

2. Insecticide-treated nets

Abuja target

In April 2000, African heads of state participating in the Abuja Summit agreed that at least 60% of those at risk for malaria, particularly children under 5 years of age and pregnant women, are to benefit from the most suitable combination of personal and community protective measures such as ITNs by 2005 (4).

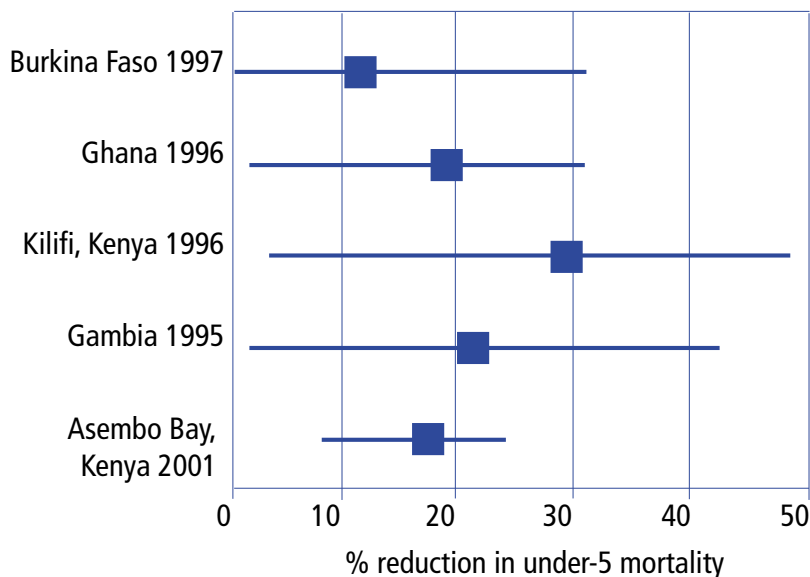
Before the development of insecticide-treated nets (ITNs) as a new technology in the mid-1980s, people in many countries were already using nets, mainly to protect themselves against biting insects and for cultural reasons (1–3). It was only recently appreciated that a net treated with insecticide offers much greater protection against malaria: not only does the net act as a barrier to prevent mosquitoes biting, but also the insecticide repels, inhibits, or kills any mosquitoes attracted to feed. Thus ITNs provide protection both to individuals sleeping under them and to other community members. The effect is so significant that use of ITNs is considered to be one of the most effective prevention measures for malaria.

2.1 Evidence

Randomized controlled trials in African settings of different transmission intensities have shown that ITNs can reduce the number of under-5 deaths by around one-fifth (5), saving about 6 lives for every 1000 children aged 1–59 months protected each year (Figure 2.1). The incidence of clinical episodes of *Plasmodium falciparum* infection is reduced by 50% on average. When used by pregnant women, ITNs are also efficacious in reducing maternal anaemia, placental infection, and low birth weight (6).

This may even be an underestimate of the

ITNs reduce under-5 mortality



Randomized controlled trials showed an overall under-5 mortality reduction of 17% in communities provided with ITNs compared with communities not provided with ITNs. The impact was similar across a range of malaria endemicities. Impact derives not only from a reduction in malaria deaths, but also from reductions in child deaths due to other causes that are associated with, or exacerbated by, malaria, such as acute respiratory infection, low birth weight, and malnutrition.

Source: reference 5, 24

Figure 2.1

efficacy of ITNs because the impact of reduced mosquito burden extends to households and communities without nets, which reduces the apparent difference between study areas with nets and study areas without nets. The protection afforded to non-users in the vicinity is difficult to quantify, but it appears to extend over several hundred metres. From observed reductions in parasite prevalences, it has recently been estimated that, in the long term, widespread use of ITNs – if regularly retreated – will massively reduce malaria transmission (7), but this effect will become fully apparent only after the usual 2-year duration of a trial.

The ITN trials achieved their impact with close to 100% of households possessing nets and 50–75% of under-5s sleeping under them, a level of use similar to the Abuja target of 60%. Where lower coverage and use rates are achieved, the impact on mortality will be less.

