



School-Based Distribution of Long-Lasting Insecticidal Nets

A Short Guide Based on Recent Country Experience

Kate Kolaczinski

For the NetWorks and VectorWorks Project

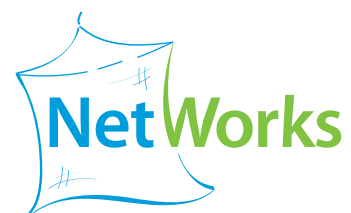
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Hannah Koenker and Karen Kramer provided particularly useful comments on the initial draft.

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SUMMARY

This document presents information on schools as a distribution channel for long-lasting insecticidal nets (LLIN). An initial summary gives a reminder of why continuous distribution through a mix of channels is important to maintain LLIN ownership levels. The document goes on to provide guidance on why, when and how schools might be used as a distribution channel for LLINs. Recommendations synthesize current guidance around continuous distribution, include expert opinion on the potential for school distribution, and draw heavily on recent country experience. Document reviews and interviews with personnel involved in country implementation were carried out.

Findings and recommendations

Scale of country experiences:

- Recent pilots in Ghana, Nigeria, Senegal and Tanzania have seen LLINs distributed through schools at scale. During Nigeria's initial round, 8,444 LLINs were distributed through 88 schools, and in the second round, 21,000 LLINs were distributed through 191 schools. Senegal delivered 73,445 LLINs through 1,153 schools, split across two consecutive rounds. Tanzania distributed 510,000 LLINs through 2,302 schools. Ghana conducted an initial pilot distribution of 181,600 LLINs through 2,313 schools followed by distribution of 1.2 million LLINs through approximately 22,500 remaining public and private schools in the country. All distributions described here took place during 2012 and 2013.

Appropriateness of school-based distribution in different contexts:

- School-based distribution is more feasible in contexts with a well-functioning and supportive education sector at national and subnational levels.
- Supportive and effective local authorities are also important. Where countries plan to repeat annual school-based distributions at scale, it may not be feasible to maintain centralized management roles.
- School-based distribution is generally more appropriate in school systems with higher enrollment levels.
- Even in areas of high enrollment, school distribution should still be considered one channel in an overall mixed model.
- Within a country, considerable variation in enrollment rates or other contextual issues mean school-based distribution may not be an appropriate choice for all parts of the country.

Main strengths of school-based LLIN delivery:

- It is possible to deliver large quantities of LLINs annually, reaching a high proportion of targeted students.
- There is extensive ability to tailor the size of the target group.
- School registration data are often sufficiently accurate to avoid the need for a separate registration exercise.

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Main weaknesses of school-based LLIN delivery:

- Feasibility of using schools as a continuous source of LLINs (as opposed to hosting periodic one-day distribution events) may be limited due to a number of logistic and security concerns.
- In settings with large numbers of small schools, the channel may be less efficient.
- The benefit of the reach of schools into communities can be complicated by a lack of necessary infrastructure in remote areas.



A student in Ghana signs the classroom LLIN register to receive an LLIN (2014).

Recommendations for design:

- All four recent pilots used similar models: one-day distribution events to selected classes planned annually. This design has been shown to work well in the four different settings, with efficient delivery of LLINs at scale. This design should be the first option considered. Other options that may be appropriate in specific settings:
 - Distribution of vouchers or coupons instead of LLINs, which could be redeemed for nets at distribution sites accessible to the community.
 - Continuous distribution of LLINs through schools, with a rolling stock.
- NetCALC is a valuable tool for planning LLIN distributions. NetCALC predictions were the driving force behind most design decisions in the school distribution campaigns outlined in this guide.
- All continuous distribution mechanisms should be planned, managed and implemented in synergy. There are many opportunities for leverage and co-ordination. It is important that continuous distribution of LLINs is seen as an overall strategy and that discrete channels, such as school based distribution, are not designed or managed in isolation from other continuous distribution activities.
- Involving health system staff closely allows for close coordination with health facility based distributions, and means that school based distribution benefit from the experience and skill of the health system personnel. Personnel at health facility, district and higher levels may have a useful role to play in the following areas: microplanning, design, training, supervision, logistics support, and reverse logistics in particular.

Operational recommendations:

- Careful planning of timing, with conservative buffers for delays (particularly for LLIN arrival in country) is vital given the fixed school calendars for exams and holidays.
- Disbursement of training and other allowances was challenging in some settings given the large numbers of personnel involved. Countries where this was least problematic put the management responsibility for the funds at lower levels and used processes they were already experienced in, e.g., processes similar to allowance management for community campaigns.

- Given the large numbers of schools and personnel involved, operations are more feasible if financial and management responsibility is decentralized.

Accountability:

- LLINs should be delivered to schools as close to the distribution day as possible to minimize opportunities for theft.
- A clear and well communicated plan should be in place for reverse logistics; i.e. to manage any surplus LLINs. These should be properly recorded and included in data reporting, should be recollected by health facility personnel and then used in health facility based distributions.
- Standard best practice for a robust logistics supply chain should be followed. Guidance is available in the guide: “Preventing, identifying and mitigating the impact of fraud, theft and diversion of LLINs”, and in the VectorWorks continuous distribution online toolkit.

Monitoring and evaluation:

- Monitoring and evaluation plans should be carefully designed at the outset. Program monitoring and process evaluations are important but additional evaluation through household surveys or net tracking should be planned to understand how the school LLINs contribute to maintaining ownership and use levels.

Costs:

- Currently available costing data are insufficient to provide an estimate of average and range of cost per LLIN delivered and a standard template for classifying costs should be used to allow for these calculations in the future. While cost estimates will be useful for budgeting, cost comparisons alone between distribution channels should not drive decision-making. Each potential distribution channel brings its own advantages to an overall model and is often not simply interchangeable with a cheaper channel.



Photo: Diana Mrazikova

Ghanaian students conversing after receiving LLINs through their school-based distribution program. (2014)

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Knowledge gaps and top priorities for operational research:

- Establishing cost-effectiveness of school-based distributions.
- Ascertaining rates of intra- and inter-household redistribution across contexts.
- Identifying long-term reach of school distribution campaigns.

Additional priorities for operational research:

- Roles that schools could play as a distribution point for households with no students attending school.
- Feasibility of distributing LLINs continuously through schools.
- Feasibility of clustering schools with one school designated as the distributor.
- Feasibility and potential for cost efficiencies of linking school-based LLIN distribution to other school health distributions, such as deworming.
- The potential role of students as agents of behavior change within the household.
- The most appropriate timing for annual school distribution events.
- The most effective strategy to combine different continuous distribution channels to reach the greatest and most equitable section of society.



A pupil in Ghana holds the LLIN he received in school that day. (2014)

BACKGROUND

Countries are increasingly considering schools as a channel for delivery of long-lasting insecticidal nets (LLIN). A number of characteristics of the school system make it attractive to countries looking for a mix of delivery channels that will achieve sufficient turnover of LLINs to sustain coverage levels. Recently Ghana, Nigeria, Tanzania and Senegal have carried out school-based LLIN deliveries at scale. Some smaller school-based distributions have also been conducted, for example in Mali and Kenya.

The purpose of this document is to ensure that planners considering school-based delivery benefit from the experiences and lessons learned from these programs. The information will help planners decide if school-based delivery is an appropriate option for their setting and will provide practical recommendations for developing a school-based delivery approach.

A range of useful materials used by these countries, from case studies to planning and implementation tools, can be accessed online (see Annex 1).

