Kenya. © Sarah Hoibak/UNHCR

10: Sustaining gains: moving beyond scale-up

Reaching the full public health potential of ITNs as a vector control tool will require achieving and maintaining net coverage levels as close as possible to universal coverage. All mosquito nets work by acting as a physical barrier to prevent vector mosquitoes from biting those who sleep under them. Insecticide-treated nets add to this personal protection with a chemical barrier which kills mosquitoes when they come in contact with the net. Therefore ITNs, when used by a majority of the target population, provide what is called a "community-wide effect", as they reduce the number of vectors in the community, giving some protection even to those not sleeping under a net[a, b].

On the basis of five randomized control trials, a Cochrane review concluded that, when full coverage is achieved, ITNs reduce all-cause child mortality by between 14 and 29 per cent in sub-Saharan Africa[c]. The general implication of this is that 5.5 lives could be saved per year for every 1,000 children under five years of age protected. It was also concluded that ITNs reduce clinical episodes of malaria caused by *Plasmodium falciparum* and *P. vivax* infections by between 39 and 62 per cent, as well as reducing the prevalence of high-density parasitaemia. A recent review of evidence of the impact of ITNs under routine (non-clinical trial) conditions has been published, which supports the findings of the randomized control trials. The analysis of data from Malaria Indicator Surveys (MIS) and Demographic and Health Surveys (DHS) showed a reduction in parasitaemia prevalence in ITN-owning households, as well as a reduction in child mortality. The authors conclude that "the recent scale-up in ITN coverage has likely been accompanied by significant reductions in child mortality and… additional health gains could be achieved with further increases in ITN coverage in populations at risk of malaria"[d].

Traditional ITNs need to be retreated with an insecticide regularly to maintain their chemical barrier. Long-lasting ITNs (LLINs) maintain their chemical barrier for up to three years without retreatment. LLINs are a vital tool in the achievement of universal coverage for malaria prevention. Maintaining LLIN coverage levels is not, however, just a matter of implementing periodic campaigns, even if funding were available to undertake such large-scale campaigns on a regular basis. While net coverage is expected to be very high immediately following a campaign, surveys show that it often quickly drops off in the months following a campaign. The two key variables with the greatest influence on net use are the number of nets in a household, and the size of a household. LLIN use increases with the number of nets in a household, but decreases as the size of the household increases. Early evidence suggests three main reasons for the rapid decline of coverage:

1. **Wear and tear**. Wear and tear is estimated to be between 10 and 25 per cent per year especially in populations receiving and using LLINs for the first time, and is assumed to be associated with how well educated the population is on proper maintenance and use of the nets. After three years, at least 50 per cent of nets are no longer in use.
2. **Population increase**. Newborn children increase the existing population each year by four to five per cent, and population movements add new members to communities.
3. **Non-achievement of universal coverage** in the first place. Coverage may not have been complete for a number of reasons. The real population base is often larger than official government estimates, leading to insufficient nets being procured. Households may be missed through lack of access or incomplete registration, or the average number of people

per sleeping place in some areas may not match up with the universal coverage estimate of one LLIN for every 1.8 persons (which is itself a broad average), due to higher concentrations of people sleeping alone, such as adolescents, single men and women and migrant workers. This may be particularly prevalent in urban areas, for example.

Other factors which influence net use include ambient temperature (too hot to sleep under the net), presence of nuisance biting mosquitoes (the net is used for better sleep due to high density of mosquitoes), knowledge of malaria risk and knowledge of how to hang a net.

The decline of coverage varies widely between populations and locations, but it is generally accepted that mass distribution campaigns should take place every three years to take account of net deterioration and population changes in areas without strong systems for continuous distribution of LLINs to ensure the population has regular access to nets. Access to LLINs is vital, particularly to cover the most vulnerable groups in the population. For this reason, more options for obtaining nets in the intervals between mass distribution campaigns must be part of the strategic planning of malaria control programmes. Continuous delivery of nets via different channels should be systematically introduced, complementary to mass distribution campaigns, and strengthened to ensure full access to LLINs for all populations at risk of malaria. See Resources R10-1 for the Roll Back Malaria consensus statement on continuous distribution systems[e].

Continuous distribution channels might include:

- public sector (distribution through antenatal clinics, immunization clinics, schools, health facility services, etc.)
- community-based organizations (distribution as part of ongoing health promotion activities)
- private sector (commercial sector networks)
- combination (public subsidies for private distribution)

Most countries have some experience with public sector routine distribution of nets to pregnant women and children under five years of age via antenatal (ANC) and immunization (EPI) clinics. This public sector distribution mechanism has the greatest capacity to increase and sustain coverage, particularly among the highest risk populations. Routine delivery can increase coverage rates dramatically especially among young children and pregnant women (a rise from 8 per cent to 55 per cent coverage of children under the age of five years in Malawi from 2000 to 2005), but in its current form is insufficient to maintain universal coverage with LLINs as it does not target all households. Ideally, countries will adopt a strategy of pairing various methods of continuous delivery and mass distribution delivery in order to provide a complete catch-up and keep-up service.

