Preventing, Identifying, and Mitigating the Impact of Fraud, Theft, and Diversion of Insecticide-Treated Nets

A summary of experiences and best practices from country programs
April 2017

USAID FROM THE AMERICAN PEOPLE
CDC
U.S. President's Malaria Initiative

VECTOR WORKS
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This report is made possible by the generous support of the American people through the United States Agency for International Development (USAID) and the President's Malaria Initiative (PMI) under the terms of USAID/JHU Cooperative Agreement No: AID-OAA-A-14-00057. The contents do not necessarily reflect the views of USAID, PMI or the United States Government.

The authors thank the interviewees, all of whom were generous with their time, open with their experiences, and helpful in sharing both published and draft documents and tools. Appreciation is also extended to Matthew Lynch for his review of this document and to Rebecca Shore for layout.

Suggested citation: Hamisu Hassan, Kate Kolaczinski, and Angela Acosta. *Preventing, identifying, and mitigating the impact of fraud, theft, and diversion of insecticide treated nets: A summary of experience and best practices from country programs*. VectorWorks Project, Johns Hopkins University-Center for Communication Programs (JHU-CCP), and Tropical Health LLP. 2016.

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Abbreviations

3PL	third party logistics provider
ACT	artemisinin-based combination therapy
AMP	Alliance for Malaria Prevention
ANC	antenatal care
CD	continuous distribution
CMA	Commodity Management Audit
DFID	Department for International Development (UK)
DRC	Democratic Republic of Congo
EPI	Expanded Programme on Immunization
EUV	End-Use verification
FHI 360	Family Health International
GPS	global positioning system
HC3	Health Communication Capacity Collaborative
IFRC	International Federation of Red Cross and Red Crescent Societies
ITN	insecticide-treated net
JHU-CCP	Johns Hopkins University-Center for Communication Programs
JSI	John Snow Incorporated
LLIN	long-lasting insecticide-treated bed net
LQAS	lot quality assurance sampling
MoE	Ministry of Education
MoH	Ministry of Health
NMCP	National Malaria Control Program
NMEP	National Malaria Elimination Program/National Malaria Eradication Program
OIG	Office of the Inspector General
PMI	President's Malaria Initiative
POD	proof of delivery
PSI	Population Services International
RBM	Roll Back Malaria
RDT	rapid diagnostic test
SANRU	Rural Health Program (*Projet Santé Rurale*) of the Democratic Republic of Congo
SFH	Society for Family Health
SLICE	Supply Chain & Logistics Internal Controls Evaluation
SMS	short message service
SOP	standard operating procedure
UNICEF	United Nations Children's Fund
USAID	United States Agency for International Development
WEC	Ward Education Coordinators

Glossary

Risk assessment	Review of a system to identify points of risk, and, for each risk, its type, source, magnitude, and likelihood of occurrence.
Diversion	Unauthorized redirection of ITNs from their intended beneficiaries to other groups. This may mean diversion to unintended geographical locations, or to unintended sub-populations within the same geographical location.
Fraud	Unauthorized interference with supply chain procedures with the intention of diverting or stealing ITNs. Examples include tampering with container seals; doctoring inventory documents; and/or deliberately changing the positioning plan.
Theft	Stealing of ITNs at any point in the pipeline for personal monetary gain.

Summary

During the past 15 years, national malaria control programs have distributed one billion insecticide-treated nets (ITNs). Given the scale of activities and the speed at which ITN distributions have scaled up, current best practices in preventing, identifying, and mitigating potential losses due to the fraud, theft, and diversion of ITNs need to be summarized.

There is a growing body of experience in ITN distributions, and consequently, in ensuring the accountability for ITNs throughout the supply chain. This document summarizes lessons learned from these experiences. To gather this information, the VectorWorks project conducted interviews and document reviews with implementing partners, government representatives, and donors.

This report begins with a *Risk Assessment* of a generic ITN supply chain. This section is a resource for countries undertaking their own risk assessments. It defines the types of risk possible at each stage of the supply chain, the likelihood that a loss event will occur, and the potential magnitude of these losses. Others can use the findings from these assessments to fine-tune logistics plans for ITN distributions.

The assessment found that loss events are likely to occur at all levels. Nets are most frequently lost during transport and during low-level storage, although the loss of nets at the transport stage has the greatest potential impact. High-impact mitigation strategies include (a) early and detailed planning, (b) establishing robust third party logistics provider (3PL) transport contracts, and (c) providing sufficient insurance coverage during transport and storage.

