give first aid

If the person is not breathing:

- give mouth-to-mouth resuscitation if required;
- remove all vomit and saliva from the mouth;
- place a handkerchief between the mouth of the patient and the mouth of the person giving first aid, to protect the person giving first aid from the insecticide.

If the insecticide has contaminated the person's skin:

- remove all contaminated clothing immediately;
- wash affected areas with soap and large quantities of water.

If insecticide has been swallowed:

- give the person plenty of water to drink (avoid alcohol or milk); if available, give a suspension of 10g of medical charcoal in 150– 200 ml of water;
- vomiting should only be induced by a qualified person (unless there is severe poisoning and no medical assistance is available) because there is a risk, associated with vomiting, of aspiration of the insecticide, which could cause pneumonia;
- vomiting should only be induced in a person who is fully conscious, by stimulating the back of the throat with a fingertip;
- give large quantities of water to drink after vomiting.

If the insecticide has been splashed in the eyes:

- gently open the eyelids with the fingers and flush with running water for several minutes.

If inhaled, remove victim from exposure and give supplemental oxygen if needed and available.

Step 3. Take to a doctor

- For pyrethroid poisoning with prolonged paresthesia, apply vitamin E oil preparation to the affected skin.
- For irritation of the upper respiratory tract, relieve symptoms with inhalation of water vapour aerosol or cough-relieving medicine.
- If convulsions occur after severe poisoning, give an intravenous injection of 5–10 mg diazepam or a benzodiazepine derivative.
- Corticosteroids should only be given in cases of definite allergic symptoms.

Source: Chavasse D, Reed C, Attawell K. *Insecticide-treated net projects: a handbook for managers.* Malaria Consortium, 1999.

For further information on safety, see WHO Fact Sheet WHO/CDS/CPE/WHOPES/99.5. *Safety of pyrethroid-treated mosquito nets.* Available at: http://www.who.int/ctd/whopes/sptmn_eng.pdf

Troubleshooting

If there is an apparent reduction in insecticide efficacy:

1. Investigate operational factors. These could include: the insecticide being used at the wrong dilution, insecticide being used after its expiry date, unrealistic perceptions of insecticidal action, excessive washing of the net, improper storage, incorrect dipping or treatment procedures resulting in under-dosing.

2. Contact the manufacturer. If there are no obvious operational errors, contact the manufacturer with the batch number of the insecticide. The manufacturer should be able to report on quality control performed on all batches of insecticide.

3. Contact WHO for advice. Contact WHO Geneva or the nearest WHO regional or country office. Bioassay kits for assessing the effect of insecticides on nets, available from WHO, may not be practical in some settings, but dosing kits, which are a more promising option, are currently under development.

4. Insecticide resistance. Find out about insecticide resistance. The MOH or other bodies should be monitoring resistance to pyrethroid insecticides in all areas where ITNs are used. Resistance is defined as when 20% or more of mosquitoes survive exposure to insecticide at diagnostic concentrations, using the WHO susceptibility test kit and procedure. Once a mosquito population is resistant to one pyrethroid, it is likely that it will be resistant to all pyrethroids to some extent.

4.2.7 Efficacy monitoring

It is important that the insecticide selected for use on nets achieves the desired effect. Efficacy may be reduced if an insecticide is sub-standard, expired, or has not been stored properly. Incorrect treatment or excessive net washing can also reduce insecticide efficacy. Sometimes, mosquitoes can develop resistance to a particular insecticide. For these reasons, it is essential to monitor insecticide efficacy.

Insecticides should be quality controlled by the manufacturer and by the national body responsible for regulating insecticides within the country. If there is no in-country capacity for monitoring the efficacy of insecticides, a regional body should be identified that can help to identify the reason or reasons for reduced effectiveness.

4.3 Ordering systems

Ordering can be done through a bulk purchase, through a standing order, or through re-ordering at set time periods or in response to demand. The advantages and disadvantages of these methods of ordering are summarized in Table 4.2. The approach to ordering will depend on the scope and timeframe of the intervention.

If it is proposed to supply nets and insecticide to a defined target population for a defined time period, once the quantity of nets needed to cover the target population and to keep them covered and the quantity of insecticide needed to treat and re-treat these nets has been calculated, it may be decided to order the required quantities in bulk from the relevant manufacturers or suppliers.

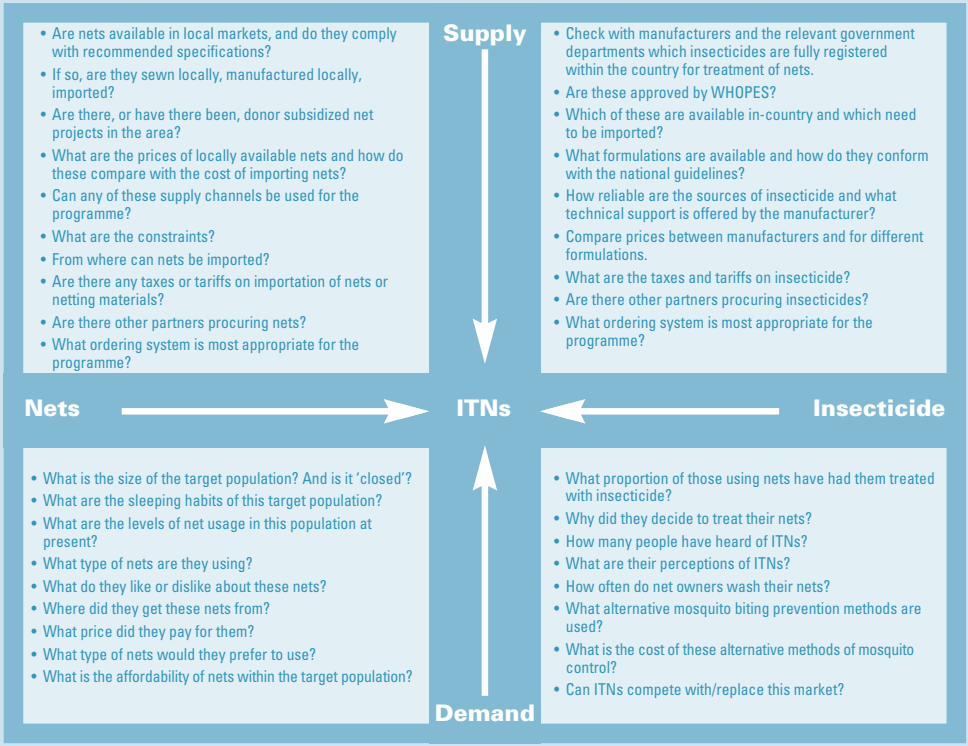
If the intervention will continue for an indefinite time period and there is an expectation that the quantity of nets and amount of insecticide will expand over time, it may be decided to make an initial bulk order and re-order in response to demand.