Planning for a mix of delivery channels

Long-lasting Insecticidal Net (LLIN) delivery via mass campaigns has provided an important opportunity to **scale up** LLIN coverage in a number of countries, moving closer to achieving Universal Coverage. At the same time, LLIN ‘keep-up’ strategies are important to **maintain** coverage levels. Studies in two West African countries, for example, show that household (HH) possession of an insecticide-treated net (ITN) dropped from 64% and 63% to 40% in both countries just 1½ years following a campaign, underscoring the importance of continued distribution of LLINs to maintain coverage. Coverage gaps start to appear immediately after mass campaigns due to population growth and net loss. Recognizing this fact, WHO recommends that, “in order to maintain universal coverage, countries should apply a combination of mass free distributions and continuous distributions through multiple channels, in particular antenatal and immunisation services¹.” For this reason, the delivery of LLINs to pregnant women and children through health facilities is a key element of many countries’ malaria prevention strategies. In many settings however health facility based distribution alone will not provide sufficient LLINs to maintain coverage at target levels. Other channels may be needed alongside these core continuous distribution channels. The document *Continuous Long-lasting Insecticidal Net Distribution: A Guide to Concepts and Planning* provides guidance on how best to plan an overall strategy, as does the VectorWorks online toolkit to continuous distributions.

Box 1 gives a brief reminder as to why and how continuous distribution through a mix of channels should be planned. The document, *Continuous Long-lasting Insecticidal Net Distribution: A Guide to Concepts and Planning*, and the NetCALC tool help planners to consider these issues (see Annex 1).

Box 1: Background—the importance of a mix of delivery channels.

Large-scale LLIN distribution campaigns can achieve rapid high coverage of LLINs, but maintaining this coverage appears to require a more complex mix of delivery channels.³ LLIN coverage begins to decline shortly after campaigns, as a result of LLIN damage, loss, population growth or decline in levels of use.³ Delivery methods that offer more frequent delivery, either at frequent intermittent intervals or continuously, will be critical to keep coverage sufficiently high between campaigns.² Having a mix of different delivery channels is important for two main reasons:

1. To make available enough LLINs for families who need new or replacement LLINs to keep their families covered. Most continuous potential delivery channels alone would not provide sufficiently high “trickle” of LLINs into families.
2. To make LLINs as equitably available as possible. Certain population subgroups—defined by socioeconomic strata or geography—may not access some potential LLIN distribution channels. To maintain the equitable coverage that mass community distribution campaigns achieve, a mix of approaches to continuous delivery will need to consider equity of access.

¹ World Health Organization. WHO recommendations for achieving universal coverage with long-lasting insecticidal nets in malaria control September 2013 (revised March 2014).

THE IMPORTANCE OF CONTINUING ROUTINE LLIN DISTRIBUTION DURING MASS CAMPAIGNS

Shortfalls in funding for mass campaigns has sometimes resulted in the re-allocation of nets from routine LLIN distribution to fill gaps in campaigns¹, causing stock-outs and the suspension of ANC LLIN delivery. Although universal coverage campaigns can, in theory, benefit pregnant women and children, many campaigns can take many months or even years to be fully rolled out across all of the regions or districts in a country, and thus, many pregnant women and children who might otherwise be able to obtain a net through routine health services are unable to do so if they are waiting for a campaign to reach their area. Moreover, LLIN distribution has been observed to increase pregnant women's attendance at ANC clinics. It also sends a powerful message to mothers about the importance of using a net during pregnancy. As a result, it is vital to continue routine LLIN distribution during mass campaigns to ensure that pregnant women are benefiting from the whole range of antenatal services and to encourage them to use nets.

In response to this trend, WHO updated its guidance in 2013 to emphasize the importance of rolling out LLIN distribution through ANC and EPI services and in ensuring these channels are functional throughout the process of planning and implementing a campaign. Specifically, the document states that "in order to maintain universal coverage, countries should apply a combination of mass free distributions and continuous distributions through multiple channels, in particular antenatal and immunisation services" (emphasis added). Moreover, "continuous distribution channels should be functional before, during, and after the mass distribution campaigns to avoid any gap in universal access to LLINs."³

THE IMPORTANCE OF A COHERENT CONTINUOUS DISTRIBUTION STRATEGY

School-based distribution is the focus of this guide. However it is important that no single continuous distribution channel is planned or operated in isolation. Before detailed design and planning of specific channels is carried out, a national planning process should be undertaken to design an overall continuous distribution strategy. The document *Continuous distribution of LLINs: A guide to concepts and planning*, provides guidance on this process.

Designing an overall continuous distribution strategy before moving into the details of planning specific channels is important as there are many opportunities for leverage and co-ordination across different continuous distribution channels.

2 Hill J, Hoyt J, van Eijk M, ter Kuile F, Webster J and Steketee R. Prioritizing Pregnant Women for Long-Lasting Insecticide-Treated Nets through Antenatal Care Clinics. *PLoS Med*, 11:9. 2014.

3 World Health Organization. WHO recommendations for achieving universal coverage with long-lasting insecticidal nets in malaria control September 2013 (revised March 2014).

WHY MIGHT SCHOOL-BASED DELIVERY BE A GOOD OPTION?

Schools have exciting potential as a delivery channel due to a number of characteristics:

1. Students are an easily defined target group and the size of the target group can be tailored in line with needs for distribution numbers (by increasing or decreasing the number of classes targeted dependent on data regarding LLIN ownership coverage). In many countries, provided enrollment rates are sufficiently high, selecting several classes can result in a fairly large target group. This results in a greater number of LLINs being delivered than is possible through other common continuous distribution channels such as antenatal care (ANC) and Expanded Programme on Immunization (EPI) clinics, which are limited by the lower numbers of pregnant women and infants in the population. There are few other distribution channels currently being considered with such easily identifiable, fairly large and flexible target groups.
2. Schools' reach into communities is often excellent—better than the reach of health facilities—because schools tend to be more numerous in most countries.
3. Teachers are educated personnel and have long-term relationships with the beneficiaries; this makes them an excellent resource to support the distribution.
4. Storage space in schools is often sufficient (lack of storage at the lowest levels in the health system can be a problem); however, this is not always the case. In Tanzania lack of storage was a serious challenge in many schools. Storage and security of LLINs in schools was highlighted as a concern in their procedural audit.
5. One-off annual school distribution may have some feature of a mini-campaign, but in many places the school records are good enough to avoid the need for pre-registration. This advantage is shared by other routine distribution approaches such as ANC and EPI.
6. The strengthening of links between the education and health sector, and school health programs will be boosted and possibly expanded—offering important opportunities for wider impact from disease-specific financing.
7. The potential exists to benefit from the role of students as agents of change within their families and communities. Recent analysis shows rates of LLIN use when an LLIN is accessible appear to be good, but behavior change communication (BCC) activities around LLINs continue to be important to maximize use in all settings, and to promote care practices with the potential to lengthen the effective life of an LLIN. Studies looking at impact on behavior change are fewer, though there are a few studies pointing



Three schoolgirls receive LLINs in Linguere, Senegal. (2013)

to the role of primary school children as effective agents of change in Burundi and Kenya. This communication channel could potentially lead to better usage and care rates of family nets received through other channels, not just the school nets. Earlier studies have shown that skills-based health education at the time of net distribution to primary school children led to a large improvement in knowledge about malaria and its control.

Box 2. Country experience.

The ability of school-based distribution to pump large numbers of LLINs into communities throughout the country on an annual basis was the driving reason behind the decision to adopt school-based distribution in all countries. Other reasons—particularly the potential to reach larger populations through schools—were important to consolidate the idea of using schools. For Senegal, an important additional driver was the potential for improvement in usage rates. They specifically considered the activity as useful to increase usage rates of LLINs already in families, as well as those delivered through schools. In this way it was hoped that the school-based distribution would lead to increased LLIN use over and above that which would be possible simply from the school LLINs.

(Endnotes)

1. Koenker, H. and Kilian, A. (*In press*) *Recalculating the net use gap: a multi-country comparison of ITN use versus ITN access*.
2. Van Bortel, W., Delacollette, C., Barutwanayo, M. and Coosemans, M. (1996) Deltamethrin-impregnated bednets as an operational tool for malaria control in a hyper-endemic region of Burundi: impact on vector population and malaria morbidity. *Tropical Medicine and International Health*, 1, pp. 824–835.
3. Onyango-Ouma, W., Aagaard-Hansen, J. and Jensen, B.B. (2004) Changing concepts of health and illness among children of primary school age in Western Kenya. *Health Education Research*, 19, pp. 326–339. doi: 10.1093/her/cyg034.
4. Marsh, V.M., Mutemi, W., Some, E.S., Haaland, A., and Snow, R.W. Evaluating the community education programme of an insecticide-treated bed net trial on the Kenyan coast. *Health Policy and Planning*, 1996, 11:280-291.