Subsequent programmes have demonstrated the effectiveness of ITNs under field conditions. In a large-scale social marketing programme in two rural districts in the south of the United Republic of Tanzania with high perennial malaria transmission, ITN coverage of infants rose from less than 10% at baseline to more than 50% 3 years later. ITN use was associated with a 27% increase in survival of children aged 1 month to 4 years and a 63% reduction of anaemia in this same age group (evaluated by case-control design) (8).

In the Gambia, the National Impregnated Bednet Programme achieved an 83% net treatment rate and reported 77% of under-5s and 78% of women of childbearing age sleeping under ITNs (9). Overall under-5 mortality fell by 25%, and case-control studies suggested that there were 59% fewer episodes of uncomplicated malaria in ITN users (10, 11).

2.2

Progress: ITN strategy plans

Eighteen of the 40 malaria-endemic countries in Africa with country strategy plans for rolling back malaria have developed strategic plans which include increasing access to ITNs. Twenty-five African countries have

successfully applied for funding in the second round of Global Fund applications.

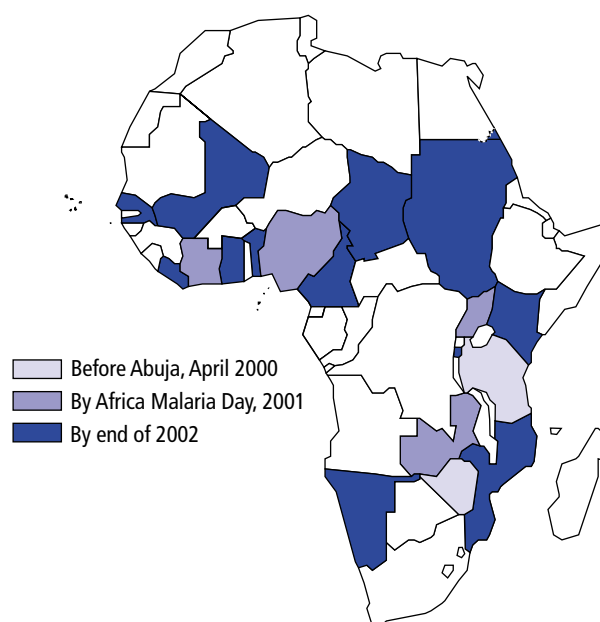
2.3

Progress: taxes and tariffs

The cost of ITNs is a barrier to their widespread use. As one element in reducing prices, the Abuja Declaration committed governments to “reduce or waive taxes and tariffs for nets and materials, insecticides, antimalarial drugs and other recommended goods and services that are needed for malaria control strategies”. Eighteen countries have now reduced or eliminated taxes and tariffs (Figure 2.2). Time-limited changes in tax or tariff regimes can be introduced through informal agreements between health and finance ministries, but more permanent arrangements normally require national legislation.

Most countries apply the “Harmonized Commodity Description and Coding System” to classify products introduced by the World Customs Office (12). Under this system, each product is assigned a six-digit code for the purposes of levying tariffs and collecting trade statistics. Nets are currently classified as textiles and customs offices can be reluctant