ANC/EPI distribution can be an excellent way of maintaining coverage for targeted groups, but will be an insufficient mechanism for ensuring that the population as a whole has access to new nets in between mass distribution campaigns. The full potential of LLINs as a vector control mechanism can only be realized with full population coverage. Therefore additional channels are required in order to reach older children, adults, including men and non-pregnant women, the elderly and those with single sleeping arrangements (e.g. those in religious orders, hospitals, military facilities, boarding schools, etc.).

10.1 Continuous public sector delivery via health facilities

The continuous delivery of LLINs through health facilities is a cost-efficient, relatively straightforward method of targeting the highest risk population groups, that is children under the age of five years and pregnant women, by using existing infrastructure. Ensuring that this system works effectively, continuously and in all areas

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of a country where malaria is a priority does, however, require a significant enhancement of existing health systems, particularly supply chains and health management information systems, and should be planned carefully and allocated a dedicated budget.

There are many advantages of continuous delivery through health facilities. These include:

- **Access**. LLIN delivery through routine services provides direct access to those most at risk of malaria where the population has access to health facilities.
- **Attendance**. Antenatal attendance, at least once during pregnancy, is above 70 per cent in almost all sub-Saharan African countries, and over 80 per cent in many. UNICEF estimates that diphtheria, pertussis, tetanus (DPT) coverage is 82 per cent globally among children under one year of age, with high variability between developing and developed countries, as well as within countries. There is anecdotal evidence that LLIN distribution through clinics is an incentive for attendance and uptake of services.
- **Distribution points**. Health facilities are located throughout many rural areas and are generally capable of storing small quantities of nets securely.
- **Promotion**. Consultation at the clinic provides a one-to-one opportunity for the health care provider to reinforce key messages regarding malaria prevention and treatment.
- **Accountability**. The pre-existing management and supervision structure of public health facilities can be used to ensure reconciliation between stocks of LLINs and records. In cases where LLINs are sold through subsidy programmes, stock and revenue can be reconciled at any time.
- **Efficiency of scale**. As the scale of the programme increases, with all public health facilities taking part, the economic cost of each LLIN delivered decreases.
- **Sustainability**. Continuous delivery through a government-led health programme creates structures that can sustain delivery of nets in the longer term.
- **Supply chain strengthening**. Ensuring continuous availability of nets in health facilities is one way of monitoring the strength of the supply chain and the health management information system. The continuous availability of promised nets can help build community confidence in public facilities and their staff.

Elements that facilitate the establishment of an effective continuous LLIN delivery programme through health facilities include the existence of a functional public health sector covering a large proportion of the population. The sector must have excellent supervisory practices, a good records system to ensure the systematic recording of distribution of nets to individuals, a reliable transport network and system to ensure supplies of nets to health facilities, an efficient tracking system to monitor stocks and avoid stock-outs, and adequate and secure central/regional warehousing to store nets.

Nets distributed through routine antenatal care services and immunization programmes are generally free or highly subsidized. Whether

LLINs are free of charge to recipients or are sold at a subsidized price is a matter of national policy. LLINs that are supplied free of charge provide a more equitable access. Even a nominal cost will make LLINs inaccessible to the poorest people, who are often the most at risk for malaria. Subsidized LLINs, however, can help to improve health facilities and renew net stocks by generating some revenue, although there is a requirement for "seed nets" to generate initial capital so that the scheme can continue. Commission on sales may also help to motivate care providers in health centres, and may encourage them to promote the benefits of LLINs actively during one-to-one consultations. Since detailed records must be kept of stock and revenue taken, it is easier to monitor the uptake of nets by consumers and the stock remaining at the facility. A nominal cost, together with a strengthened net culture, may also, in time, encourage households to allocate some income to LLIN ownership, promoting sustainability in the future.

COUNTRY CASE STUDY

In Kenya, LLINs were initially sold to the facility at 30 Kenyan Shillings (KES) each. The facility then sold the LLINs to the target group at the standard 50 KES price. Twenty of those 50 Shillings were reinvested in the facility for improvements and/or for staff incentives, and 30 were put aside to purchase more LLINs.

While there are a number of public sector continuous distribution models, it is important that all NMCPs ensure that the protection of the most vulnerable risk groups (pregnant women and children under the age of one year) is a priority, through the systematic integration of mechanisms for continuous LLIN distribution into national malaria control strategies, including the use of routine antenatal and EPI services.

Delivery of LLINs through antenatal care or EPI clinics can be carried out in two ways:

1. giving a free LLIN directly to the caregiver or pregnant woman attending the clinic
2. giving a voucher that can be exchanged for a LLIN (with or without a top-up payment) at a distribution point, such as a commercial outlet

Delivery of LLINs through antenatal care

In most malarious countries, it is NMCP policy that pregnant women are eligible for a new net at each pregnancy, and they should be given a LLIN or a voucher at their first antenatal visit. Withholding a net until the second or third visit in order to encourage subsequent visits is not recommended as the woman would be at risk for malaria in the meantime. Health facility staff should be trained to give messages regarding the proper use and maintenance of LLINs during ANC visits, as well as messages about malaria in pregnancy and the importance of intermittent preventative treatment (IPT) and when it should be received. In many countries, pregnant women are provided with LLINs during their consultation and the airing and correct hanging of the net is explained.