WHEN MIGHT SCHOOL-BASED DELIVERY BE A GOOD OPTION?

Once the school channel is identified as an option, consideration must be given to the feasibility of the channel in a given context.

Supportive stakeholders and partners

Strong support from a well-functioning education sector appears to be a main contributing factor to the success of all distributions so far. All four recent programs benefited from the advantage of enthusiastic and efficient Department of Education support at national and lower levels. In particular, countries cited strong and proactive district-level education sector personnel as a pivotal element to achieving smooth distributions. Current experience does not tell us how efficient this model would be where strong collaboration is lacking, but planners should be wary about choosing a school-based approach in areas where the education sector is unwilling or unable to take an active role.

Enrollment

Enrollment levels will often be higher in primary than in secondary schools, and thus a more efficient and equitable option for distributions. Some countries have opted to include both secondary and primary school classes to reach more households. The extent to which students cluster in households is an issue that would benefit from further exploration to understand the true saturation point of schools as an effective channel to households.

Sound empirical evidence does not yet exist, but modeling indicates that in areas of **low school enrollment** (perhaps less than 50% average gross enrollment rates in primary classes), use of schools to deliver LLINs is unlikely to be a cost-effective or sufficiently equitable choice of delivery channel. However, if the reach of schools into communities is good, despite low enrollment, they may have a role to play in distribution of LLINs to a wider target group (i.e., beyond only enrolled students). This approach has not been used to date and small pilots would be useful to examine the potential and feasibility of this approach, particularly regarding appropriate definitions and methods of identifying beneficiaries.

“Our country is large and the context changes from area to area. Schools won’t be the right answer in all places. School delivery might be used in LGAs with a strong school administration and good enrollment rates; in other areas community groups might be a better answer. It’s about working out what’s best in different parts of the country.”

— Emmanuel Obi, Malaria Consortium Nigeria.

In areas of medium school enrollment (50% to 80% gross enrollment rates in primary classes), school-based distribution to enrolled students *may* have some use to reach households not reached through other channels, though equity could be a concern. Careful contextual analysis would be needed to determine if the cost and efforts involved would make this an appropriate approach. Alternative approaches may include use of community-based networks, expanded health facility-based distribution or use of schools to deliver LLINs beyond just enrolled students.

In areas of high school enrollment (more than 80% gross enrollment rates in primary classes), schools can successfully support large-scale annual distribution of LLINs to enrolled students. While robust cost data from a range of settings are not yet available, it could be a highly efficient delivery channel

due to the potential distribution of large numbers of LLINs and the ability to modify the size of the target group in line with numbers required. Efficiency may be lower in settings where there are many small schools. Options to increase efficiency could be to use one school as a distribution point for a number of surrounding smaller schools, though this would inflict opportunity costs on students and teachers and may not reduce costs significantly if teachers of all schools were still required to be involved for sensitization, provision of registration data, etc. Small pilot studies may be useful in appropriate settings.

Equity and reach

Very high equity of school enrollment is ideal for school-based distribution but is not always a realistic expectation. Even in areas of high enrollment, complementary distribution channels are needed to reach families who do not or cannot send their children to school. In areas of low enrollment, school-based distribution is still useful as one channel in an overall mixed model—especially where the reach of schools into communities is good.

Households receiving excess LLINs may pass these on to non-beneficiary households, but this has not yet been documented. An evaluation in Tanzania suggested such inter-household redistribution is rare, however, in this case the school distribution was undertaken two years after the campaign and population access had already dropped to around 40%. Accordingly, there were very few families that had more than “one ITN for every two people” and most of these were small households. Further study is needed to examine redistribution patterns across settings. If inter-household redistribution of LLINs is less than expected in all settings, then countries will need to plan a combination of distribution channels that reach the range of different households in the country. Some guidance and a do-file to assist with this can be found online through NetWorks, the Health Communication Capacity Collaborative, the RBM Vector Control Working Group, and the USAID Development Experience Clearinghouse (see Annex 1).

Box 3: Checklist—Are schools an appropriate delivery channel?

Essential:

- The Department of Education at national and lower levels—particularly the School Health Department/Coordinator—is supportive of plans.
- The Department of Education at lower levels, or local government authorities, is administratively strong enough to support the training and supervision.
- School enrollment is high enough to make the distribution worthwhile and will contribute to the total number of LLINs the country wants to deliver annually. Note that in some settings total enrollment may not be very high but enrollment of at least one student per household may be higher.

Helpful:

- Equity of access to schools is high. If not, schools may still be a useful channel, but complementary channels will be needed to ensure equity.
- There is an existing productive working relationship between the health and education sector, with some routine health activities run through schools (e.g., deworming and nutrition services).

Note: The helpful points are not essential, but if some of these characteristics are present then it makes it more likely that schools will be a good and cost-effective option.

HOW MUCH DOES SCHOOL-BASED LLIN DELIVERY COST?

Currently, costing data are insufficient to provide a clear figure of cost per LLIN delivered through schools in these different settings. Extensive costing studies comparing distribution channels are planned in some of the countries.

While estimates of costs per LLIN delivered would be useful for budgeting, how much any one LLIN delivery channel costs compared to another is unlikely to be a driving factor in deciding which channels to include. A range of delivery channels will be needed to ensure sufficient numbers of LLINs are delivered to communities and that an equitable spread of households is reached. Direct cost comparisons are of limited relevance when distribution options are not interchangeable. In addition, studies repeatedly show that the operational costs associated with LLIN delivery are minor compared to the commodity costs. The most efficient channel is the one that delivers the right number of nets to the right people.

Nevertheless, country programs have resulted in some cost experiences worth sharing:

- Anecdotal evidence suggests cost experience was very different from country to country—planners considered it expensive in Tanzania and cheap in Senegal.
- Costs per LLIN may be considerably higher where there are many small schools.
- Differences in non-commodity costs per LLIN delivered appear to be driven by whether

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a separate registration exercise was conducted, the number of schools targeted and the number of students per school, and the size of the communications budget.

- Non-commodity cost centers are similar to those for other LLIN distribution channels. Training of teachers to document distribution and promote net use, in addition to transport and storage of LLINs, appear to have been the most costly activities. Other non-commodity costs included supervision, communication (including printing), planning and sensitization meetings.



Photo: Diana Mirzikova

Unique costs countries encountered:

- Costs of giving LLINs to all teachers as an incentive; in some countries this practice was adopted in second rounds.
- Costs associated with revised training due to the redesign of models. Nigeria increased their spending on training between the first and the second round to allow for school representatives to be trained in smaller groups.

Potential opportunities for cost savings:

- Linking activities to other large-scale school health programs; no countries have taken advantage of these opportunities due to timing constraints. Potential for savings on transport costs are limited as LLINs are bulky and likely cannot be easily combined with other commodities, but there is potential for saving on meetings, training, communications, supervision, monitoring and evaluation costs.
- Avoiding a separate registration exercise if possible. Countries found existing school enrollment data to be sufficiently accurate, and easily accessible by school supervisors.
- Bulk packaging of LLINs (i.e., without the individual net packages) have been used in Senegal and can potentially lower per net and operational costs. However, additional research is needed to build on findings from Senegal and to address potential concerns associated with this strategy. Some concerns include whether unpackaged nets (“naked nets”) are more vulnerable to damage or loss on the way home from school, whether skin irritation or rashes from insecticide exposure could cause problems, and to what extent used plastic bags at the household level pose significant solid waste or other problems.

HOW TO DELIVER LLINS THROUGH SCHOOLS?

This section discusses options for and experiences with the design and planning of a school-based LLIN distribution and outlines operational experiences and recommendations. Activities that would be part of an annual activity cycle for an annual LLIN distribution event, such as those undertaken in the four countries examined here, are shown and discussed in Box 5.