Reduction of taxes and tariffs



Source: RBM data from countries, 2003

Figure 2.2

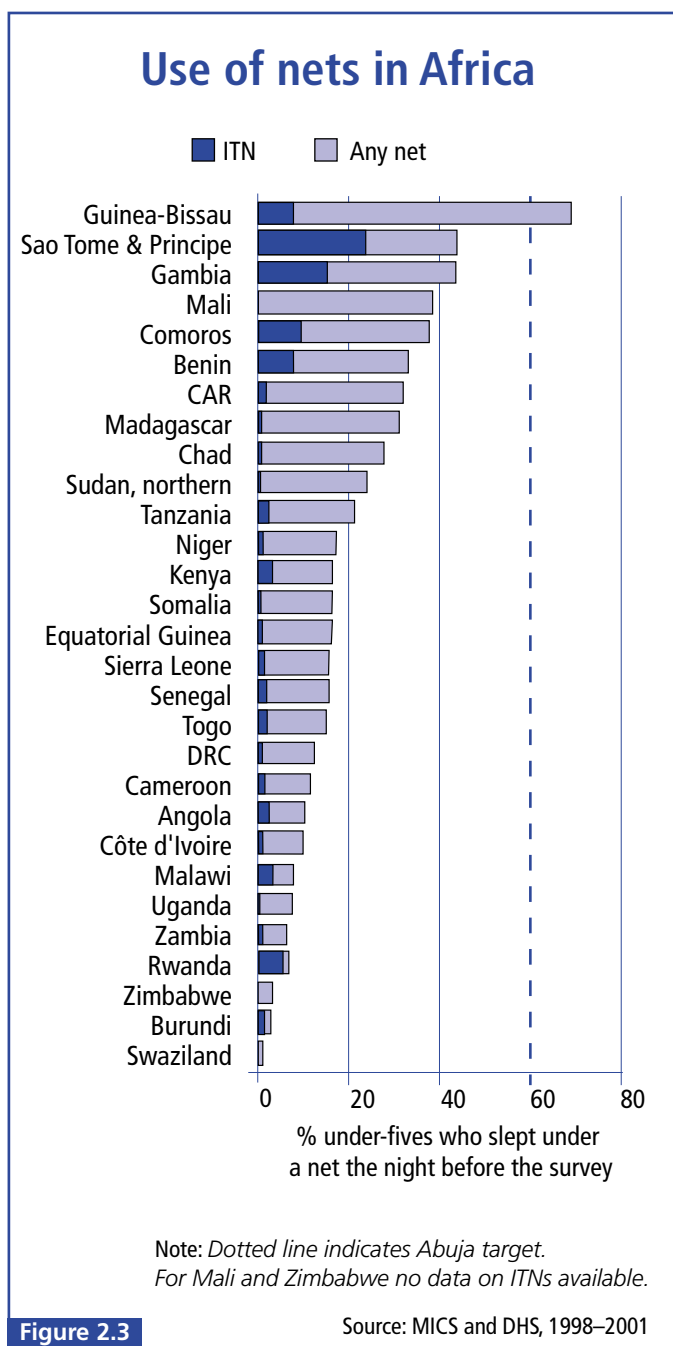


Figure 2.3

to give exemption for the whole range of products covered by the code. Some countries also subscribe to regional agreements on tariffs and taxation rates, which can influence the adoption of policy change. For example, the West African Economic and Monetary Union requires all of its eight member states to adhere to the Common External Tariff Resolution, which stipulates fixed rates for import duty of 20% and for value-added tax (VAT) of 18%. Clearly, changes in national policy would be greatly facilitated by changes to international agreements.

2.4

Progress: long-lasting insecticidal nets

In response to low re-treatment rates of conventional insecticide-treated nets, especially in Africa, WHO prompted industry to develop long-lasting insecticidal nets (LLINs) – ready-to-use, factory-pretreated nets that require no further treatment during their expected lifespan of 4–5 years. This technology obviates the need for re-treatment (unlike conventional ITNs, LLINs resist washing) and reduces both human exposure (at any given time, most of the insecticide is hidden and not bioavailable) and the risk of environmental contamination.

Using the most recent fibre technologies, LLINs are regarded as a major breakthrough in malaria prevention. One LLIN is already commercially available and is recommended by WHO. At a current price of around US\$ 5 per net, LLINs are already more cost-effective than conventionally treated nets. Efforts are being made to scale up production capacity to meet demand, which is already high. The RBM partnership is facilitating technology transfer and stimulating local production of LLINs in Africa (13).

2.5

Progress: coverage

In nine countries surveyed between 1997 and 2001, a median 13% of households possess one or more nets (range 1.1–54%). A median 1.3% (range 0.2–4.9%) of households surveyed in three countries own at least one ITN (14). The proportion of under-5s sleeping under nets is also low – about 15% across 28 countries surveyed. Even fewer children (less than 2%) sleep under ITNs. Only two countries, the Gambia and Sao Tome and Principe, reported ITN use rates of more than 10% (Figure 2.3).