In other countries, systems have been established where a pregnant woman will receive a voucher during a health facility visit that can be exchanged for a net at a nearby commercial outlet. Depending on the system, the voucher may be exchanged for a standard, free net or the voucher may represent an amount of money which will require a top-up depending on the LLIN selected. Distributing vouchers can serve to stimulate local trade by building and maintaining a countrywide network of outlets. Commercial demand and the commercial market are strengthened, while the burden on the public health system of the management and logistics of net distribution is reduced. However, a potential disadvantage is that private sector retail outlets may be rare or absent in rural areas. Voucher distribution should only be considered if there is a viable commercial market, and if funding to monitor and support that network (e.g. printing and tracking of vouchers) is available.

Free-of-charge net distribution to pregnant women at their first ANC visit is the recommended mechanism to ensure equitable access by all sectors of the community. This requires a sustainable funding source (either national or international) to ensure a continuous supply of nets.

Delivery of LLINs through immunization programmes and other interventions

The highest malaria mortality rate is among children under the age of five years. Infants can receive their LLIN either as a new-born infant at their delivery in a health facility, at the first EPI visit (6 weeks), after completion of the first routine vaccination series (three doses of vaccine against diphtheria, pertussis and tetanus (DPT3) at 14 weeks) or finally at the moment of measles routine immunization (9—12 months). If the mother of the baby has already received a LLIN during her pregnancy through antenatal care, it is most likely that the baby will sleep with her under the same net, and it is permissible to withhold the new net until at least week 14 to encourage the child and mother to complete the DPT3 vaccination series (if the net can be stored under secure conditions).

Where health facilities and systems are strong, continuous delivery of LLINs to children (especially those under one year) can be managed at routine immunization visits. Distribution of LLINs can also easily be integrated into the package of services delivered through child health days/weeks, which target children under the age of five with interventions such as supplemental immunization (particularly polio and measles), and nutritional services such as vitamin A supplementation and deworming. Where outreach systems are in place for communities with limited health facility access, LLINs can be included within the package of services being provided.

Kenya. © Sarah Hoibak/UNHCR

In an effort to ensure sustained universal coverage, countries may consider providing LLINs (or vouchers) to older children who attend facilities and test positive for malaria infection. Visits to outpatient departments for childhood or adult episodes of illness provide opportunities for distribution of LLINs and for following up on net use among individuals to monitor population ownership and utilization.

10.2 LLIN distribution through community channels

Within the continuous distribution framework, there is a need to identify and develop possible community channel pull systems that can be used to replace LLINs as they expire or become physically degraded to the point of no longer providing effective prevention. Community channels for LLIN distribution have been explored on a small-scale basis but have not yet been taken to the level of regional or country coverage.

Community-based distribution of LLINs can be implemented through a number of different channels. For example, community-based organizations can be contracted to deliver nets to households that need them. Household need may be assessed through ongoing door-to-door or community health promotion activities, with malaria as one component in a broader programme. They might sell subsidized nets and keep a portion of the profits for their own activities or to purchase additional nets as a revolving fund.

COUNTRY CASE STUDY

In Senegal, community groups received 100 nets at a time to distribute to members of their community, prioritizing pregnant women and children under five. The groups sold the nets for a small fee of 100 West African CFA franc (around US$0.25), which they kept and used for transport costs and other activities.

Alternatively, nets may be provided to the organization by the NMCP to be distributed free of charge according to need. It is important with community-based distribution that the criteria for assessing net condition and viability and for allocating new LLINs in the case of need are clear during training to ensure rational use of limited resources.

Community-based distribution is often an attractive initial option for many countries, since it relies on the community to identify those households without nets (or with an insufficient number of nets), and to ensure they then receive nets. Empowering community groups also helps promote the activities of women's groups, youth groups, or other local groups already active in health promotion interventions.

COUNTRY CASE STUDY

In Madagascar, itinerant saleswomen sell a variety of health products from village to village; the sales of subsidized LLINs made it worthwhile for the women to expand their sales areas, resulting in an uptake of other health products such as family planning items.

Periodic community distributions could also be organized, although there is less experience with this type of channel. These mini-campaigns would require a similar level of effort as larger-scale campaigns in planning and logistics, but stocks of nets could be delivered continuously into the country and delivered to district level, and distributed to families on a quarterly or six-monthly basis. The main problem with this mechanism is making sure that families who need new nets are properly identified, and that the distribution does not become an opportunity for households to obtain more nets than they need. One way of ensuring this is to allow households to redeem only an old, torn net for a new net. This may, however, encourage poor care and repair of LLINs, and rewards households who do not take

good care of their nets. In addition, if households are asked to exchange old and torn nets for new nets there must be a way of managing the nets that are exchanged. If there are no means for disposing of unusable nets, collecting them can become problematic.