If procurement and distribution of nets and insecticide are to be left to the private sector, the role of the government is to ensure that the commercial market is able to obtain supplies to meet demand.

Table 4.2 Advantages and disadvantages of different approaches to ordering

Ordering system	Advantages	Disadvantages
Bulk buying	• Possible economies of scale • Reduced chance of demand exceeding supply (stock-outs)	• Excess of stocks and expiry of insecticide if demand creation is inadequate
Standing order	• Ensures a regular supply	• May not be adequate to cope with seasonal fluctuations in demand
Flexible standing order	• Ensures a regular supply that can be decreased or increased according to demand	• Problematic if poor communication • Supplier may not be able to respond to larger variations
Order as required	• No stockpiling or insecticide expiry	• Risk of stock-outs, which can decrease the motivation of consumers and agents

Sourcing/Procurement: summary of issues



Financing and distribution

Chapter 5

Financing and distribution

Approaches to financing and distribution, like other components of ITN interventions, must contribute to and support the national ITN strategy. It is important to identify partners that are best placed to implement the chosen approaches to financing and distribution.

This chapter covers the main aspects of financing and distribution that need to be considered:

- **financing options,**
- **pricing policy options,**
- **distribution and delivery options.**

5.1 Financing options

The options for approaches to financing are:

- no-cost recovery,
- partial cost recovery,
- full-cost recovery.

The following questions and Table 5.2 should be used to select the most appropriate financing option:

- What are the objectives and longer-term vision of the national ITN strategy? (See Chapter 1)
- How much will the intervention cost overall? (See Chapter 3)
- How much funding is available?
- What is the timeframe for funding?
- Has the donor identified priorities that will influence financing approaches, for example sustainability or targeting vulnerable groups?
- Has the donor specified what components they will support?

5.1.1 No-cost recovery

There will be no-cost recovery if nets and insecticide are given at no charge to the target population. Provision of nets and insecticide at no charge should only be considered as a short-term approach, for example to protect refugee or displaced populations during the acute phase of an emergency.

5.1.2 Partial-cost recovery

Most ITN interventions recover some costs, usually through the sale of nets and insecticide. Different methods can be used to recover costs (see Table 5.1), and levels of cost recovery vary. For example, revenue from net sales may be used to subsidize the cost of insecticide in settings where demand for nets is high but re-treatment rates are low. If costs are only partially recovered, revenue generated will be less than expenditure. When the original funds are depleted and eventually used up, this is called a sunset fund.

Table 5.1 Financing options

Level of cost recovery	Financing options	Common terms
No costs recovered	No-charge nets and insecticide to all groups at risk	
Some costs are recovered	• No-charge nets and insecticide to vulnerable groups only, charges for other at-risk groups.	Sunset fund
	• Charges for nets, but insecticide is at no charge.	Sunset fund
	• Cross-subsidy of insecticides from net sales.	Sunset fund
	• Cross-subsidy of one type of net with other types of net (market segmentation).	Sunset fund
	• Charges for nets and insecticides, but below level of full-cost recovery.	Sunset fund
All costs are recovered	• Sale of nets and insecticide designed to cover all programme costs, but losses incurred due to inflation, fluctuating exchange rates, etc.	Sunset fund
	• Revenue from sale of nets and insecticides covers all programme costs.	Revolving fund

5.1.3 Full-cost recovery

Full-cost recovery means that all the costs of an ITN intervention are recovered, not just the costs of nets and insecticide. Planning for full-cost recovery requires costing all components of an ITN intervention, including nets, insecticides, research, promotion, monitoring and evaluation, and the costs of staffing, training, logistics and other activities associated with these components (see Chapter 3), and selling nets and insecticide at prices that cover all these costs.

Planning for full-cost recovery must also take into account potential losses from inflation and fluctuating exchange rates. If costs are fully recovered, revenue generated will cover expenditure. When the original seed funds are replenished through revenue from sales, the fund has "revolved". If the project continues to cover its costs in full, it becomes a "revolving fund".

Table 5.2 Selecting the most appropriate financing option

Cost recovery	Strategy	Considerations
No-cost recovery	Emergency relief	• Short-term strategy. • The size of the population at risk should be considered relative to the funding available. • Availability of funds for re-treatment of nets should also be considered.
	Demand creation only	• No product sales involved. • Should aim to continue into the medium term. • Need to balance the level of resources and the timeframe. • Should not be done in isolation from product availability (through alternative sources).
	Targeted distribution to vulnerable groups	• Should aim to be long term. • The size of the target population and the availability of funding to continue covering this population should be assessed.
Partial cost recovery	"Pump-priming"	• Short-term strategy.
	Social marketing	• Timeframe is dependent on donor input.
	Sunset funds	• Short-term strategy.
		For these three strategies, the number of nets and quantity of insecticide that can be delivered with funds available plus revenue generated from the sale of nets and insecticide should be balanced with the proposed timeframe.
Full-cost recovery	Revolving funds	• Long-term sustainability. • The price that nets and insecticides need to be sold at in order to recover fully all costs, including the cost of nets and insecticide and other components.

Table 5.3 Selecting the most appropriate pricing policy

Strategy	Pricing policy	Considerations
Sustained subsidies for equity	No-charge or low prices.	• Availability and sustainability of resources. • The size of the target population.
Revolving fund	Prices must cover all costs (promotion, distribution, handling, administration, etc.).	• Total costs. • Cost per net and per treatment required to cover all costs or cost per net to cover all costs and allow re-treatment at no charge.
Social marketing	Similar or lower than the commercial market.	• Cost of nets in the commercial market. • Cost of nets in the commercial market of similar quality to socially marketed nets. • Affordability and willingness to pay of the target group. • Availability and sustainability of resources.
"Pump-priming"	Low prices (to encourage uptake) but not too low (to avoid perceptions of low value).	• Affordability and willingness to pay of the target group. • Availability of resources. • Balance between coverage and level of subsidy.
Emergency relief	No-charge or low prices.	• Availability and sustainability of resources. • The size of the target population. • Is it a natural disaster with an endpoint, or a complex emergency that may become chronic?