“We felt that a single distribution per year would be far easier to manage. Holding stocks of LLINs long term in schools would give us problems with accountability and security of the commodities. We weren’t ready to attempt that.”

— Emmanuel Obi, Nigeria.

Design

A range of different models may be considered for distribution of LLINs through school, though the practicality and appropriateness of each will vary depending on context. Alternative model possibilities include:

- **Varying the distribution timing:** Intermittent distributions would happen once per year; continuous distributions would see an assigned school staff member distributing throughout the year.
- **Varying the delivered product:** As described in the current examples, the LLIN itself could be provided to students, or alternatively they could receive a coupon or voucher for exchange at a local storage point—for free or for a reduction of the purchase price of an LLIN in commercial outlets associated with the exercise.
- **Varying the target group:** Eligible students could be all new registrants, all students in certain classes, families who have a new baby at home, anyone who asks for one (i.e., acts as a source for the general population in areas where the population cannot afford it or does not have access to a commercial sector).
- **Varying the type of schools:** Some countries have opted to include only public schools. Including all schools—particularly private schools, boarding, and religious/Koranic schools where these exist—may improve equity and is recommended.

“We originally planned to distribute vouchers instead of nets. But we were concerned about low voucher redemption rates, especially as the spread of schools is very good and reaches some more remote communities probably far from affiliated outlets. We also weren’t sure shops could handle the once a year surge in demand. In the end we distributed LLINs directly.” — Jacob Macha, JHU-COMMIT, Tanzania.”

— Jacob Macha, JHU-COMMIT, Tanzania.

While the options appear fairly numerous, pilots so far have used very similar annual distribution models due to potential security and logistic concerns associated with other strategies.

Quantification

All four pilots used the NetCALC modeling tool when considering the overall mix of distribution channels appropriate for each country. Often the NetCALC model and its predictions informed most aspects of decision-making. Planners should note the following when using NetCALC to guide decision-making:

- A country may have considerable variation in gross enrollment rates from area to area. NetCALC can be used to consider each area with different enrollment rates, which will help give more accurate estimates.
- Gross enrollment rates—entered as a variable by planners and underpinning NetCALC estimations of LLIN distribution numbers and predicted ownership levels—are often drawn from national surveys which measure enrollment regardless of school type. Planners should check whether the enrollment rates they are using reflect the model design they are proposing. This disconnect between different steps in planning was seen in a number of countries. For example, if only public schools are included yet private school enrollment is fairly high, then using NetCALC estimates to guide other decisions, such as which and how many classes to target, is only sensible if the predictions are based on *public* school enrollment.
- NetCALC predictions of impact on ownership levels assume inter-household redistribution. For ease of design, the NetCALC model is based on the assumption that nets are distributed evenly across households in order to make estimates of population coverage. We do not yet have evidence to support or disprove this assumption. Given this, planners should not rely solely on NetCALC predictions but should consider what proportion of the population live in households likely to be reached by the proposed channels, and ensure distribution channels complement each other and reach as much of the population as possible.
- NetCALC includes an estimated value for planners to enter, predicting the “efficiency” of the distribution channel. This is a reflection of how many of the LLINs moving through this channel will actually be delivered to the target beneficiaries. Experience so far suggests planners should enter a value of around 85% to 95% for school-based distribution because annual distribution events targeting students in schools appear to have high efficiency. Both Ghana and Tanzania estimated that over 90% of targeted students received LLINs.

Coordination and stakeholder involvement

The scope of stakeholder involvement in school distribution has varied from country to country. Some have involved only core education, health, and transport partners and others have included a wider range of community organizations to support with communications and sensitization. All approaches appear to have largely worked well. In settings where fewer community-based stakeholders were involved, partners relied on parent-teacher associations (PTAs), students themselves and, at times, radio spots to support the distributions.

Countries differed as to whether the education or health sector was considered the lead on the distribution. Both approaches appear to have been successful in the context of strong and positive partnerships. A constant across all countries so far is that at subnational levels, the education teams were pivotal and led the task of compiling enrollment numbers and organizing training and supervision.

At this level the malaria program personnel were considered technical advisers on the malaria-specific components.

In most settings however it is likely that the health system will have an important role to play. This role will include involvement in the design process, as well as direct support to the micro-planning, training, support supervision, communication and monitoring and evaluation activities. Whilst district and higher level staff will very likely be involved, the health facility based personnel have an equally important role. These personnel may well already be involved in continuous LLIN distributions to health facility clients, and will therefore have some experience and skills to support the school based distribution. They may have active and important roles in training, in support supervision, in supporting data compilation and reporting and in logistics. The logistics role of these personnel may be particularly important after the distribution, to ensure appropriate reverse logistics and accountability for surplus nets. The importance of working closely with the health system from the outset is therefore stressed here.

Tanzania found that local government authorities could have a critical role to play in the sustainability of the approach, with the recommendation that financial management of the activities lie with them, rather than centrally.

Suggested improvements in the areas of coordination have focused on the lowest levels. The health and education sector collaboration appears to have been strong at national and subnational levels, such as districts, but has been largely absent at school and community levels. Given the health focus of the activity, more than one country reported concerns from health post or facility staff that they had not been aware or involved in any way. Options for collaboration could be expanded and health facility staff could potentially support health promotion and supervision.

While it is recommended that all types of schools be involved in the distribution (i.e., public, private, boarding, religious/Koranic, etc.), this involvement may bring further coordination challenges. The benefits in terms of reaching all sectors of society likely make it worth striving to ensure this cross-sectoral approach can be taken. Recommended best practices from countries that have included all school types include:

- Engage all school types from the early planning stages.
- Commit to working with the non-public sector in terms of securing enrollment data, school information, planning trainings, and supervision. Organization of the public sector's involvement has been fairly straightforward in all countries, smoothed by strong district-level public education sector personnel. Additional and focused efforts will be required to bring non-public schools and their representatives along in the planning process.
- Give special consideration to boarding schools. The objectives of distributing nets to boarding schools are different than the objectives of distributing nets to communities through schools. In a boarding school context, we do not expect students to carry nets home for household use. If the program wishes to ensure coverage of students in boarding schools, nets should be distributed to all students. While boarding schools should already have malaria prevention measures in place, with indoor residual spraying of dormitories or students sleeping under LLINs, often these protective measures are not in place. National programs should consider whether their net distribution policies include boarding school students.

Timing

Countries' overall LLIN distribution models should plan to have continuous distribution channels functioning during and immediately after any community campaigns, to avoid ownership levels dropping too rapidly after a campaign. Once levels have dropped too low, even continuous channels with fairly high volume, such as schools, will be unable to bring levels back up to targets. Where planners intend to use school-based distributions as a maintenance approach, it is recommended to start continuous distribution programs immediately and not wait a year or more following a community campaign.

Given that many school-based distributions will be once-a-year events, the timeliness of procurement is even more important than it is for other continuous distribution channels. Ensuring LLINs are in place at schools by the scheduled day of distribution is particularly critical given the link to fixed school schedules of exam weeks and holidays, which the LLIN distribution should not coincide with. All countries reported this as a challenge in the pre-distribution stages of their pilots.

Procurement delays were the biggest reported concern, along with insufficient buffer stock of LLINs to allow for adjustments in actual enrollment. Planning should take both factors into account (see Procurement in Box 5).

Initial pilots saw class enrollment numbers rising between planning and distribution phases, leading to LLIN shortages. Most countries now opt to carry out distributions in the second school semester, when enrollment has often stabilized somewhat.

Transport and handling

Transport and handling of LLINs in school-based distributions will depend largely on the model of delivery chosen. It may be that a voucher or coupon approach will be chosen. In this case transport and handling will be a very different task—it will focus both on ensuring supply of the vouchers or coupons reaches the schools as well as the availability of LLINs in accessible, affiliated outlets for voucher or coupon redemption.