School-based distribution of nets can target older children, who are often the group not sleeping under nets following mass LLIN distributions due to sleeping arrangements in households. School-based distribution may target only the student, or multiple nets can be provided to a student that will be used to protect other members of their family living in the same house. School-based distribution is being piloted in some countries but has not yet been undertaken nationally or even at a regional scale.

School-based distribution has not been implemented on a wide basis, but offers a potentially effective way of reaching households on a continuous basis as their children age and progress through their education. The mechanism does not work well in places where school enrolment and attendance are low. However, in countries with high rates of enrolment, school-based distribution of nets to different age-groups each year has the potential to deliver enough nets to maintain universal coverage, when combined with ANC/EPI distribution.

COUNTRY CASE STUDY

In Tanzania and Nigeria, pilot schemes will be conducted to assess the effectiveness of delivering one net per child in selected age groups at primary school as a means of getting new nets into households. This mechanism assumes that nets brought home by the child will be distributed among the household members.

Other combinations of age groups, for example, giving to new pupils and leavers in primary school each year, will contribute fewer nets, but

COUNTRY CASE STUDY

In Tanzania, 71 per cent of households (equalling 84 per cent of the population) had either a pregnant woman or a current student, making a combination strategy of distribution via ANC, EPI and schools a potentially effective mechanism for maintaining universal coverage post-campaign.

depending on enrolment and completion rates, could significantly contribute to maintaining universal coverage. School-based distribution has the drawback that it will not reach households who do not have children of school age, such as young couples, single adults or the elderly. It will also not reach parents whose children are out of school or who cannot/do not send their children to school. Depending on the demographics of the particular country, these households may make up a smaller or larger percentage of the population.

Other possible channels for community-based distribution of LLINs include projects focused on providing support to HIV/AIDS affected families, patients undertaking directly-observed therapy for tuberculosis, or neglected tropical diseases. In these projects, community-health workers or volunteers regularly visit households and can assess net condition and need as part of their ongoing tasks. Requirements for LLINs can be communicated to the NMCP or to the responsible project partner to trigger delivery to the community and distribution to households.

When looking at possible community channels for continuous distribution, it is important to undertake an assessment of the population structure and demographics (such as percentage of households with pregnant women, children under one, children under five, school-attending children, etc.). It is also important to undertake mapping of civil society and faith-based organizations, as well as other possible community or youth structures, that could contribute to continuous distribution

of LLINs for sustained universal coverage. It is unlikely that a single channel for continuous LLIN distribution will be sufficient to sustain universal coverage so using as many channels as is practical is important to reach all population groups. Establishing community channels for continuous LLIN distribution in areas with poor health facility access should be a priority.

10.3 LLIN distribution through the private sector

The private sector has a role to play in ensuring sustained access to LLINs. The private sector offers enormous opportunities for increasing availability of products given that the majority of people living in malaria-affected countries already rely on the commercial market for a majority of their household and personal needs. The private sector is able to increase availability to those who are able to afford products, allowing public sector delivery to focus on the most vulnerable with its available and often limited resources. The public sector in most cases does not have the capacity to scale up and sustain coverage with malaria prevention without donor and commercial partnerships.

The private sector offers a number of opportunities and private sector partners should be engaged early in discussions about establishing or expanding continuous distribution channels. The private sector is demand-driven and for this reason, companies work to create and sustain demand through marketing campaigns to increase product uptake and appropriate use. Private sector marketing campaigns will reach even those who cannot afford the products, generating demand for other continuous distribution channels, such as free delivery to pregnant women and children through routine health services.

Commercial markets are valuable sources of nets. Untreated locally produced or imported nets are often available through the commercial sector and in markets. While these nets can contribute to prevention of malaria for the individual

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user, they will have little impact on malaria transmission intensity. In addition, in most countries LLINs are sold in pharmacies or local shops or in markets, though in many cases, the prices are prohibitively expensive for a majority of the population.

Where strong commercial markets exist or are developing, they should be encouraged. NMCP should communicate malaria control plans to the commercial sector to allow them to anticipate market growth. A strong, competitive commercial market leads to higher quality, greater variety, lower prices and wider availability. Also, while free distribution of LLINs is often done using a standard net with a low price, commercial distribution increases choice and convenience once a sufficient number of vendors and outlets are involved.

10.4 LLIN distribution through social marketing

A social marketing approach uses public funds to support market-based systems for delivery of nets. The strategy of using accessible commercial outlets makes LLINs available to any potential user at any time of the year. However, legislation must ensure that nets available through this

channel conform to the WHOPES-approved guidelines and are of high quality. Centralizing procurement at the national level before distributing to wholesalers and retailers would ensure the lowest procurement price. Highly subsidized sales through the private sector may be the only option for populations not otherwise reached through public sector health facilities, for example in post-conflict settings where the public health systems are either non-existent or do not have the capacity for rapid delivery of effective malaria control interventions. In these situations, using public sector funds to subsidize LLINs can result in the lowest possible consumer prices, while still allowing a profit margin for the retail outlets. Private sector outlets such as kiosks, markets and shops, as well as community-based organizations can be used as delivery channels.