5.2 Pricing policy

For approaches that involve distribution of commodities, it is necessary to decide on a pricing policy. The most appropriate policy (see Table 5.3) will depend on the financing option and the strategy selected. Although, in theory, most of these pricing policies can be applied to both nets and insecticides, nets and insecticides are very different commodities. For example, it is easy for consumers to assess the quality of nets, but it is not so easy for them to assess the quality of insecticide. In addition, demand for insecticide tends to be lower than demand for nets. Different pricing policies may therefore be required for nets and insecticide, particularly in places where re-treatment rates are low.

A policy of **no-charge or very low prices** for nets is appropriate both for sustained subsidies to promote equity, and for emergency situations. While the pricing policy is the same, however, the strategies are different. Targeting vulnerable groups is a long-term strategy that requires tightly controlled targeting. Emergency relief is a short-term strategy that requires a different approach to targeting. While a policy of no-charge or very low prices for nets is only suitable for specific situations, a policy of no-charge or very low prices for insecticide

may be more widely appropriate, especially where re-treatment rates are low. Before implementing a policy of providing commodities at no-charge or at very low prices, it is important to assess the level of funding available relative to the current and future size of the target population, and the sustainability of funding.

Low prices can be used to encourage uptake of nets and to "pump-prime" the commercial market. However, this pricing policy should only be used for a short time, because ongoing provision of nets at low prices will undermine the commercial market. The level of subsidy, and hence the price set, should be determined by the funds available, ability and willingness to pay of the target population, and coverage targets.

Social marketing programmes (see Chapter 7) tend to set **prices at levels comparable to, or slightly lower than, the commercial market**. Pricing of nets and insecticides is determined by commercial prices, funds available, ability and willingness to pay of the target population, and coverage targets. Pricing policies in some social marketing programmes are also influenced by factors such as cross-subsidies between nets and insecticide, and cross-subsidies between different

Illustration: J Mehra

Figure 14 Nets can be provided at no charge of at low prices to target vulnerable groups, such as children under five and pregnant women

types of nets for different segments of the market. As with low prices, it is important to ensure that socially marketed commodities are not priced significantly lower than commercial prices, to avoid undermining the commercial market. Careful market segmentation can help.

In situations where the public sector provides no-charge or very low priced insecticides, for example, the commercial market can focus on selling DIY kits for home treatment of nets.

With a policy where **prices must cover all costs**, the prices set will be determined by the total cost of the intervention and, usually, how many nets will be sold. In some settings, it may be appropriate to include insecticides in the calculation, but in others it may not. Where re-treatment rates are low, for example, sales of insecticide may be too low to cover costs. If the prices required to cover all costs are higher than market prices, it may not be appropriate to supply nets or insecticide. If nets and insecticide can be sold at prices lower than or comparable to market prices, the intervention can compete on an equal basis with private retailers.

If the focus is on demand creation only, then there is no need to consider pricing policy for nets and insecticide, as market forces will determine prices. This approach assumes that the commercial sector can provide an assured supply of nets and insecticide. In practice, this is more likely to be the case with nets than with insecticide, and it may be necessary to combine demand creation with distribution of insecticides.

Pricing policy options for insecticide distribution as part of a strategy of demand creation

- no-charge initial treatment
- no-charge initial treatment and re-treatment
- low prices to 'pump-prime' the commercial market
- cost recovery price of insecticide.

5.3 Distribution and delivery options

The main factors to consider are:

- distribution channels,
- delivery of nets,
- delivery of insecticides.

The following questions should be used to help to make decisions about distribution and delivery options:

- Who is responsible for distribution and delivery?
- What mechanisms are already in place?
- Where will nets and insecticides be distributed?
- What is the target population?
- What methods will be used for targeting this group?

Distribution is about how nets and insecticides are transported to their point of delivery. Delivery is about how nets and insecticides reach the population or target groups. Distribution channels (see Table 5.4) can be used for both nets and insecticides. However, delivery outlets and methods for nets (see Table 5.5) and insecticides (see Table 5.6) may differ substantially.

Table 5.4 Distribution of nets and insecticides

Distributor	Distribution method	Advantages	Disadvantages
Public sector	Existing systems, e.g. drug delivery systems	• Reduced costs	• Dependent upon the existing distribution schedule • Nets are bulky and transport may not be adequate
	Establishing new systems	• Can develop distribution systems in areas where none presently exist	• Expensive
	On an ad hoc basis	• Supply as needed	• May be unreliable • Dependent upon good stock control • Expensive
NGOs and other organizations	As part of an ITN programme		• Expensive • May not be sustainable, especially if dependent upon donor funding
	Distribution alone	• Can use existing distribution channels, therefore reducing costs	• May not be sustainable, especially if dependent upon donor funding
Assisted private sector	Combines public or NGO, and private sector efforts	• Partners carry out the activities relevant to their skills and resource capacity • Subsidizing distribution reduces prices for the consumer and may increase coverage in the short term. • May 'crowd in' the commercial sector	• Dependent upon effective collaboration • May not be sustainable, especially if dependent upon donor funding • May 'crowd out' the commercial sector
Unassisted private sector	Existing private sector systems	• Higher chance of sustainability	• Dependent upon sales and, therefore, upon demand creation • Need to convince private sector demand will be generated

Table 5.5 Delivery of nets

Outlet	Target	Advantages	Disadvantages
Government, mission or NGO clinics	Clinic attendees (outpatients)	• Emphasizes the role of nets as a health care product • Links demand creation through health education with supply at the clinic	• Adds to the workload of already overstretched clinics • Health workers may not be the best people to deal with financial accounting required, if nets and insecticide are not provided at no charge[29] • Dependent upon level of access to health facilities
Antenatal and Mother and Child Health clinics	Under fives, pregnant women	• All of the above advantages • Effective for targeting biologically vulnerable groups • Can identify those who need no-charge or highly subsidized nets • Can provide ITNs as part of a package of antenatal care, including iron and intermittent preventive treatment	• All of the above disadvantages • Dependent upon level of use of antenatal care services by the population
Door-to-door sales agents	Geographic target community	• Convenient for the customer	• Only covers a small area • Requires supervision for accountability
Retail outlets	General population, target population of a promotion campaign	• Competition between retailers should lead to price reductions • Convenient for the customer • No costs to the public sector • Potential for wider coverage than through clinic outlets	• Only covers those who can afford to buy from the private sector • Potential for price fixing by retailers

[29] To avoid health workers needing to deal with financial accounting, patients can be given vouchers to exchange at retail outlets.

