



Achieving and maintaining universal coverage with long-lasting insecticidal nets for malaria control

DECEMBER 2017

RECOMMENDATIONS

Long-lasting insecticidal nets (LLINs) have played an important role in reducing the global malaria burden since 2000.¹ They are a core prevention tool used widely by people at risk of malaria. Part of pillar 1 of the *Global Technical Strategy for Malaria 2016–2030* (GTS) is to ensure universal coverage for all people at risk of malaria using effective vector control with either LLINs or the other core prevention tool, indoor residual spraying (IRS).² Universal coverage for malaria vector control is defined as universal access to and use of appropriate interventions by populations at risk of malaria.

To achieve and maintain universal coverage with LLINs in line with the GTS, WHO recommends³ the following based on current evidence.

Distribution mechanisms

1. To achieve and maintain universal LLIN coverage, countries should apply a combination of mass free net distribution through campaigns and continuous⁴ distribution through multiple channels, in particular through antenatal care (ANC) clinics and the expanded programme on immunization (EPI). Mass campaigns are the only proven cost-effective way to rapidly achieve high and equitable coverage. Complementary continuous distribution channels are also required because coverage gaps can start to appear almost immediately post-campaign due to net deterioration, loss of nets, and population growth.
2. Mass campaigns should:
 - a) Distribute one net for every two persons at risk of malaria. However, for procurement purposes, the calculation to determine the number of LLINs required needs to be adjusted at the population level since many households have an odd number of members. Therefore, in general, an overall ratio

of 1 LLIN for every 1.8 persons in the target population should be used. In places where the most recent population census was conducted more than 5 years prior, countries can consider including a buffer (e.g., adding 10% after the 1.8 ratio has been applied) or using data from previous LLIN campaigns to justify an alternative buffer amount.

- b) Normally be repeated every 3 years, unless available empirical evidence justifies the use of a longer or shorter interval between campaigns. In addition to these data-driven decisions, a shorter distribution interval may also be justified during humanitarian emergencies, as the resulting increase in population movement may leave populations uncovered by vector control and potentially increase their risk of infection as well as the risk of epidemics.⁵
3. Continuous distribution through ANC and EPI channels should remain functional before, during and after mass distribution campaigns. School-based distribution should be discontinued in campaign years to avoid over-supply of LLINs. In areas where school-based distributions are operating at scale and achieve high coverage, these distributions may even be sufficient to replace mass distribution campaigns.
4. “Top-up” campaigns (i.e., LLIN distributions that take into account existing nets in households and provide each household only with the additional number of nets needed to bring it up to the target number) are not recommended. Substantial field experience has shown that accurate quantification for such campaigns is generally not feasible and the cost of accounting for existing nets outweighs the benefits.

Strategic planning

5. There should be a single national LLIN plan and policy that includes both continuous and campaign distribution strategies. This should be developed and implemented under the leadership of the national malaria control programme, and based on analysis of local opportunities and constraints, and identification of a combination of distribution channels with which to achieve universal coverage and minimize gaps. This unified plan should include a comprehensive net quantification and gap analysis for all public sector LLIN distribution channels. As much as possible, the plan should also include major LLIN contributions by the private sector.

Therefore, in addition to mass campaigns, the distribution strategy could include:

- ANC, EPI and other child health clinics: these should be considered as high-priority continuous LLIN distribution channels in countries where these services are used by a large proportion of the population at risk of malaria, as occurs in much of sub-Saharan Africa.
- Schools, faith- and community-based networks, and agricultural and food-security support schemes: these can also be explored as channels for LLIN distribution in countries where such approaches are feasible and equitable. Investigating potential use of these distribution channels in complex emergencies is particularly important.
- Occupation-related distribution channels: in some settings, particularly in Asia, the risk of malaria may be strongly associated with specific occupations (e.g., plantation and farm workers and their families,

miners, soldiers and forest workers). In these setting, opportunities for distribution through channels such as private sector employers, workplace programmes and farmers' organizations may be explored.

- Private or commercial sector channels: these can be important channels for supplementing free LLIN distribution through public sector channels. Access to LLINs can also be expanded by facilitating the exchange of vouchers or coupons provided through public sector channels for a free or subsidized LLIN at participating retail outlets. LLIN products distributed through the private sector should be regulated by the national registrar of pesticides in order to ensure product quality in line with WHO recommendations.