Next, the *Current Practices* section presents approaches that partners use to **prevent, identify**, and **mitigate** the impact of fraud, theft, and diversion of ITNs. Standard logistics best practices around storage, transport, and documentation are built into logistics plans and are seen as a primary way to prevent losses. However, many countries face challenges in ensuring that plans and best practices are followed. Even when enhanced, monitoring and supervision can only extend so far, especially when activities are widespread. Increased political engagement, and wider support and understanding of the process from communities, appear to help maintain a spotlight on activities, even when formal supervisors are not present. Moves to simplify and align implementation, supervision, documentation, and reporting tasks with existing in-country practices or routine systems also seem to be helpful—particularly in preventing losses; but, also, in improving identification and mitigation of the impact of such losses.

Identifying losses was reported to be difficult. The most common tracking mechanisms—monitoring of documents and spot checks—may not identify losses until long after the event, require large budgets to be useful at-scale, and do not necessarily distinguish between mistakes rather than true instances of fraud or theft. It is often impossible to compare geographical areas, partners, or distribution channels, because differences in how they are detected make it unclear whether levels of reported losses are accurate. Partners differed in their approach to investigating suspected losses, because investigation can be time- and cost-intensive. If losses are small, partners may not investigate; thresholds vary, but losses of more than 500 ITNs are usually investigated.

The document review revealed that planners have a number of documents and tools available. These resources are summarized in the *Current Guidance* section. Available documents adequately cover practices that can prevent loss incidents. However, guidance is not available for analyzing and interpreting monitoring data, or other documents, to identify potentially significant incidents of fraud, theft, or diversion.

The *Conclusions and Recommendations* section provides detailed suggestions for each component of ITN distributions. Table 13 summarizes the main recommendations, their resource requirements, and their potential effect on preventing or mitigating fraud, theft, and diversion. Most of these are not time consuming, but they have medium to high impact. In-country recommendations with low costs but high impact include strong contracts with 3PL providers, early and detailed planning and budgeting, streamlining documentation requirements, and timely communication with storage and distribution

points about the number of nets they expect to receive. On a global level, guidance and tools on robust contracting with 3PL providers is needed, as well as guidance on how to analyze documents and monitor data to prevent losses.

Introduction

Background

About 3.2 billion people worldwide are at risk of malaria, a preventable disease that caused nearly 600,000 deaths globally in 2014. ITNs are one of the most effective and important tools for preventing malaria infection. Supported by global development partners, national malaria control programs have distributed one billion ITNs in the past 15 years alone. Nets have been distributed through mass campaigns, as well as continuous distribution (CD) channels, such as health facilities, including antenatal clinics (ANC) or Expanded Programme on Immunization (EPI) clinics; schools; community networks; and, less frequently, private-sector subsidized sales.

Increasingly, aid donors have focused attention on the need to minimize losses due to fraud, theft, and diversion of health commodities. Major resources have been invested to establish systems and processes that ensure a neutral and transparent procurement environment in line with international best practices, and that supports the need for accountability for distributed commodities. All commodity supply chains face the challenge of preventing, detecting, and mitigating loss, and ITNs are no different. However, some characteristics of ITNs give rise to specific supply chain challenges (see *Box 1*).

Box 1: Characteristics of insecticide-treated nets

ITNs, a very **bulky commodity,** need to be stored and transported outside the normal public health supply chain. This often requires the establishment of an expanded workforce, storage network, transport network, and new systems and procedures.

ITNs are fairly **expensive** to distribute (primarily because of their bulk) and public health funding is limited. Also, ITNs are often distributed outside the normal public health supply chain; the result is often that the activities involved in distribution, such as supervision and monitoring, are not funded to an ideal level.

ITN **distribution has escalated rapidly**, with billions in public health funding supporting this single commodity, and distributions are taking place on a massive scale with little opportunity to build up experience and systems. The breadth of activities at community level and use of community distributors in mass campaigns brings supervision challenges and increased exposure to potential diversion.

ITNs are **not classified in the same way as medicines or diagnostics**. This means the often-strong supply chains developed to support the flow of drugs and diagnostics do not always benefit the ITN supply chain. For example, well-trained pharmacy stores personnel may not be responsible for ITN stores, but ITNs may be managed by staff with less skill, experience, and training.