There are many potential outlets for delivery of nets. The choice of outlet will be determined by the overall strategy, target groups, ease of access, and resources available.

Delivery of insecticides is more complicated than delivery of nets, because it involves initial treatment and regular re-treatment of nets. Nets can be treated individually or in small batches on a family basis. Mass dipping of nets is to be cautiously recommended. Community preferences and resources available will determine the approach to insecticide delivery.

Table 5.6 Delivery of insecticides for net treatment

Delivery method	Key points	Advantages	Disadvantages
Community campaigns	• Time community net re-treatment campaigns to take place when communities have cash available and just before the peak malaria transmission season • Make sure people know when a re-treatment campaign will take place, so that they can wash and dry nets before re-treatment • Dippers must be trained in safe and effective treatment of nets	• Can achieve high re-treatment rates in a short timeframe, therefore increasing cost-effectiveness • Accessible because re-treatment services come to the community	• Needs to be able to treat nets of a variety of sizes and shapes, as people may bring a range of nets for re-treatment • Campaigns may need to be frequent if people wash their nets often • Can be expensive (at least some costs borne by public sector or NGO organizing the campaign) • May not be sustainable, especially if dependent on donor funding
Fixed service	• Treatment services are offered from a fixed point • Dippers must be trained in safe and effective treatment of nets	• People decide when to re-treat their nets rather than fitting in with the timing of a campaign	• Less accessible as people must take their nets to the service point • Relies on people taking the initiative to get their nets re-treated • Dependent upon the opening hours of the service • Can be expensive (at least some costs borne by customer) unless treatment provided at same point as other services
Mobile service (door-to-door agents)	• Usually operate in a geographically defined area, within reach of where they live • Agents need to record when net owners last re-treated their nets, to enable them to time home visits when re-treatment is due • Dippers must be trained in safe and effective treatment of nets	• Convenient for the customer as the agent comes to their home • Can increase re-treatment rates, especially if agents are paid on a commission basis • May be more financially sustainable than community campaigns or mobile re-treatment teams	• Agents who receive commission linked to the number of nets re-treated, may not generate sufficient income to live on • Agents paid on a commission basis may focus on densely populated, easy to access areas, leaving some populations unserved
Mobile service (mobile re-treatment teams)	• Mobile re-treatment teams can plan to visit areas on a regular basis or provide re-treatment services on market days • Mobile teams can also supply nets to those who do not have them or who need replacements • Make sure people know when a re-treatment team will visit, so that they can wash and dry nets before re-treatment • Dippers must be trained in safe and effective treatment of nets	• Can reach more sparsely populated or less accessible areas more effectively than door-to-door agents • Can cover a wider area than single agents	• Can be expensive (for same reasons as community re-treatment campaigns) • May not be sustainable, especially if dependent on donor funding
Home treatment kits (Dip-It-Yourself)	• Intended to make net treatment widely available • Must be accompanied by clear, simple instructions to ensure safe and effective home treatment	• Convenient for the customer • Net re-treatment can be timed to fit in with net washing frequency • Reduces costs to the public sector, and sustainability not dependent on donor funding	• Can be expensive, because of additional costs of packaging and instructions • Poorer families may not be able to afford to buy kits • Need to convince private sector demand will be generated

Promotion

Chapter 6

Promotion

Promotion is an essential component of ITN interventions, whether they are implemented by governments, NGOs, social marketing organizations, or by the private sector. Promotion plays a critical role both in creating demand for nets and treatment of nets, and in encouraging appropriate use of ITNs.

This chapter provides an overview of the important steps in promotion, which are to:

- **define promotion objectives**
- **plan implementation**
- **develop messages**
- **identify communication channels**
- **pre-test, post-test and evaluate.**

6.1 Define promotion objectives

The purpose of any promotional campaign is to increase coverage and use of ITNs. This usually involves changing people's behaviour by:

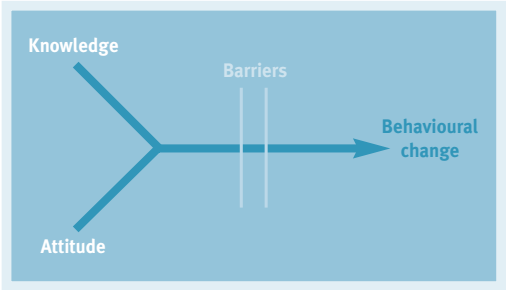
- increasing knowledge of the health benefits of using ITNs;
- promoting positive attitudes towards malaria control and ITNs;
- minimizing barriers to behavioural change.

Promotional campaigns should provide people with the **information** they need about malaria, about the role of ITNs in malaria prevention, and about why and how to treat their nets with insecticide.

Such campaigns also need to promote positive individual and social **attitudes** to malaria control and ITNs including, for example, appreciation of the severity of malaria, perception of personal risk, use of ITNs as a social norm, and the economic benefits associated with use of ITNs.

Promotional campaigns cannot address all of the **barriers** to ITN use. For example, promotion can influence willingness to pay and those who make decisions about household expenditure. But promotion can do little to increase the availability

Figure 15 Barriers to behavioural change



or affordability of nets and insecticides (see Chapters 4 and 5).

Increasing knowledge, promoting positive attitudes, and minimizing barriers are important overall objectives. But the specific objectives for promoting behavioural change in a specific context must be defined.

The following questions should be used to help to determine promotion objectives:

- What aspects of people's knowledge and understanding of malaria, its causes and prevention, need to be improved?
- What attitudes towards malaria and its prevention, including use of ITNs, need to be promoted?
- What negative or blocking perceptions need to be addressed?
- What aspects of treated net use need to be improved?

The specific objectives will be determined by the findings of the assessment of the current knowledge, attitudes, enabling or blocking perceptions, and practices of the target population (see Chapter 2), as the examples in Table 6.1 illustrate. These objectives will also feed into the plans for monitoring and evaluation (see Chapter 3).