Unlike delivery through antenatal and immunization clinics which target pregnant women and children under the age of one year, social marketing delivery makes LLINs available to any subset of the target population in a country aiming for universal coverage. This availability might ensure that families allocate some income to the acquisition of LLINs. Over time, the subsidized price could increase as households consider LLINs essential items and are willing to pay more to own them.

There are, however, disadvantages. Price, however well subsidized, may still be a barrier to the poorest people. In addition, commercial density drops off in rural areas where the risk for malaria is often highest. A lack of capital in rural areas results in a tendency to trade only in proven fast-moving consumer goods. In order for small-scale retailers to buy, transport and stock slow-moving consumer goods such as LLINs on their own initiative, there must be a demonstrated demand for the product by the consumers. Most communities are informed and have some knowledge of the protective effect of nets, having been exposed to messages through the various channels mentioned above. To ensure a sustainable market community, however, demand must be continuously stimulated. Households should therefore be encouraged to purchase nets as their income levels permit.

10.5 The introduction of continuous distribution mechanisms

The introduction of continuous LLIN delivery requires the enhancement and strengthening of the structures and activities for mass distribution campaigns described in this toolkit. These include:

- coordination of malaria partners at central, regional and community level
- short- and long-term planning
- procurement
- storage
- transport and accountability of LLINs
- communication for advocacy, social mobilization and behaviour change

Additional activities also include training and re-training of personnel at different levels, accurate record-keeping, data management and transmission, and ongoing supervision, monitoring and evaluation of all aspects of the delivery programme. The MoH must provide leadership, policy formulation and supervision, but may opt to subcontract the logistics, training, communication and/or monitoring and evaluation to a third party to ensure accountability, transparency and the comparative advantage of using a specialized agency or partner.

Some recommended steps to introduce health facility distribution include:

Coordination

As described in Chapter 2, good coordination between all partners at all levels involved in the country's malaria programme is critical to its success. Developing an appropriate continuous distribution policy and strategy for LLINs is a primary responsibility of the MoH, often in conjunction with the department of

reproductive health or EPI, so that it ensures ownership and accountability at all levels of the public health system. Other ministries will be involved in ensuring the success of the system selected, ranging from the finance ministry, often responsible for providing or overseeing funding, to the agriculture ministry who will monitor the effectiveness of the insecticide used, to the education ministry who will need to be engaged in the case of school-based distribution of nets. Close coordination between the NMCP and district health offices ensures that LLIN distribution activities are routinely integrated into ongoing health services. Health providers should perceive LLIN distribution and promotion as an integral part of their job. National and district health officers and health facility staff must be committed to, and participate fully in, the approach adopted.

At the district level, a LLIN committee should be set up to coordinate activities locally. A coordinator should be employed to oversee implementation. The district LLIN committee could be made up of district health management team (DHMT) members, the district LLIN programme coordinator, representatives from partners at district level (e.g. NGOs, private sector), and representatives from subcontractors (e.g. transport provider) where relevant.

Planning

Macro-planning and macro-quantification are an aggregate responsibility as they require information from all levels, from the top down to health facility or community level, to ensure that numbers are as accurate as possible. The following steps are recommended:

- definition of epidemiological coverage in terms of whether the continuous distribution strategy will cover endemic areas only, endemic plus epidemic, or epidemic plus low transmission
- definition of geographical coverage of the programme based on epidemiology
- calculation of population size in that geographical area
- definition of targets (women through antenatal clinics, children under the age of one year and/or under the age of five years through EPI clinics, school-age children, general population or all these)
- definition of channels for LLIN distribution (health facilities, civil society organizations, commercial outlets, etc.)
- quantification of targets based on demographic data, including population access to and use of the various channels being used for LLIN distribution
- estimate of staffing needs for all aspects of the programme, including monitoring and evaluation

An example of macro-quantification to define annual need for a programme targeting children under five

Population = 28 million
Children under five = 16%

28 million x 0.16 = 4,480,000 in year one

Birth rate = 3.7%

28 million x 0.037 = 1,036,000 in year two, three, four, depending on length of programme and birth rate rise, etc.

Plus an additional 10—15% per year to account for nets that are wearing out.

Micro-planning activities need to establish the criteria for health facility eligibility in the programme and identify health facility (public, private, faith-based) infrastructure within the geographical area. The facilities to be used as distribution points should be determined by the regional health management team (RHMT), in conjunction with the district health management teams (DHMT) under their responsibility. The ideal scenario, depending on reliability of reporting by the facilities, should be one where all public and faith-based facilities offering routine services like immunization and antenatal care are included and distribute LLINs to the target population free of charge. All facilities should

Sierra Leone. © Doug Mole, IFRC

be given a unique identification for reporting purposes to ensure proper targeting of nets, and monitoring of stocks. A code that assists in identifying the facility by province/region, district and type of activity is ideal.

Private health facilities can also be included as continuous distribution channels. In these cases, given that patients are paying to receive services, subsidized or full cost sales may be an appropriate method for increasing population access to and ownership of LLINs. Engaging private health facilities may be difficult if they are not grouped under a single coordination structure as it will involve a facility-by-facility process of information provision and start up of activities.