For distribution of LLINs through schools, thorough advanced planning of transport routes has been important to improve adherence to schedules. Given the reach of schools into communities, transport is often a cumbersome task with some schools accessible only by boat, bicycle or foot. Responsibility for transport varied between countries. Most assigned a specific transport agent ranging from a local nongovernmental organization (e.g., Tanzanian Red Cross Society) to a large project (e.g., USAID | DELIVER PROJECT in Ghana). Similar problems of unforeseen delays and/or delivery outside working hours were seen in all countries. Education supervisors have provided useful guidance to planners on accessibility of different schools.

Storage at schools has often been fairly easy given the amount of space in schools, the short time for which LLINs were at the schools, and the relatively small numbers of LLINs per school. However, this has not been always true. In Tanzania storage was a major concern with many schools having no secure space. Storage and LLIN security in schools was highlighted as a major concern by Tanzania's procedural audit. Some countries, including Tanzania, provided money to schools to increase security (e.g., locks and guards), though other countries found this unnecessary.

Storage may also be a problem at the district level, and planners may need to consider hiring storage

locations if government sites are insufficient. Careful review of storage requirements and availability should be part of the microplanning process.

Standard best practice around storage and transport should be followed at all times. Guidance on this can be found in the guide: “Preventing, identifying and mitigating fraud theft and diversion of ITNs”.

Transport and handling of reverse logistics should be planned for from the outset, and these plans clearly communicated to all involved. Appropriate management of surplus LLINs following school based distribution has been identified as an important aspect to improve accountability of this distribution mechanism. A form should be available to allow distribution staff to record surplus nets; a system should be in place for recollection of these, likely by local health facility personnel whereby the LLINs can then be absorbed (with appropriate documentation) into the health facility continuous distribution.



Photo: Diana Mrazikova

Pupils in primary class two who have just received LLINs at their school in Ghana. (2014)

Training and supervision

Both cascade and non-cascade training approaches have been used with success. Ghana’s large-scale distribution (over 1.2 million LLINs through nine regions in the country) was staggered to allow for training with only one cascade level. Regional teams trained all head teachers by clustering schools into their “circuits” for a staggered sequence of training events. Other countries have adopted a traditional cascade approach with the annual LLIN distribution events mirroring the cascades used for any other large-scale health sector initiative, such as LLIN campaign distributions.

The potential for cost efficiencies around training exist, with some countries using standard monthly education meetings as an opportunity for training. This had mixed success. In Nigeria, for example, the first round of distributions saw all heads of schools for one local government area (LGA) trained together at the time of a normal monthly meeting. In the subsequent round, stand-alone trainings were conducted with smaller groups of head teachers to allow for a greater amount of dedicated training time, which improved training quality.

Supervision centered on distribution day itself. Supervision was fairly limited in terms of the proportion of the schools visited, given the number of schools involved and the available personnel. Some countries increased supervision by involving independent supervisors, such as local midwives, former teachers, etc. It may be advisable to extend the focus of supervision to examine health promotion and BCC activities prior to distribution and practices for reaching students who were absent on distribution day.

Incentives

The general approach has been to avoid paying financial incentives to any staff involved, aside from training or travel allowances. The exception has been Tanzania, where ward education supervisors

were paid a per diem in light of the extra reporting responsibilities. However, Tanzania's own review process has led to post-pilot recommendations that no per diems be paid in future.

LLINs were given as an in-kind incentive in some settings, to head teachers and either all teachers or teachers of target classes. Countries that did not do this are considering it for future rounds. Countries that did give LLINs to teachers are contemplating how to approach this in future rounds given that the same teachers may then repeatedly receive LLINs. With many schools involved, it can end up being a considerable cost. In Ghana, for example, there are approximately 24,000 schools, and about eight teachers at each school who would receive LLINs. However, given the importance of teachers' roles in distribution, record keeping and promoting net use, and as role models in the community, the benefits gained from these investments ought to be carefully considered before deciding that providing about 200,000 nets to the teachers overseeing the Ghana distribution is not cost-effective.

Disbursement of training and other allowances caused problems in some settings given the large numbers of personnel involved. Where there was some level of decentralization of this task it appears to have worked more smoothly.

Communications

A range of approaches to communication has been taken in different countries.

Sensitization of leaders, students, beneficiary households and communities to the plans were undertaken primarily through PTAs, students and, at times, through radio spots or community meetings. Most countries considered the PTAs as playing an important role in clarifying questions from parents and encouraging families to spread the word.

This sensitization approach appears to have worked well in all settings. Most countries reported some efforts were required to ensure communities understood why only some classes were included but no country cited this as a significant or persisting problem.

Use of print materials varied from country to country; materials were primarily used as aides for teachers. Simple and short frequently asked questions laminated cards were reported to be extremely useful. Ghana and Nigeria had a more elaborate teachers' guide, including a range of activities teachers could include in assemblies, class lessons and during distribution itself. Nigeria created a "malaria protection pledge," taught in class and reinforced with a wall poster, where students promised to use a net every night and encourage others to do the same. Other programs gave paper leaflets to children with each net. Programs that did include print materials felt that they played a useful role and plan to continue using them in the future. Careful evaluation of the cost benefit linked to rates of use, care practices or retention of LLINs may be useful given the fairly high cost of print materials.



Nigerian students on the LLIN distribution day in Cross River state. (2013)

Given the limited supervision, it is unclear to what extent teachers responded to requests to engage in health promotion or simple communication activities with the students prior to and during distribution.

Distribution

Single-day, in-class distributions have been successful and smooth. All countries reported very few problems with children being absent on the day of distribution. When children were absent, the success of reaching them is not clear. Most countries reported that LLINs were stored in the head teachers' office and given to the student at the next opportunity, and that this was successful. However, Tanzania is the only country with evaluation data on this issue to date, and they found that 94.4% of eligible students who were present on distribution day received nets, but only 83.7% of students who were absent on distribution day received nets, suggesting the post-distribution day approaches for ensuring students receive their LLINs may need some attention.

To deal with the potential need for additional LLINs, some countries had small buffer stocks at schools while others kept these at districts. Use of buffer stocks appears to have been limited; countries report this is due to microplanning data being highly accurate, though it may also be that accessing buffer stocks, particularly when these were stored off-site, was problematic.

Some countries had concerns over the security of sending younger primary school children to walk home alone with a valuable commodity. Parents or older siblings were asked to accompany the younger students on distribution day, which worked well.

Reporting

Some countries faced problems with slow reporting of distribution data. Recommendations to improve this include increased emphasis at training, empowering subnational education personnel with this task, and—where appropriate—involving local government authorities. Local government authorities with a financial management role may be better empowered to ensure reporting takes place.

The level of detail in reporting differed, which can lead to considerable differences in costs. Tanzania, where a complete pre-distribution registration exercise was conducted, maintained a central database of named students. In other settings where distribution registers contain names, numbers are increasingly summarized up the reporting chain. The countries' understanding of donor requirements often affected how much detail was included in their reporting. It seems that a sufficient level of detail is achieved by using enrollment data (rather than having a pre-distribution registration exercise) and collating summaries of LLINs distributed—with complete registers remaining available for audit purposes; however, this assumption should be validated.

Monitoring and evaluation

As with other LLIN distribution channels, monitoring and evaluation will ideally include monitoring of process efficiency, audit trail of commodities and evaluation of outcomes. Roll Back Malaria has key indicators related to LLINs that countries should be tracking as part of their overall malaria monitoring and evaluation strategy (see Box 4), but more detailed program-specific indicators would help inform the contribution of school-based distributions to universal coverage targets and inform design decisions in future years.