Table 6.1 Using assessment of current knowledge, attitudes and practices (KAP) to develop promotion objectives

Findings from assessment	Promotion objectives
No understanding of malaria as a severe disease or how it is transmitted, or of how ITNs protect against malaria.	Increase understanding of malaria and of the role of ITNs.
Good general understanding of malaria, but no use of ITNs.	Increase understanding of the role of ITNs in protecting against malaria; increase use of ITNs.
Nets or ITNs are used but re-treatment rates are low.	Increase understanding of the importance of re-treatment; increase rates of re-treatment of ITNs.

6.2 Plan implementation

The following questions should be used to help to plan implementation:

- What approach to promotion will be taken?
- Who will carry out promotion activities?
- What is the target audience for promotion activities?
- When will promotion activities be carried out?

6.2.1 Approach

Possible approaches to promotion include:

- **Generic promotion**, which involves promoting the type of product, for example nets in general rather than a specific brand.
- **Umbrella branding**, which attempts to capitalize on the power of brand advertising without promoting any one brand over another.
- **Brand advertising**, which is the approach used by the commercial sector and by product-based social marketing programmes, to promote a specific brand.
- **Hybrid approach**, which may involve a generic campaign to educate the population about malaria and the role of ITNs, combined with umbrella or brand advertising.

6.2.2 Implementing agencies

The NMCP does not necessarily need to implement promotional campaigns. It is more important for the NMCP to identify organizations with the capacity and expertise to contribute to promotional campaigns, to work in partnership with these organizations or promote collaboration, and to ensure that promotional activities and messages are complementary. Organizations with suitable skills and experience may include advertising agencies, marketing boards, social marketing organizations, radio and television stations, and commercial manufacturers of nets and insecticides.

If the NMCP does play a role in promotion, it should focus on generic messages about malaria, and the role and use of ITNs, and leave the advertising of specific brands of ITNs to the private sector, social marketing organizations and NGOs. It could also encourage NGOs and community educators to adapt and use participatory behavioural change tools, such as the Participatory Malaria Prevention and Treatment package that has recently been developed for use with communities in Mozambique.

6.2.3 Target audience

The findings of the assessment should have identified who needs to be targeted by a promotional campaign. The target audience may include intended users, household decision-makers, carers, and influential people in the community.

Pregnant women are usually an important target group for promotion, to ensure that they use ITNs to protect themselves and their children against malaria. However, women may not always be able to make decisions about the purchase of commodities such as nets, and household decision-makers may be an important secondary target audience for promotion.

The target audience for promotion may not necessarily be the same as the target group for ITN use. For example, if protection of children under five is a priority, promotion will need to target mothers, fathers and others who care for young children.

Community or religious leaders, traditional healers, grandparents and others who influence people's behaviour may also need to be targeted by promotional campaigns.

6.2.4 Timing

Promotional campaigns should only be carried out when systems for supply and distribution of nets and insecticide are in place. It is a waste of effort, and may even be counterproductive, to create demand that cannot be met.

Sustained promotion is necessary to maintain and increase sales of nets and insecticides. However, more intensive efforts to promote nets should be timed to coincide with the season when the target audience has cash available (see Chapter 2). Similarly, efforts to promote insecticide should take place just before the peak malaria transmission season.

6.3 Develop messages

Messages should be determined by the findings of the assessment and the specific promotion objectives that have been identified. It is important to design messages carefully and to think about their possible impact. For example, in many communities the main motivation for net use is protection from nuisance biting and it may be tempting to develop messages that promote ITNs as a way of getting a good night's sleep. Such messages may increase household coverage with ITNs, but they may also result in ITNs only being used at times when nuisance biting is a significant problem, which means that people will not be protected from malaria transmission when nuisance biting is low. Such messages may also result in ITNs being used by wage earners for whom a good night's sleep is perceived to be more important, rather than by children under five and pregnant women, who are most vulnerable to malaria.

Messages should therefore focus on the health impact of ITNs.

The following questions should be used to help to plan message development:

- What are the main messages to be communicated?
- How many important messages are there?
- What language and local terms will be used?

Messages should be:

- simple,
- clear,
- understandable,
- informative,
- memorable,
- positive,
- specific,
- interesting,
- culturally appropriate.

Examples of messages include:

- Malaria is transmitted by a particular type of mosquito.
- Malaria is a serious disease that can kill people.
- Children under five and pregnant women are most at risk of severe malaria disease.
- Malaria can be prevented.

- A mosquito net protects against biting by acting as a physical barrier and therefore protects against malaria.
- Treating a net with insecticide increases the protective effect by repelling and killing mosquitoes.
- Treated nets will also kill bedbugs, fleas and head lice.
- Nets must be re-treated with insecticide after three washes.
- Sleep under a treated net every night.

6.4 Identify communication channels

Communication channels should be appropriate for the target group and for the messages to be delivered.

The following questions should be used to help to decide about communication channels:

- How does the target audience or audiences normally obtain or receive information?
- What communication channels are available?
- Which of these channels is appropriate for different messages and target audiences?

Potential communication channels include interpersonal contact, drama, radio, television and print media, and advertising billboards. Each has advantages and disadvantages. For example, interpersonal contact and drama are more interactive but reach fewer people, whereas television and advertising are less interactive but reach a larger audience. These examples are discussed in more detail below.

Interpersonal contact usually involves person-to-person communication between programme staff, health staff or community leaders and community members. Interpersonal contact can use locally appropriate terminology and provides an opportunity for discussion and clarification of messages. It can target specific groups selectively and achieve a good impact in communities, especially in rural areas where there is greater community cohesiveness and potential for information sharing by word of mouth. Interpersonal contact tends to achieve low coverage and a low rate of message repetition, however, and the cost per person reached is relatively high because of intensive staff inputs. Training and transport may also add to the costs. There may also be difficulties in ensuring quality control of messages and the way in which they are delivered.

Drama and other entertainments are other examples of community-based communication channels. Drama, using professional or non-professional groups, can include theatre, song, dance and puppet shows. Other entertainment methods may include storytelling and poetry. Entertainment events are usually very popular, especially in rural communities

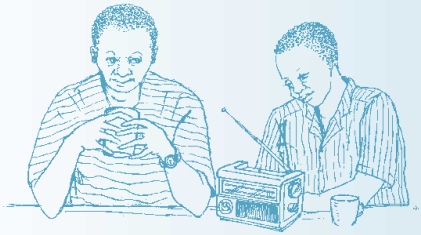


Figure 16 Drama or role play, the radio, and personal communication are all methods that can be used to promote ITNs

Illustration: J Mehra

who do not have access to television. It is important that messages delivered through entertainment are simple and clear, because there is a possibility that the audience may be distracted by the entertainment and not take in the messages. Drama may only reach a limited audience and may be expensive if a professional group is employed, but using local groups, health students, community health educators or other volunteers can increase coverage and reduce the cost.