Plans should be made to ensure that all supervision and monitoring structures are in place before the programme begins, and that training manuals, materials for communication of all kinds, and data collection tools for reporting and monitoring are available and harmonized. If implementation of the programme is staggered, plans for training and communication must reflect the exact situation in terms of planning and implementation of activities. For example, until nets are available for distribution in each district, country-wide messages are not appropriate, although start-up dates can be announced publicly for each district.

Micro-quantification requires the quantification of target populations at the lowest level possible. This should be at least health facility level and if possible community level to ensure the availability of sufficient nets. All available data should be used, including recent census data (e.g. for electoral purposes), and EPI data which will give an indication of the number of children. If a recent universal coverage campaign took place and good quality data were collected, collated and synthesized during the household registration, these data can also be used to guide quantification.

Facility need is determined by each district through the Annual Operating Plan. If National Bureau of Statistics population numbers by districts do not match with facility data on population, based on consultation rates, the disparity should be investigated to discover the cause. It may be that figures are out of date or overestimated. In cases where this is not so, there might be other explanations. For example, some populations, such as those in extremely remote communities, will be counted by the Bureau, but may not have been previously served by any of the identified health facilities. It should be noted, however, that free LLIN distribution may have an effect on facility attendance by attracting these under-served populations, and provision should be made accordingly.

Populations should only be left out of programme quantification for health facility delivery when provision for increasing their access to nets has been determined by other means. For example, some populations may derive greater benefit by being the recipient of other specifically targeted mechanisms such as distribution of LLINs by community health workers, social marketing of LLINs or other outreach activities. This will require

expansion of the health facility delivery programme or engagement of additional partners as other continuous distribution channels. In some areas, active distribution and replacement of LLINs may be occurring through civil society or faith-based organizations or as part of ongoing programmes, such as for neglected tropical diseases.

A further example of how the population figures might not match is the double or triple counting of population by different types of facilities (public, private, faith-based) in the same catchment area. This could lead to population figures of the collective facilities being larger than the National Bureau of Statistics figures. There should be triangulation of figures to eliminate overlaps and knowledgeable local authorities such as the DHMT should be consulted to verify and validate numbers.

Procurement and logistics

The steps outlined in Chapter 4 of this toolkit should be followed to ensure timely delivery of a sufficient number of LLINs to cover demand for a specified period.

The NMCP should give guidelines on the minimum net specifications, such as net size, shape, chemical to be used and colour. The colour, label and packaging of the net may be important elements when the issued nets are free to distinguish them from nets distributed by other channels if it is Ministry of Health policy to track which channels are most used for LLIN acquisition. In some cases, the Ministry of Health is interested in a clear distinction of free versus commercial or campaign nets to facilitate net tracking by distribution channel and avoid leakage, as well as to make identification easier during surveys. Where possible, net specifications should be based on known population preferences and should take into consideration potential barriers to uptake and use. The shape will also affect the logistics operation (e.g. conical nets take up twice as much room as rectangular nets). Warehousing capacity in different areas should be taken into account to minimize risk of loss (theft, improper conditions, etc.). To minimize warehouse costs, and if feasible, deliveries of LLINs should be staggered.

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Only WHOPES-approved nets should be procured and must conform to the country-specific Pesticide Regulatory Authority's guidelines. Net suppliers meeting all requirements should be invited to tender in an open tender process. Before nets are issued out, previously planned quality control measures should be implemented to ensure consistency with product specifications.

The supply chain infrastructure within geographical areas to be served needs to be mapped out, taking into consideration the transportation means available (road, water, rail, etc.), and seasonal variations in accessibility of different areas. As described in Chapter 5, the inventory management system may be centralized or decentralized. In the case of centralized, secure storage facilities, able to store at least two months' supply of LLINs should be found within regions/provinces, plus a larger warehouse at central level from which the regional storage facilities will be stocked. Based on the country's epidemiology and geographical outlay, regional warehouses should be situated in areas with the highest malaria transmission to reduce the possibility of stock-outs.

COUNTRY CASE STUDY

In Kenya, where the continuous distribution of nets via health facilities has been in place since 2001, one central and three regional warehouses are needed to distribute 2.1 million LLINs per year.

Health facility quantities delivered should be based on both their yearly net needs and also the frequency that they will re-stock or be re-supplied. It is important to forecast LLIN needs and delivery carefully, and to develop a schedule for the supply chain circuit, to avoid either under-stocking or overstocking health facilities. Overstocking is an inconvenience for health facilities that have limited storage space, sometimes leading to substandard storage of LLINs. Under-stocking results in breaks in the continuity of the supply, which is vital to the reliability of the programme. Once needs are quantified, a small buffer stock should be added (5 per cent) in case demand is greater than expected, particularly initially, as in many cases, there will be a spike in demand for LLINs in the first year. In subsequent years, the demand should stabilize, with only new pregnancies and new-born babies eligible for receipt of a LLIN, depending on the MoH policy.