22 | School-Based Distribution of Long-Lasting Insecticidal Nets

Activities that may be useful to routinely monitor and evaluate a school-based LLIN distribution include:

- Collation of LLIN audit trail documentation.
- Supervision of activities against specific criteria including adherence to communications activities and quality of training. Supervision reports should be collated and findings used to inform planning of subsequent rounds.
- Collation and analysis of distribution data to determine:
 - Number of LLINs delivered.
 - Efficiency of the distribution (i.e., what proportion of targeted students are recorded as receiving nets).
- Net tracking study following distribution to estimate:
 - The proportion of LLINs received by students that were taken to their households.
 - The proportion of LLINs received that were slept under the previous night. Data on other LLINs and the household structure will depend on understanding.
 - The extent to which messages about LLINs delivered as part of school programs are recalled by students and household members.
- Useful indicators to inform planning include the proportion of:
 - Targeted students who received LLINs.
 - LLINs that successfully reached households.
 - LLINs retained by households.
 - LLINs given to other households.
 - LLINs hung.
 - LLINs used the previous night, by whom and how many people.
- Community surveys to estimate:
 - Coverage of LLINs at individual and household levels after implementation of the school distribution (provided feasible and robust study designs can be assured).
 - Proportions of eligible school children who received the net.
 - Identify characteristics of households who did not receive nets.
 - To explore community members' perceptions and experience of the program.

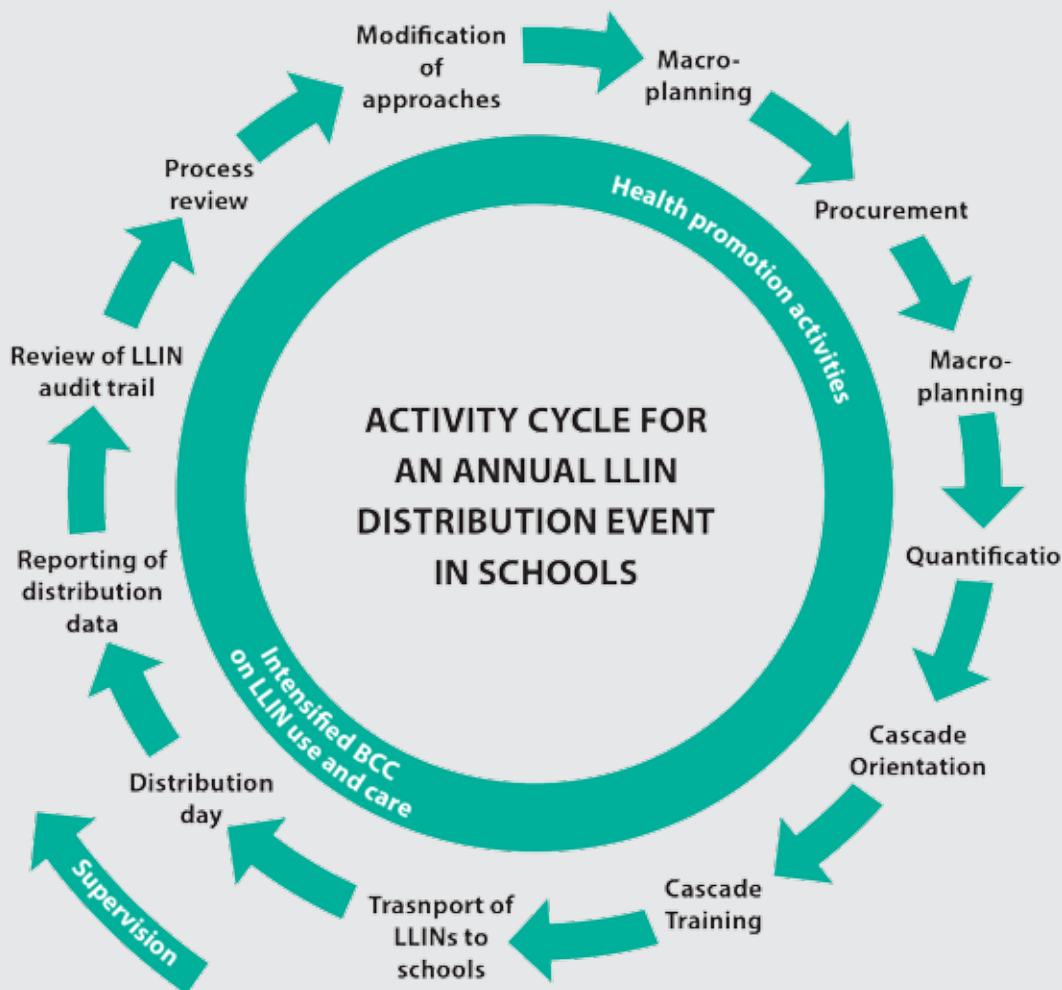
Box 4: Standard Roll Back Malaria recommended indicators for insecticide-treated net programs.

The indicators below will likely be monitored as part of the overall national monitoring and evaluation strategy:

The indicators below will likely be monitored as part of the overall national monitoring and evaluation strategy:

- *Proportion of households with at least one insecticide-treated net (ITN).*
- *Proportion of households with at least one ITN for every two people.*
- *Proportion of population with access to an ITN in their household.*
- *Proportion of the population that slept under an ITN the previous night.*
- *Proportion of children under 5 years old who slept under an ITN the previous night.*
- *Proportion of pregnant women who slept under an ITN the previous night.*
- *Proportion of existing ITNs used the previous night.*

Box 5: Activity cycle for an annual LLIN distribution event in schools



Macroplanning: At the national level, involving all stakeholders. Focuses on reviewing plans, confirming procurement tender based on broad estimates of need, planning broad timing and prompting planning for subsequent steps.

Procurement: To reduce paperwork and delays, countries can consider procuring multiyear quantities of LLINs, split into annual deliveries, to avoid the need for repetitive procurement processes.

Microplanning: At district or regional levels, including a session for sensitization of relevant authorities and peripheral stakeholders as well as detailed microplanning sessions for all central stakeholders. Includes a review of the previous years' school list and map, with an update of the detailed transportation plan if necessary.

Quantification: At district or regional levels, led by education sector personnel with close involvement of non-public sector representatives, as appropriate for the range of schools included. Includes a review and update of the previous years' school list and map, and includes collating and finalizing school enrollment numbers for relevant classes.

Cascade orientation: Steepness of cascade determined by numbers of schools, area to be covered and country norms. The end result is the orientation of PTA committee members, relevant community organizations, school parents and communities on the rationale, plans and timing.

Cascade training: Cascade to be designed as appropriate to the setting. End result is the training of teachers on health promotion approaches and messages, distribution process, audit trail for receipt and storage of LLINs, data collection and reporting process. Any materials to support BCC and other health promotion activities should be delivered to schools through this process to avoid either the costs of a specific delivery of print materials or the print materials being delivered with the LLINs, too late for significant pre-distribution class or school discussions.

Transportation of LLINs to schools: Following a detailed transportation plan with sufficient buffers to absorb delays and avoid delivery of LLINs at night, weekends or school holidays. Aiming to receive LLINs in schools one to two days prior to distribution to reduce storage and security concerns.

Distribution day: Distribution toward the end of the school day. Some schools needed half a day, others just an hour. Parents and caretakers of younger children may be invited to the school to accompany their children home with the LLINs. Staggering distributions may allow increased supervision.

Supervision: Visits may be helpful prior, during or after distribution rather than only on the day of distribution. Cost of increased supervision needs to be weighed against the likely gains. Most countries seem to have had successful distributions with relatively limited supervision.

Opportunities to reduce cost/increase benefit of supervision if other continuous distribution channels are operating in the same area.

Monitoring activities should take place throughout the program cycle. Activities include:

Reporting of distribution data: Data on LLINs distributed to students should be collated and reported up the supervision chain (e.g., from school to cluster to district to regional and national levels).

Review of LLIN audit trail: Programs may choose to have an audit process to review proper adherence to processes and the quality of the commodity audit trail.

Process review: A process review should provide an opportunity for all stakeholders to offer their opinions on the process, successes, challenges and lessons learned. Stakeholders from students and communities through schools, clusters, districts, regional and national level should be involved and include all departments or organizations involved.

Modification of approaches: Outcomes of monitoring and evaluation activities should be considered and approaches for the coming year modified as appropriate. The process review may be particularly useful. All countries that have conducted more than one round have made numerous practical changes between rounds. Annex 3 includes a table listing the changes countries have made or propose to make.