Television has the potential to reach a large audience and to get across messages very effectively. In many countries, however, television is only accessible to people living in urban areas or in wealthier socio-economic groups. When deciding about the use of television in a promotional campaign, the following factors should be considered: access to television among the target audience(s); channels available, the geographical areas they cover, and the types of programmes they transmit; peak viewing times and times when the target audience(s) are most likely to watch television; and the cost of television spots.

In many countries, **radio** reaches a larger audience than television and it may be the most effective communication channel available. The issues the need to be considered when deciding about the use of radio are the same as for television.

Print media such as newspapers and magazines also have the potential for reaching a large audience, depending on their frequency, circulation and readership, and on literacy levels. Other types of printed materials, such as newsletters and leaflets, can be used to target specific groups, such as health workers, retailers, and community leaders. Where literacy levels are low, pictures can be used to communicate a certain amount of information.

Outdoor media, such as billboards placed in prominent areas, are a useful form of advertising.

6.5 Pre-test, post-test and evaluate

No matter how much care is taken in developing messages, they should always be pre-tested with a sample of the target population before a promotional campaign is launched. Pre-testing, which is usually conducted through focus group discussions or in-depth interviews, can help to avoid expensive mistakes. Use the feedback from pre-testing to modify messages and materials. It may be necessary to pre-test messages and materials more than once. Important things to assess during pre-testing are summarized below.

- **Presentation.** Does the audience like the words and pictures?
- **Attention.** Does the message hold the audience's attention?
- **Comprehension.** Does the audience understand the message as intended?
- **Personal relevance.** Does the audience see the message as personally relevant? Do they identify with the people and situations shown?
- **Believability.** Does the audience perceive the message and its source to be credible?
- **Acceptability.** Does the audience find the message acceptable?

Source: Chavasse D, Reed C, Attawell K. *Insecticide-treated net projects: a handbook for managers.* Malaria Consortium, 1999.

Perceptions about nets and insecticide will change as a result of promotion. So post-testing, which involves monitoring the campaign periodically and making modifications as required, is also important. Messages and communication channels should be checked and revised on a regular basis, to make sure that they are still appropriate and relevant, and to ensure that promotion is still achieving maximum impact. Another reason for post-testing is that, after a time, people get bored with hearing the same messages and tend not to notice them any more.

Figure 17 It is important to pre-test promotion materials with a smaller group before using them with the wider community

Source: Mehra S. *Partnerships for change and communication: guidelines for malaria control.* WHO/Malaria Consortium, 1997.

Illustration: J Mehra.

In addition to ongoing monitoring of messages and communication channels, it is important to evaluate the impact of the promotional campaign (see Chapter 3).

Social marketing

Chapter 7

Social marketing

Social marketing is an approach that has been used to increase ITN coverage and is used in many countries. Before deciding what role social marketing will play in the national strategy, it is important to understand what social marketing involves and how it fits with ITN interventions by the public and private sectors.

This chapter provides an overview of social marketing and its components, including:

- **planning**
- **product**
- **price**
- **place**
- **promotion.**

7.1 What is social marketing?

Social marketing is different from commercial marketing. Commercial marketing is about influencing behaviour to achieve commercial objectives, whereas social marketing is about influencing behaviour to achieve social objectives. Social marketing uses commercial marketing techniques and tools – such as market segmentation, consumer research, product branding, and promotion – but, unlike commercial marketing, social marketing targets vulnerable populations, aims to keep prices as low as possible, and emphasizes the health benefits of ideas, products or services.

Social marketing aims to create awareness of, and demand for, new ideas, products or services and to motivate acceptance of these ideas, products or services by promoting their benefits, in addition to making them economically accessible. It is particularly effective when there is a clear target audience and a specific behaviour to influence, and can be applied to a range of public health issues.

Social marketing recognizes that the process of behavioural change involves four different stages: pre-contemplation, contemplation, action, and maintaining action. Using the example of ITN use to

Defining social marketing

Social marketing employs a range of different approaches. It applies marketing tools and concepts to encourage positive behavioural changes among those who are under-served by existing public and private systems. It advertises and promotes commodities, services and behavioural change through mass, traditional and interpersonal media, and charges subsidized prices for products and services at retail outlets and clinics, and through community groups. Behavioural change strategy promotes access to and demand for goods and services by integrating health education with commercial brand advertising.

Social marketing incorporates the **four 'P's**:

- Create an enticing **'Product'** or package of benefits associated with the desired action.
- Minimize the **'Price'** that the audience believes it must pay in exchange.
- Make the exchange and its opportunities available in **'Places'** that reach the audience and fit its lifestyles.
- **'Promote'** the exchange opportunity with creativity and through channels and strategies that maximize desired responses.

Figure 18 Understanding the target audience is a vital part of social marketing

Source: Mehra S. *Partnerships for change and communication: guidelines for malaria control.* WHO/Malaria Consortium, 1997.

Illustration: J Mehra.

prevent malaria, an individual needs to recognize that they are at risk of malaria, to decide to use ITNs, and to use them consistently. Product-based social marketing develops and communicates messages to raise awareness of the health risks that may be reduced or solved by purchase and use of the social marketing organization's product. Social marketing also recognizes that behaviour and behavioural change are driven by the trade-off between benefits and costs, by what others are doing, and by personal experience.

Understanding the target audience, the barriers to behavioural change and the factors that encourage behavioural change, is crucial. This "customer-centred" approach, characteristic of the private sector, differentiates social marketing from the organization-centred approach that is often characteristic of the public sector. Listening to the "customer" is critical, and investment in formative, pre-testing and monitoring research—and adjustment of approaches based on the findings of this research—is a crucial aspect of social marketing.

7.2 Planning

Like any other ITN intervention, social marketing must be planned on the basis of information collected during assessment (see Chapter 2). To enable social marketing programmes to plan effective market segmentation, product branding, delivery and promotion, it is especially important to find out about:

- socioeconomic status of target groups;
- preferences for different types of nets and insecticides;
- acceptability of different brands of products;
- access to different distribution and delivery outlets;
- knowledge and attitudes of target groups;
- media access and habits of target groups.