While current rates of coverage are generally low, the availability and use of nets have increased appreciably over the past 10 years, particularly in countries where nets were not normally used. In the United Republic of Tanzania, for example, nets were rare in the 1980s, especially in rural areas, but ownership has increased to 63% in towns

and to 29% in rural areas (14). Such trends are encouraging and highlight the progress that is being made.

2.6

Challenges: increasing coverage

Most African households in malaria risk areas do not possess any net, whether treated with insecticide or not. To achieve adequate coverage most countries will require many more nets; to cover all Africans at risk (16), an estimated total of 260 million nets would be needed.

Increasing ITN availability will require large-scale expansion of supply and distribution. Barriers to increasing the supply and distribution of nets and insecticides include taxes and tariffs, regulatory issues, and inadequate distribution systems. Barriers to increasing the demand for nets and insecticides relate to the price, to their affordability for households, and to promotion and marketing.

There is also scope to increase the use of ITNs by providing insecticide treatment for any untreated nets already in houses. Based on the comparative coverage with untreated and treated nets, this could double the percentage of households with ITNs.

Low insecticide re-treatment rates are another challenge. Insecticide for net treatment is still an unfamiliar commodity in Africa. Moreover, people's motivation for using nets is often to reduce mosquito nuisance, not to repel or kill malaria-transmitting mosquitoes. The increasing availability of attractive branded formulations in Africa should stimulate demand for insecticides, and the development of LLINs is another potential solution to the problem of low re-treatment rates.

2.7

Challenges: overcoming disparities in net coverage

A major barrier to net ownership is poverty. The most common reason cited for not possessing a net is lack of money: the price of a net represents a large proportion of the income of a poor household.

Eritrea's national impregnation campaign

The current estimate of the number of nets in use in Eritrea is 533 200, with some 226 000 having been procured and distributed in 2002. Net treatment rate increased from 20% in 2000 to 58.5% in 2002. Most households in endemic areas of Eritrea possess two nets (17).

2.8

Scaling up

Net possession and use have to increase considerably if the gap between the number of under-5s who would benefit from a net and those who currently sleep under one is to be reduced. The challenge is to find the balance between covering the costs of increasing ITN coverage and stimulating the growth of commercial markets, while ensuring that the poorest and most vulnerable are protected (23).

In most malaria-endemic African countries the public sector does not have the financial or logistic capacity to extend net use to the scale required. Most countries spend only US\$ 4 per capita a year on health – the equivalent of the average cost of an untreated net. The Abuja target for expanding ITN use in Africa will therefore require synergy between public and private sector activities.

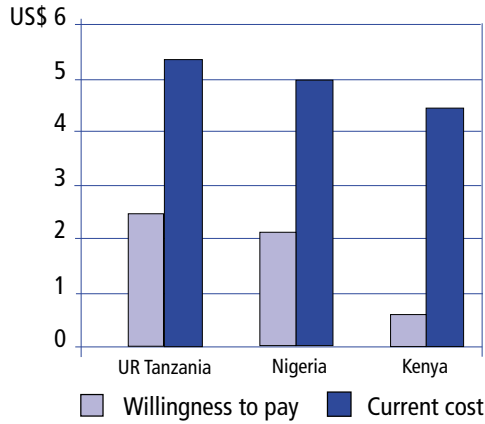
In providing an enabling environment for scaling-up actions, governments need to focus on the following priorities:

- Creating demand for ITNs through health information channels and mass media.
- Providing sustained subsidies targeted to the most vulnerable groups, preferably through a system that uses public channels (e.g. at antenatal clinics) for delivery of

ITN coverage in Zambia

A community programme in rural Zambia achieved net coverage of more than 60% of individuals at risk. With support from UNICEF, ITNs have been sold since 1995 by the provincial community-based malaria control programme. In a survey, a third of the population reported sleeping under a net the previous night, more than 80% had re-treated their nets at least once, and pregnant women and under-5s were given priority for net use. The incidence of malaria was significantly lower among net users than non-users (18).