Health promotion and BCC messaging: Ideally throughout the year, integrated into the curriculum but emphasized prior, during and after distribution, and possibly during the rainy season. Pre-distribution events may include class discussions, school assemblies, radio spots, community activities, etc. LLIN proper care and maintenance is likely to be an important focus. There are opportunities to reduce cost and increase benefit if broader malaria and other health messages are included and messages are integrated into school health curricula.

KNOWLEDGE GAPS AND PRIORITIES FOR FURTHER INVESTIGATION

Many knowledge gaps around school-based LLIN distribution stem from the fact that all distributions so far have followed similar models and, with the exception of Tanzania, have not yet undertaken or completed the analysis of evaluation activities. These areas represent priorities for further investigation. Determining the costs associated with school-based distributions, understanding the rates of intra- and inter-household redistribution, and identifying the long-term reach of school distribution programs should be top priorities for investigation.

Knowledge gaps around school-based LLIN distribution:

1. Costs associated with school-based distributions. Reaching an understanding of the average cost per LLIN delivered and the range of costs in different settings is important, particularly as a tool to support planning. It is important to compare cost efficiencies of school-based delivery at different scales, particularly where schools are disparate or have low enrollment, and to measure the impact on health and education outcomes.
2. Final destination of LLINs received by students. Data show that NetCALC is based on the assumption that LLINs are redistributed both within and outside of households. It will be important to collect information on whether this happens, particularly rates of inter-household distribution of excess LLINs in a range of settings. This information could be useful to allow countries to understand whether their chosen mix of distribution channels might leave some subgroups of the population without access to LLINs.
3. Long-term reach of school-based distributions. The effect that variation in household size and clustering of students within certain households will have on the long-term reach of school-based distributions. This will require long-term follow-up or modeling.
4. Roles that schools could play as a distribution point for non-school attending households, perhaps in more remote areas (e.g., as a potential low-level source of replacement nets for non-school families in certain areas). This option should be explored further.



Pupils in a classroom in Ziguinchor, Senegal, display the LLINs they have received at school. (2013)

5. Feasibility of distributing LLINs continuously through schools (i.e., as opposed to an annual distribution event). So far all countries have considered annual event distributions more feasible. This is more likely given the potential challenges around identification of the appropriate target group, assuring a robust LLIN audit trail and LLIN storage and security. However, in some specific contexts continuous distribution may be feasible and useful. Experiences in this approach should be tracked and shared.



A Nigerian student enters her name in the LLIN register before she receives a net at her school in Cross River state. (2013)

6. Feasibility of clustering schools with one school designated as the distributor. This may be possible but the cost advantages and practical disadvantages of such an approach would need to be examined.

7. Feasibility and potential for cost efficiencies of linking school-based LLIN distribution to other school health distributions, such as deworming. Costing analysis, with a scope wide enough to estimate the range of costs and health benefits, should be explored.

8. Whether the potential for students as agents of change within families and communities can be leveraged to lead to increased rates of year round use, good net care practices, and (linked to a broader malaria agenda at school) improved treatment-seeking or other prevention behaviors. Country experience shows that the administrative requirements for curriculum change are a hurdle to any rapid progress and would require a concerted effort and longer-term commitment.

9. Most appropriate timing for annual school distribution events following large-scale mass distribution campaigns.

10. The most effective strategy to combine different continuous distribution channels to reach the greatest and most equitable section of society. This should be a priority for consideration.

ANNEX 1. RESOURCES

Resource	Website
VectorWorks	http://www.vector-works.org
VectorWorks Online toolkit for continuous distribution	http://cdtoolkit.org
WHO recommendations for achieving universal coverage with long-lasting insecticidal nets in malaria control September 2013	http://www.who.int/malaria/publications/atoz/who_recommendations_universal_coverage_llins.pdf
RBM VCWG Continuous LLIN Distribution Systems Work Stream. Continuous long-lasting insecticidal net distributions: a guide to concepts and planning. 2011, Updated by VectorWorks 2016.	http://www.vector-works.org/resources/5-continuous-long-lasting-insecticidal-net-distributions-a-guide-to-concepts-and-planning/
Guide to continuous distribution of LLINs through health facilities. NetWorks, 2014; updated by VectorWorks 2016.	http://www.vector-works.org/resources/anc-epi-distribution-country-to-country-guide-for-llin-keep-up/
Community-based distribution of ITNs: a short guide based on recent experience. VectorWorks 2016.	http://www.vector-works.org/resources/community-based-insecticide-treated-nets-distribution-guide/
Preventing, identifying and mitigating fraud, theft and diversion of insecticide treated nets. VectorWorks, 2016.	Coming soon!
NetCALC 3.2	http://www.vector-works.org/resources/netcalc-planning-tool/
Continuous Distribution Online Toolkit	https://www.k4health.org/toolkits/continuous-distribution-malaria/guides-continuous-distribution
Health Communication Capacity Collaborative	http://www.healthcommcapacity.org/health-compass/
RBM Vector Control Working Group	http://www.rollbackmalaria.org/organizational-structure/working-groups
USAID Development Experience Clearinghouse	https://dec.usaid.gov/dec/home/Default.aspx

ANNEX 2: COUNTRY EXPERIENCES

The following pages summarize recent country experience with school-based LLIN distributions.

Ghana

Scale: A mixed delivery model of LLINs through antenatal care services, Expanded Programme on Immunization services (through child welfare clinics) and primary schools was designed for the Eastern Region and piloted in 2012 with 181,600 LLINs delivered through 2,321 public and private primary schools. In July 2013, the school-based distribution was scaled up nationally with 1.2 million LLINs delivered to Primary 2 and Primary 6 students in all public and private schools in the other nine regions of Ghana (a second distribution for the Eastern Region took place in October 2013).

Design: Annual one-day distribution events to two primary school classes (2 and 6) in all public and private schools. A wide-ranging communications approach with community meetings, radio stations, use of community opinion leaders as change agents, and dedicated print BCC materials in schools. A total of 374 school health education officers and cultural officers were trained in 10 regions on BCC approaches including using a list of discussion points, a flip chart focusing on malaria prevention, and the guide How to do a drama. Prepared drama scripts were provided to all schools.

Evaluation: Desk review and stakeholder interviews to examine process of initial Eastern Region pilot. Household survey investigating success of targeting, retention, final destination and use of LLINs in Eastern Region following the pilot of multiple continuous distribution approaches has been completed but the report is not yet available.

Lessons learned:

- Specific and proactive efforts are required to ensure private schools are sufficiently well informed, engaged and integrated into the plans.
- Communication efforts are needed to manage community expectations that all children should receive LLINs regardless of class.
- Education sector personnel at lower levels were a superb resource to support LLIN distributions. Circuit supervisors—an existing position within the education sector—were pivotal in the training and supervision approach. Their strong knowledge of the transport networks, schools, school personnel and other useful stakeholders within their circuits is believed to have been a main factor in the smoothness of the implementation.
- BCC materials should be adapted specifically for school children i.e., using less complex terms than those provided to adults receiving LLINs through ANC or as caretakers of infants at EPI.
- Cost savings are possible, for example training on a bundle of continuous distribution approaches at once and engaging those trained to be involved in training, distribution support and supervision for all the different channels (to appropriate extents).

Timeliness of reporting end distribution data from schools can be a problem. Increased emphasis on timeliness during training is needed and supervisors may need to commit additional time to this.

Tanzania

Scale: A total of 510,000 LLINs were delivered through 2,302 schools in 19 districts, in three regions of the Southern Zone over a one-week period.

Design: Annual one-day distribution events to every second class in primary (Primary 1, 3, 5 and 7) and classes 2 and 4 in secondary. Communications activities were wide ranging: standard malaria behavior change partners' activities intensified in program areas; organizations brought in to support additional community mobilization; radio spots; and word of mouth through students, teachers, PTAs and community change agents. Financial and operational management was centralized and led by the National Malaria Control Programme in partnership with the education authorities.

Evaluation: A household survey in program and control areas was conducted to look at a range of indicators related to accessibility of the school LLINs, retention and use. A procedural audit was also conducted. Detailed costing analysis is planned.