Most ITN social marketing programmes are involved in promotion, distribution and delivery of nets and insecticides. But each programme needs to decide what mix of the four 'Ps' is most likely to achieve the desired objectives.

The following questions, and the following sections, should be used to help to decide on the best mix:

PRODUCT (see Chapter 4)

- What products and brands will be targeted at which segments of the market?

PRICE (see Chapter 5)

- Will the cost of products be subsidized?
- What approach to subsidy will be taken, e.g. blanket subsidies, cross-subsidies, targeted subsidies?
- Will the programme aim to recover costs? Will this be partial or full-cost recovery?
- Will consumers be expected to pay for products at the time of purchase or will credit schemes be introduced?

PLACE (see Chapter 5)

- What outlets are appropriate for the target groups?
- How will leakage of subsidized products to other segments of the market be prevented?

PROMOTION (see Chapter 6)

- What messages will be delivered by the promotional campaign?
- What is the target audience for the promotional campaign?
- What communication channels will be used to deliver messages to the target audience?

7.3 Product

The main issues to consider are:

- nets,
- insecticide treatment,
- branding,
- market segmentation.

7.3.1 Nets

- The information from the assessment should be used to determine the most appropriate type of nets, in terms of fabric, shape, size and colour, for the target population.
- Use the same information to decide whether or not it is necessary to promote different types of nets to different populations, for example, rectangular nets to rural populations and conical nets to urban populations.
- Find out where nets that meet the desired specifications can be sourced at reasonable cost.
- Choose a procurement and ordering system that is appropriate for the programme, or a partner organization with experience in procurement.
- Decide how the nets will be packaged, and whether or not they will be packaged with a single treatment dose of insecticide.

7.3.2 Insecticide treatment

- The information from the assessment should be used to determine the most convenient way for delivery of net treatment and re-treatment to the target group, for example, home treatment, treatment at a fixed facility, treatment by door-to-door agents.
- Use the same information to decide whether or not there is a need for a range of options for delivery of net treatment and re-treatment.
- Find out where insecticides in the appropriate packaging for the selected delivery mechanism can be sourced at reasonable cost.
- Choose a procurement and ordering system that is appropriate for the programme, or a partner organization with experience in procurement.
- Decide how the insecticide will be packaged and whether or not insecticide will be included with nets or distributed separately.

7.3.3 Branding

Using the commercial marketing technique of branding, with the development of logos and attractive packaging, increases the uptake and use of socially marketed products. This is because branding has the potential:

- to increase the perceived quality of the product;
- to create a product image that is attractive to the target group;
- to encourage behavioural change;
- to increase sales of other generic products through the 'halo effect', where promotion of one particular brand also increases sales of other non-branded or differently branded products through expanding the market as a whole.

A social marketing programme will need to decide about net and insecticide branding, including whether or not different brand names and logos will be used if more than one type of net or insecticide is to be promoted to different segments of the market.

7.3.4 Market segmentation

Commercial marketing segments the market into different types of consumers with different preferences, and targets different brands of products to different segments of the market. This technique is used to increase the total volume of sales of a particular type of product. For example, some brands of soap are sold as beauty products and others are sold as baby products and, as a result, the total volume of soap sales is higher than if just one brand of soap were available.

Net markets can be segmented in the same way, for example with white, conical nets targeted at the urban market and blue, rectangular nets targeted at the rural market. In principle, market segmentation can also be used to prevent subsidized nets provided by social marketing organizations and the public sector from undermining or 'crowding out' the commercial net market (see Chapter 1 and section 7.4.3).

This involves identifying the consumers to be targeted by subsidized products and the consumers to be targeted by the commercial market, and developing, promoting and selling different brands to these different groups of consumers. One potential disadvantage of this

approach, however, is the development of an illegal market, with people "selling on" subsidized nets to generate income.

There are two ways to define the target groups for subsidized products:

- those who are most vulnerable to malaria, i.e. children under five and pregnant women;
- those who are least able to afford to buy nets and insecticides, i.e. the poorest socioeconomic groups and households.

In practical terms it is easier to target subsidized products at children under five and pregnant women, as these groups are clearly identifiable and can be reached through antenatal and Mother and Child Health (MCH) clinics. Targeting the poorest is less straightforward, because it is not always easy to achieve community consensus about which groups and households are the most economically deprived.

7.4 Price

The main issues to consider are:

- pricing structure,
- cost recovery,
- subsidies.

7.4.1 Pricing structure

Social marketing programmes usually sell nets and insecticide for around the same or slightly lower prices than the commercial market. The pricing structure for social marketing programmes will be determined by private sector prices, in addition to assessment of ability to pay (see Chapter 2) and the approach to financing adopted (see Chapter 5).

7.4.2 Cost recovery

Most social marketing programmes aim for some cost recovery, usually the total cost of nets and/or insecticide or a proportion of the costs of these commodities. Social marketing programmes rarely try to recover other programme costs, such as formative research, promotion or distribution, and these are often covered by donor funds. This is because the level of cost recovery must be weighed against the level of coverage. Higher product prices will increase

cost recovery, but may result in lower sales and coverage. Conversely, lower prices will decrease cost recovery, but may result in higher sales and coverage.

The extent to which social marketing programmes aim to recover costs will therefore depend on the size of the target population, its socioeconomic status, and the donor resources available to support non-product costs. Chapter 5 provides additional information about cost recovery.

7.4.3 Subsidies

Subsidies are intended to make nets and insecticides more affordable to the target population and, thereby, to increase coverage. There are several potential approaches to net and insecticide subsidies:

Blanket subsidies, where the cost of all nets and insecticides are reduced by a certain amount, for example a US$ 4 net is sold for US$ 3. Reducing the cost from US$ 4 to US$ 3 is likely to increase affordability only for a small proportion of the population. In addition, this approach subsidizes the better off who can afford to pay US$ 4, but still excludes the poorest who cannot afford to pay US$ 3.

Cross-subsidies, together with market segmentation and branding, where some types of nets are sold at higher prices to the better off and other types at lower prices to the poorest. Specially branded nets targeting the more affluent urban market may be sold at above cost price and the profit used to subsidize the price of a differently branded net for rural populations (see Chapter 5). An alternative approach is selling nets at above cost price and using the profit to provide no-charge or subsidized insecticide treatment. This approach has been used in settings where demand for nets is high but re-treatment rates are low.