Professional full-time security is required for LLINs in all central and regional warehouses. All goods should be insured when in transit and storage at all levels of the supply chain. As need arises, a fleet of trucks will transport nets from the central warehouse to the regional storage. From there, transportation to health facilities using the most appropriate and available method (e.g. small truck, boat, motorbike) will be required. Coordinators in each district should oversee the movement of the LLINs, which need to be in bales rather than individual nets in order to simplify paperwork and reduce loss. As was emphasized in Chapter 5, stock control tools must be used at every movement of stock to keep an accurate inventory and to ensure nets are tracked up to and including their receipt by beneficiaries. Tools are required to keep systematic records of movement between central, regional and health facility levels, as well as for forecasting need to avoid stock-outs. For example:

- at central level a system and stock management tools to handle reception of LLINs and requisitions from regional level
- at regional level tools to request LLINs from the central warehouse, and to record stock when received and sent, plus delivery notes for health facilities
- at health facility level, stock sheets, record of issue to individuals, both in a central register and on the clinic card of each person receiving a net, secure method of storing cash (if nets are sold)

Permanent registers which are used for immunization, growth monitoring or antenatal

information should be used to record nets distributed to avoid having multiple tools for reporting different health indicators. Each net issued should be ticked off against the recipient's name where other services are being rendered. To avoid any duplication, clinic cards belonging to recipients should be stamped indicating that a net has been received. The particulars of the recipient will be noted in the permanent register, making it easy to track net issue to the end user and follow up on net ownership, hanging and use.

Communication

Coordinated and targeted promotional and advocacy activities are crucial to ensure that gains made following a mass distribution of LLINs are sustained through continuous delivery of LLINs. The promotion of continuous distribution and utilization of LLINs requires commitment from a large number of different organizations – government, public, private, NGO, faith-based, academic – to work in partnership. It is critical following a mass distribution, where interest has been generated in LLINs and their use, to ensure that the population knows where additional nets can be accessed and any costs associated with their acquisition.

Materials will need to be developed for information, education and communication (IEC) and for behaviour change communication (BCC), and the communication plan should contain information on how these supports will be disseminated. In the case of public health facility delivery of LLINs, key messages for malaria prevention and treatment and LLIN utilization and care can be reinforced at one-to-one consultations between mothers/caregivers and health providers at routine clinic visits, as well as through group talks while mothers are waiting to be seen. Good support materials, such as drawings or having a net properly hung in the waiting area, facilitate discussion. Key messages can also be disseminated through mass media channels. In the case of community-based or commercial outlet sales, it is important that the NMCP is involved in the development of key messages, that job aids are provided to ensure clear and correct messages are disseminated to beneficiaries and that these activities are coordinated with and complementary to ongoing NMCP communication activities.

BCC is extremely important after beneficiaries have received nets to ensure that they are hung properly, cared for and used on a nightly basis. BCC messages can be disseminated through mass media channels which have the potential to reach large numbers of beneficiaries at a low to moderate cost. A number of approaches should be combined to reach the maximum number of people. BCC must be culturally and contextually relevant and should endorse simple-to-do behaviours. Mass communication channels, such as radio, television, newspapers, posters and other visual materials can be used all year round to promote acquisition and utilization of LLINs, and can be intensified around the high transmission season. As well as in the health facilities, useful channels for BCC can be found within the community, for example using volunteers to give talks to women's groups, faith-based groups, schoolchildren, etc.

Tchad. © MENTOR Initiative

Information given at school is often shared with the family, thus disseminating messages to a broader audience in the home setting. Repetition of the key messages to children early strengthens the culture of LLIN use over a longer period.

Communication materials of all kinds and messages should be clear, simple, easy to understand and consistent. The guidance given in Chapter 6 for developing key materials for mass distribution campaigns is equally relevant for continuous LLIN delivery.

Training

At the start of the programme, it is important to hold targeted training and induction for different stakeholders, focusing on the skills they will need to ensure that the continuous distribution channel(s) functions effectively. At the managerial level, including NMCP personnel, regional and district health teams, training is required on forecasting, data and supply chain management and supervision. Regional and district health teams should have the responsibility of monitoring the health facility and its staff and should receive training to do so. Activities to be carried out during a routine supervisory visit might include:

- reconciling commodity stocks with records
- verifying record-keeping by health facility staff and provision of guidance where necessary
- restocking LLINs, where appropriate
- checking availability of job aids and communication materials
- observing how health workers communicate with patients about nets and how to hang and use them
- conducting refresher training on technical or operational issues
- recognition of exemplary practice

Training for supervisory and implementation staff should cover both technical and operational issues. Technical training includes basic information about malaria prevention, treatment and the correct use of LLINs. Operational training includes supply chain management, record-keeping and reporting.

Standard training guidelines can be developed at the national level and adapted to suit the local context. Job aids should be developed that remind health workers about the procedures for recording nets and keeping other records. These could be in the form of a simple flowchart to be hung on the health facility wall.