Lessons learned:

- Where schools are many, sometimes with low enrollment numbers, the costs of the distribution increase considerably. This is due to increased training, transport and supervision costs per LLIN delivered.
- Disbursement of money for training or supervision payments (per diems, reimbursements, etc.) was a challenge. Attempts to reduce the need to carry cash were largely unsuccessful: mobile money transfers were frequently impossible because of network limitations, account transfers often failed due to incorrect account information or inactive accounts. Cash may need to be used in the future, which may be more feasible if districts are empowered to handle their own budgets.
- Decentralizing financial management roles is necessary for the sustainability of the approach.
- Storage and security of LLINs at schools has been a serious problem. Storage capacity has been overestimated and better training and supervision on LLIN logistics record keeping is required.
- Planning timing with very conservative buffers for unforeseen delays is vital because of the involvement of the educational sector working on its own fixed timetable (school holidays, exam periods, etc.). Consignment of LLINs often arrived at night or on weekends, causing practical challenges. Transportation schedules need to be robustly realistic and with buffers for the likely delays and problems.
- Interpretation of cross-sectional community surveys attempting to examine impact of a distribution on ownership levels can be complicated by considerable differences between regions at baseline, or within a region over time. Evaluations need to carefully consider what indicators will be meaningful and usable within the context.
- Using basic usage indicators to draw conclusions about communications approaches is not possible. The numerous differences between control and program areas, particularly in history and timing of other LLIN distributions, make it difficult to draw any conclusions. Within intervention areas, differences between eligible and non-eligible households are equally hard to interpret. Use of any LLINs by people with access to an LLIN was similar between households who were and were not eligible for school LLINs—is the potential of students as agents of change within families not being realized or are students affecting change in communities as a whole? Qualitative research should be used to increase understanding of the impact and usefulness of communications approaches.
- A range of organizations was involved to support communications, differing by area, with some groups performing less well than others. Management inputs were needed to reorganize and reinvigorate activities at times. Radio was useful in some areas but not others, and word of mouth was important. Community change agents and PTAs appeared to work sufficiently well to ensure eligible households were aware, though non-eligible households in these areas were less aware.

Senegal

Scale: A total of 73,445 LLINs were delivered to students (and 2,265 to teachers) in 1,153 schools in the Louga and Ziguinchor regions of Senegal (2 of the 14 regions in the country).

Design: Annual one-day distribution events to children in first and fourth primary classes. Teachers were provided LLINs as incentives. The education sector took the lead in planning, verifying numbers, and organizing schools. A number of education sector organizations were involved in organizing their representatives at regional and lower levels. The health sector was seen as technical support rather than being in a lead management role. Printed communications guides supported communications activities at schools. These included a range of suggestions from activities for assemblies, to activities for classroom lessons and for distribution day itself. Printed frequently asked questions guides for teachers were also available and print leaflets with key messages were provided to children receiving LLINs.

The school-based distribution is part of a mixed-channel continuous distribution model currently being piloted. This mixed model includes health facility distribution and distribution through community groups alongside the school distributions.

Evaluation: Process evaluation including a range of stakeholder interviews. End of pilot evaluation is planned.

Lessons learned:

- Education sector personnel have an unrivaled knowledge of the school system, personnel at school and higher levels, and access and authority to quickly and easily engage school staff, collate enrollment data and foster engagement. Replicating this in the private school sector can be a challenge.
- General communication guidelines and activities can be complemented by schools' own initiatives. The print document, which gave suggestions to schools for various activities, was likely a useful prompt.
- Planning must include conservative time buffers. Delays and rapidly approaching school holidays and exam periods caused problems and plans had to be rearranged on a number of occasions. These problems were identified during the first round and efforts were successfully made to improve coordination and planning for the second round.
- Whereas coordination between the health and education sectors was strong at national and regional level, at lower levels it was weaker. Health post personnel (most schools had nearby health posts) were not informed about the program nor were they asked to be involved.

Nigeria

Scale: Three rounds of distribution have been undertaken as part of a pilot program. Round 1: 8,444 LLINs were delivered through 88 schools in 1 LGA (Obubra: population 185,000) of Cross Rivers State; Round 2: 21,000 LLINs were delivered through 191 schools in 2 LGAs (Obubra and Oguja: population 365,457); Round 3: 21,000 LLINs were distributed in the same schools as Round 2.

Design: Annual one-day distribution event to classes in primary and secondary at three class intervals (i.e., P1, P4, JS1, SS1). Only public schools have been included. There is discussion about expanding this to private schools.

Evaluation: A final evaluation will take place after the third round of the pilot in 2014.



Pupils in Cross River state, Nigeria sit in their classroom after having received LLINs to take home with them. (2013)

Lessons learned:

- Importance of careful, detailed and conservative planning schedules for transportation of LLINs to schools. Many deliveries occurred outside working hours when head teachers were not on site, which caused some logistical problems.
- While cost savings may be possible in some areas, a dedicated training session for the LLIN distribution is important at least for the initial round in any one area. During Nigeria's initial pilot, training was scheduled for the same day as a standard monthly meeting. In the subsequent round the schedule was modified to ensure a more dedicated training environment (and, it was hoped, higher quality of training).
- Importance of conducting the campaign once registration has stabilized somewhat, in the second semester. While registration goes on throughout the year, the second term sees less ongoing enrollment than the first, which means there will be less change in enrolled students between the microplanning stage and distribution day.
- Distribution during the school break (30 to 45 minutes) ensures school activities are not disrupted.
- Based on lessons learned in the second round, the distribution will be conducted during the dry season, as it reduces transport challenges in reaching remote areas.

ANNEX 3. CHANGES COUNTRIES HAVE MADE OR RECOMMENDED

Country	Changes made or recommended, following initial pilots
Ghana	<ul style="list-style-type: none"> • Earlier engagement with private schools. • Simplification of communications messages on print leaflets for school children. • Increased emphasis on reporting and timeliness of reporting in training and supervision.
Nigeria	<ul style="list-style-type: none"> • Inclusion of private schools. • Distribution during the dry season. • Increased emphasis on planning and communication of delivery times and dates to schools, to avoid deliveries outside working hours. • Dedicated training sessions for head teachers in smaller groups.
Tanzania	<ul style="list-style-type: none"> • No separate registration exercise—enrollment data will be used. • Teachers will receive LLINs. • Financial management will lie with local government authorities. • Decentralization of supervision, training and supervision, with regional teams responsible for these tasks in their districts. Central team will continue to play a supervision role during distributions. • Increased emphasis on audit trail and community security in training and supervision.
Senegal	<ul style="list-style-type: none"> • Better coordination with education department on timing and appropriate alignment with school calendars. • Improved collaboration between lower levels of the health system (facilities and health posts) and schools around the time of distribution.

ANNEX 4. PEOPLE INTERVIEWED

Country	Name	Affiliation
Ghana	Felix Nyanor-Fosu	JHU-CCP, NetWorks
	Georgina Portia Ansah	Regional SHEP coordinator
Tanzania	Karen Kramer	NATNETS Programme, National Malaria Control Programme, Swiss Tropical and Public Health Institute
	Jacob Macha	JHU-CCP, Commit
	Jane Lweikiza	Tanzania Red Cross Society
	Kheri Issa	Tanzania Red Cross Society
Nigeria	Emmanuel Obi	Malaria Consortium, NetWorks
	Mrs. Amos	Ministry of Education, Calabar, Cross River State
	Mr. Bassey Duke	Former Programme Manager of the State Malaria Control Programme
	Eng Oyama	Executive Education Secretary at LGA level
Senegal	Mbaye El Hadji Abdoule Aziz	JHU-CCP, NetWorks
	Ardo Faye	JHU-CCP, NetWorks
	Sarah Legare	Peace Corps, Senegal

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Secrétariat du Partenariat RBM

Hébergé par l'OMS

20, Avenue Appia

1211 Geneva 27

Suisse

Tél: +41.22.791.4318

Fax: +41.22.791.1587

Site Internet: <http://www.rollbackmalaria.org>