Targeted subsidies, where the subsidized commodities are targeted to the most vulnerable or the poorest groups. Few social marketing programmes have implemented tightly controlled targeting of this kind.

As discussed in section 7.4.2 on cost recovery, other social marketing programme costs, such as formative research, promotion and distribution, are often subsidized by donors. In addition, donor-supported social marketing programmes are “subsidized” in that they, unlike the private sector, are exempt from import tariffs on nets and insecticides.

Without careful market segmentation and targeting, subsidized nets and insecticides may undermine the existing private sector or prevent the development of a commercial market. It is therefore important to monitor the potential impact of subsidized products on the commercial sector (see Chapter 3).

7.5 Place

The main issue to consider is distribution channels and outlets.

7.5.1 Distribution channels and outlets

Social marketing programmes deliver nets and insecticides to consumers through a variety of distribution channels and outlets in both the public and private sectors. Potential distribution channels and outlets include public sector health facilities and private sector marketing. The distribution channels and outlets must be selected on the basis of their appropriateness to the target group and to the type and brand of product. Chapter 5 provides more details about different distribution channels and outlets and their advantages and disadvantages. It is also essential to make sure that nets and insecticides are available through the selected channels and outlets before launching promotion activities to create demand (see Chapter 6).

Public sector delivery of nets in social marketing programmes usually focuses on reaching children under five and pregnant women through antenatal and MCH clinics. Delivery through the public sector is appropriate for targeting vulnerable

groups, and promotes nets and insecticides as far as possible as health products.

Private sector distribution of nets supplied by social marketing programmes is another approach. This is a form of assisted private sector distribution, based on a partnership between a social marketing organization and the private sector, where the social marketing organization supports distribution systems in the short term until demand is created and a viable commercial market is established. This type of partnership also allows the commercial market to benefit from import tariff exemption, while efforts are made to eliminate all taxes and tariffs on nets and netting.

Public and private sector marketing of insecticide could be carried out through outlets including public health facilities, pharmacies and shops. The outlets selected will depend on the way in which insecticide is branded and packaged. Distribution of insecticides for treating nets must be regulated to prevent misuse, so outlets in the informal sector may be less appropriate for insecticides than for nets.

Figure 19 Sales agents that travel to communities can make nets more accessible

Source: Chavasse D, Reed C, Attawell K. *Insecticide-treated net projects: a handbook for managers.* Malaria Consortium, 1999.

7.6 Promotion

Promotion plays a critical role in all ITN interventions, including social marketing programmes, both in creating demand for nets and treatment of nets, and in encouraging appropriate use of ITNs. Chapter 6 provides more detailed information about promotion.

Aspects of promotion that are of particular importance in social marketing programmes include brand advertising through the mass media, interpersonal approaches and sales promotion.

Like the commercial sector, social marketing programmes take a **brand advertising** approach to promotion. Specific brands are usually advertised through television and radio campaigns. Radio tends to have wider coverage and is less expensive than television, but television is a powerful medium for creating brand image, product awareness, and perceptions of quality among consumers, traders and opinion leaders.

In social marketing programmes, **interpersonal approaches** at community level, through road shows, special events and direct sales by sales representatives, are important channels for promotion, especially to rural populations. Health workers, shopkeepers and pharmacists can also be important promoters of products to their clients.

Sales promotions can be used to launch promotion campaigns. For example, consumers could be offered time-limited special offers, such as 3 for 2, buy 1 get 1 free, buy a net and get the insecticide kit at no charge. Sales representatives and others involved in promotion need supporting promotional materials. Special promotional events, billboards and printed material can also help to support promotion activities.

Roll Back Malaria is a global partnership founded by the governments of malaria-afflicted countries, the World Health Organization, the United Nations Development Programme, the United Nations Children's Fund and the World Bank. Its objective is to halve the burden of malaria for the world's people by the year 2010 by saving lives, reducing poverty, boosting school attendance and making life better for millions of people living in poor countries, especially in Africa.

If you are interested in becoming part of the Roll Back Malaria movement, receiving the RBM newsletter and becoming part of the global success story in reducing malaria, please write to:

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Insecticide-treated mosquito net interventions

A manual for national control programme managers

This book provides a practical guide to all factors – from price and technical qualities to accessibility and community acceptance – that need to be considered when planning to increase population coverage with insecticide-treated nets. Addressed to the managers of malaria control programmes, the book draws on over 15 years of experience in endemic countries to identify strategic options for increasing coverage and then explain their advantages and disadvantages in terms of specific programme objectives. Details range from advice on how to secure sustainable funding, through instructions for calculating the number of nets needed for a given target population, to the simple observation that white nets are subject to more frequent washing. Throughout, emphasis is firmly placed on development of the commercial market as the only realistic and sustainable option for securing wide-scale population coverage with treated nets. Managers are also advised to organize the sourcing and procurement of nets and insecticides as separate operations, as the commercial market for insecticides is virtually nonexistent.

The book has been issued by WHO in response to both the documented effectiveness of nets as a strategy for reducing malaria transmission and the low population coverage achieved to date. It aims to give endemic countries all the expert advice needed to accelerate the introduction and use of insecticide-treated nets. With this goal in mind, numerous tables, charts, checklists, drawings, and alerts to common pitfalls are used to enforce the book's abundant practical advice.

The book has seven chapters. The first describes the role of insecticide-treated nets in reducing the risk of malaria transmission and discusses ways to create an enabling environment for the commercial sector. Chapter two explains how to develop an appropriate national strategy based on an assessment of factors ranging from domestic conditions and mosquito biting habits to malaria epidemiology and community attitudes. Subsequent chapters provide a step-by-step guide to the planning, monitoring and evaluation of a national intervention strategy, and discuss the sourcing and procurement of nets and insecticides, giving particular attention to the many factors beyond price that influence cost-effective investments. A chapter on financing and distribution covers options for securing funds and establishing pricing policies that influence demand, growth of the commercial market, and coverage of vulnerable groups. The remaining chapters provide a how-to guide to the use of promotion and social mobilization to support national strategies for rapidly increasing population coverage with insecticide-treated nets.

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ISBN 92 4 159045 9