Households are willing to pay for nets

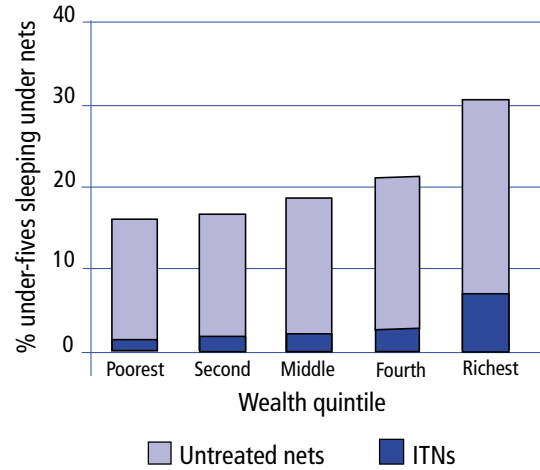


Studies in Kenya, Nigeria and the United Republic of Tanzania indicate that household members are willing to pay for ITNs, but typically less than the current cost. One approach to reducing inequities is social marketing – subsidizing, to some extent, the cost of ITNs on sale. In the United Republic of Tanzania, a social marketing project that started in 1998 increased coverage while reducing socioeconomic inequities.

Source: references 19, 20 and 21

Figure 2.4

Net ownership and use is lowest in poor households

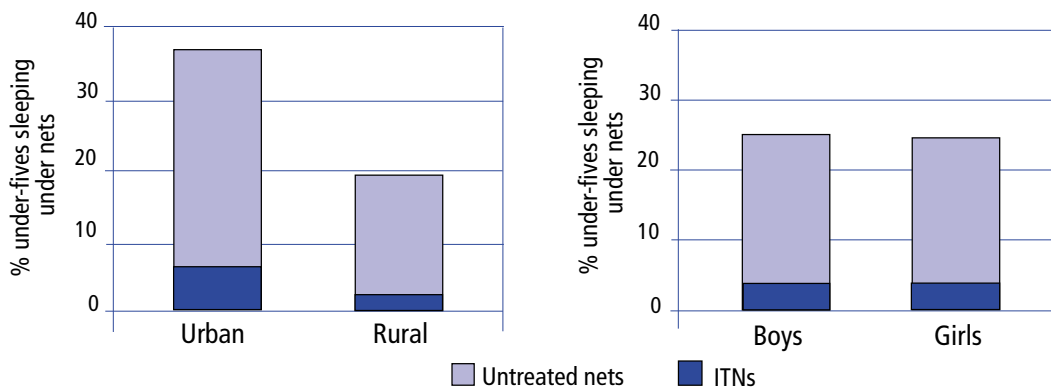


Poor households are less likely to have ITNs or any net. The disparity contrasts with a probably higher burden of malaria in poorer households, who live in houses and areas that typically allow for more exposure to mosquitoes, and who are less able to afford treatment once infection has occurred.

Source: MICS, 1998–2001, average across 22 countries

Figure 2.5

Children in rural households are less likely to use nets



In rural areas, fewer children under-5 sleep under a net than in urban areas, even though malaria is often more prevalent in rural areas. The magnitude of the urban–rural difference was larger for ITNs than for any net. Pooled over all surveys, the ratio of urban to rural coverage was 1.8 for any net and 2.8 for ITN. From these same surveys, use of any nets or ITNs is similar in boys and girls.

Source: MICS and DHS, 1998–2001, average across 22 countries

Figures 2.6 and 2.7

subsidies but commercial distribution channels for delivery of the goods.

- Stimulating and facilitating the development of commercial markets, through tax and tariff reduction and by streamlining the regulation of new insecticide products. Competition between manufacturers and distributors must be promoted to ensure that nets are available to the general population at the lowest possible price.

- Monitoring insecticide resistance.

- Possibly, market priming (i.e. the temporary procurement and distribution of ITNs, aimed at strengthening commercial distribution channels) in areas where the demand for nets is too low for manufacturers to make an economical return.

To overcome the challenge of low re-treatment rates, there should be a stronger role for subsidy of insecticide distribution through publicly funded channels. This is the system followed in the world's largest and longest-sustained ITN programmes, namely those in China and Viet Nam (23).

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