Other considerations

6. In sub-Saharan Africa, evidence from malaria indicator surveys and demographic and health surveys indicates that LLINs with different attributes (e.g., different shapes, colours and textiles) are used at similar rates, regardless of the intended end users' preferred net attributes.⁶ Furthermore, even if usage rates in certain settings are higher for LLINs with attributes that deviate from the standard (which in most places are rectangular, white, large-sized, polyethylene or polyester LLINs), the increased use is unlikely to offset the higher costs associated with procuring nets with non-standard attributes. The procurement of LLINs with attributes that are more costly (e.g., nets of conical shape) is therefore not recommended for countries in sub-Saharan Africa, unless nationally representative data clearly show that the use of LLINs with particular attributes increases significantly among populations at risk of malaria. To build an evidence base to support the purchase of more costly nets, investigation into the preferences of specific population groups at risk of malaria may also be warranted if standard nets are unlikely to suit the lifestyle of these groups, such as may be the case for nomadic populations.
7. The lifespans of LLINs can vary widely among individual nets used within a single household or community, as well as among nets used in different settings. This makes it difficult to plan the rate or frequency at which replacement nets need to be procured and delivered. All malaria programmes that have undertaken medium- to large-scale LLIN distributions should conduct LLIN durability monitoring in line with available guidance.^{7,8} Where there is evidence that LLINs are not being adequately cared for or used, programmes should design and implement behaviour change communication activities aimed at improving these behaviours.
8. In countries where untreated nets are widely available, national malaria control programmes should promote access to LLINs. Strategies for treating untreated nets can also be considered, for example, by supporting access to insecticide treatment kits.

Monitoring and evaluation

9. As national malaria control programmes implement different mixes of distribution methods, there will be a need to accurately track LLIN coverage at the district level. Subnational responses should be triggered if coverage falls below programmatic targets. Tracking must differentiate the contributions of various delivery channels to overall LLIN coverage.

10. Countries should generate data on defined standard indicators of coverage and access rates in order to ascertain whether universal coverage has been achieved and maintained. The data should also inform changes in implementation in order to improve performance and progress towards the achievement of programmatic targets. Currently the three basic survey indicators, as developed by the RBM Monitoring and Evaluation Reference Group (MERG)⁹ and adapted by WHO for the World Malaria Report, are:
 - a) proportion of households with at least one ITN/LLIN;
 - b) proportion of population with access to an ITN/LLIN within their household;
 - c) proportion of population reporting having slept last night under an ITN/LLIN (by age (<5 years; 5–14 years; 15+ years), gender and access to ITN).

These outcome indicators are usually measured in cross-sectional demographic and health surveys, multi indicator cluster surveys and malaria indicator surveys. Monitoring against process indicators is also likely to be necessary to guide malaria programme implementation.

Endnotes

1. World malaria report 2016. Geneva: World Health Organization; 2016 (<http://www.who.int/malaria/publications/world-malaria-report-2016/report/en/>, accessed August 2017).
2. Global Technical Strategy for malaria 2016–2030. Geneva: World Health Organization; 2015 (http://www.who.int/malaria/areas/global_technical_strategy/en/, accessed August 2017).
3. These recommendations supersede the *WHO recommendations for achieving universal coverage with long-lasting insecticidal nets in malaria control* published in September 2013.
4. The term “continuous” is used to describe distribution systems that deliver nets continuously and without interruption over time, as opposed to “campaigns” that deliver a consignment of nets to a defined target population in a single time-limited operation. “Routine” LLIN systems deliver nets along with other routine health services.
5. Estimating population access to ITNs versus quantifying for procurement for mass campaigns. Geneva: World Health Organization; 2014 (www.who.int/malaria/publications/atoz/who-clarification-estimating-population-access-itn-mar2014.pdf, accessed August 2017).
6. Koenker H, Yukich JO. Effect of user preferences on ITN use: a review of literature and data. *Malar J.* 2017;16:233 (<https://doi.org/10.1186/s12936-017-1879-8>; accessed August 2017).
7. Guidelines for monitoring the durability of long-lasting insecticidal mosquito nets under operational conditions. Geneva: World Health Organization; 2011 (<http://www.who.int/malaria/publications/atoz/9789241501705/en/>, accessed August 2017).
8. LLIN durability monitoring: toolkit and data repository. The President’s Malaria Initiative (<https://www.durabilitymonitoring.org/>, accessed August 2017).
9. Household survey indicators for malaria control. Measure Evaluation Project; 2013 (http://www.rollbackmalaria.org/files/files/resources/tool_HouseholdSurveyIndicatorsForMalariaControl.pdf, accessed August 2017).