Topics of training at the health facility level might include:

- the need to deliver LLINs as a means of preventing malaria among the target group
- the advantages of personal protection to the individual and the cumulative effect on the community (emphasizing the need for use among a large number of individuals each and every night)
- net need forecasting based on population and supply chain management
- procedures for issuing LLINs
- procedures for reordering LLINs
- proper data management and recording
- use of job aids
- behaviour change communication and counselling on hanging, using and maintaining LLINs
- use of communication materials around malaria

COUNTRY CASE STUDY

In Kenya, the regional programme coordinator performed ad hoc troubleshooting training as necessary when visiting health facilities to top up net supply. Additionally, he would often join monthly DHMT meetings to review the procedures of the net delivery programme and encourage facilities to share challenges and lessons learned with one another.

During implementation, refresher training is essential, particularly if there is a high turnover of staff. The focus of refresher training should be on proper record-keeping and appropriate LLIN issuing procedures. It should also be an opportunity to find out and address any

Sierra Leone. © United Methodist Church

difficulties or challenges that have occurred during implementation to date.

Monitoring and evaluation

Periodic surveys on net coverage, use and durability should be used to monitor whether targeted beneficiaries are in fact receiving nets, and to check on the effectiveness and efficiency of the continuous distribution programme, as well as the behavioural factors contributing to high or low use and net maintenance. Health facility data should be monitored on a regular basis to check on routine delivery via ANC and EPI interventions. As net coverage increases through the various continuous distribution channels, malaria prevalence throughout each community should be evaluated to assess whether malaria transmission is being interrupted and to determine whether a new strategy is needed to maintain achievements.

The Roll Back Malaria consensus statement on continuous distribution systems states that currently "evidence on the effectiveness of alternative continuous distribution systems is scant and a high priority should be given to the monitoring and evaluation activities needed to collect such evidence" (see Resources R10-1). The collection and sharing of such evidence within the malaria community will be key to the achievement and maintenance of universal coverage targets.

10.6 Key recommendations for sustaining gains

- Integration into existing health systems, especially antenatal and immunization clinics, offers a practical channel for continuous LLIN distribution. In countries with low net coverage, scaling up should be achieved by means of a mass distribution campaign and then sustained through free or highly subsidized delivery of LLINs through public services. Significant management and health system challenges are involved, but the approach makes rapid scaling up simpler than alternatives. Until the foreseeable future, a combination of LLIN mass distribution campaigns and continuous distribution will be required in many countries with limited options for ensuring access to LLINs. Funding applications should include both.
- Countries that have already achieved relatively high coverage should assess their achievements, especially in terms of coverage, equity and potential for reaching those who have not yet been covered. Systems and mechanisms that work well in the context of a public sector led national plan should be maintained, while scaling up other continuous distribution channels to ensure high population access to LLINs.
- Greater international coordination in campaign and continuous distribution support could increase cost efficiency and improve and stabilize gains.
- Countries must look closely at their specific context in order to make decisions about which channels may work best for sustaining gains made with universal coverage campaigns. ANC and EPI attendance, school enrolment, and the reach of community organizations

are not always high enough in all countries to make use of these channels effectively.

- What works well in one country may not be best for another. Countries should plan to dedicate resources to assess different options, and for pilots where new mechanisms can be tested and evaluated. No single continuous distribution channel will be sufficient for maintaining universal coverage.
- Continued communication around net hanging, use, care and repair is an integral part of maintaining universal coverage. As people get more used to LLINs, the culture of net use can grow until owning and using a net is as important as having a cooking pot or pair of shoes. Building this net culture happens over time, and can be accelerated and facilitated by broad-based BCC efforts at national and community level. Over the long term it may be possible to build a net culture strong enough to support full price net sales in certain areas.
- Improved longevity of LLINs, especially against wear and tear, would greatly facilitate sustaining coverage. Efforts should be made to develop effective care and repair interventions at country level to promote good maintenance of nets. While there is not yet sufficient evidence to tell whether improved care and repair can significantly affect the lifespan of LLINs, and how many extra months or years could be gained, promotion of care and repair should be included in BCC strategies for LLIN use.

Endnotes

a. Killeen GF et al, *Preventing childhood malaria in Africa by protecting adults from mosquitoes with insecticide-treated nets.* PLoS Medicine, 2007, 4(7):e229. See: www.plosmedicine.org/article/infor:doi/10.1371/journal.pmed/0040229

b. Hawley WA et al. *Community-wide effects of permethrin-treated bed nets on child mortality and malaria morbidity in western Kenya.* Am J Trop Med Hyg 2003, 68:121-127. See www.ncbi.nlm.nih.gov/pubmed/12749495

c. Lengeler C, *Insecticide-treated bed nets and curtains for preventing malaria.* Cochrane Database of Systematic Reviews, 2000, (2):CD00363 (update 2004). See: www2.cochrane.org/reviews/en/ab000363.html

d. Lim SS, Fullman N et al. Net benefits: *A multicountry analysis of observational data examining associations between insecticide-treated mosquito nets and health outcomes.* PLOS Medicine. See: www.plosmedicine.org/article/info%3Adoi%2F10.1371%2Fjournal.pmed.1001091

e. The Continuous Distribution workstream of Roll Back Malaria Vector Control working group is in the process of developing a set of guidelines, tools and case studies on continuous distribution. See: www.rbm.who.int/mechanisms/vcwg.html