ITNs **can be easily converted into cash**; they have a good market value. Most cases of ITNs theft trace the product to the market. Pharmaceuticals and laboratory commodities are much more regulated compared with ITNs. The value of ITNs much more obvious to the broader public compared

Various guidance documents support governments and other implementing partners in preventing, detecting, and mitigating fraud or theft of health commodities. For example, the Alliance for Malaria Prevention recently published guidelines specifically for the supply chain management of ITNs during mass distribution campaigns. A wealth of experience in ITN distribution is available, through various channels in a range of countries, containing many valuable lessons about how best to avoid losses in the in-country ITN supply chain.

Rather than being a *how to* guide, this document shares experiences and practical approaches, then provides recommendations for countries and partners to help plan supply chains that reduce the risk of fraud, theft, and diversion. More detailed guides and standard operating procedures (SOPs) are available for specific distribution channels (see the *Tools and resources* section). It is recommended that planners and implementers refer to these guides for detailed planning; the current document is not a detailed logistics or supply chain planning guide.

The focus of this work is on public sector ITN distributions: mass campaigns and routine distributions through health facilities, schools, and community networks. Subsidized sales through private-sector supply chains are another method of ensuring continuous availability of ITNs, but their supply chain issues are quite different, and are not addressed in this document. One exception is the voucher system used in Tanzania; vouchers were distributed to pregnant women at ANC consultations, and redeemed by beneficiaries at private outlets.

This document focuses on the in-country supply chain—that is, from port arrival to receipt by the beneficiary. Issues of fraud surrounding procurement, including issues around fake and sub-standard products, are important possible points of risk, but are not within the scope of this work.

This report complements the current efforts of the Alliance for Malaria Prevention (AMP) to support partners in the sound management of mass ITN campaigns. This report focuses on accountability for the number of nets given into the custody of the government and implementing partners, but this report does not go into accountability for the funds used for implementation. The potential for issues such as falsified training or supervision reports, fake receipts, and other concerns need to be considered when planning ITN distribution programs and monitored and addressed during implementation as part of financial accountability practices.

Overview of different ITN delivery channels

ITN supply chains vary, depending on the delivery channel used and the context in which the delivery happens—for example, distributions that use a specific channel, such as ANCs, may vary in design from one context to another. The design affects the level of risk for theft, fraud, and diversion at different points, as well as the opportunities for preventing, identifying, and mitigating this risk.

This document uses terminology that differentiates between the central-, mid-, and low-level elements of the supply chain. These are defined as follows:

- Central level: The nation's capital, seat of the Ministry of Health and location of the National Malaria Control Program (NMCP).
- Mid-level: Seat of sub-national supervisory teams, such as regional health teams, state-level health teams, and district health teams.
- Low-level: Distribution points including schools, health facilities, and communities.

Table 2 shows some similarities and differences between basic supply chain designs used for some of the most common distribution channels; this information may also be a reminder of pertinent issues during the process of conducting a detailed risk assessment (see *Risk Assessment* section).

Table 1. Supply Chain Characteristics of Common ITN Channels

Supply Chain Characteristics	Mass Campaign	Health Facilities (e.g., ANC, EPI)	Schools	Community Networks
Level of integration with existing systems	Some integration (e.g. use of mid-level storage facilities) but otherwise standalone	Integrated into health system as far as possible (incl. planning, distribution, reporting and data management) Parallel activities sometimes required (e.g. transport or storage, given the bulk of the ITNs)	Integrated into school facilities and staff Activity itself is standalone	Generally limited integration May link to existing community networks Health system staff responsible for planning and oversight
Personnel involved	MoH personnel at all levels District health teams for planning and oversight Many ad hoc personnel at lower level	MoH personnel at all levels District health teams for planning and oversight Existing health facility staff for distribution Partners may support	MoH and Ministry of Education (MoE) personnel at all levels District health teams often provide support School personnel Partners may support	MoH personnel at all levels District health teams for planning and oversight Community health agents, community groups, other community volunteers
Timing	One off, usually once every three years	Continuous	Usually annual, could be continuous	Continuous
Storage	Storage network design varies Some countries bypass central level and have shipments delivered directly to mid-level or district	Storage network design varies Some countries bypass central level and have shipments delivered directly to mid-level or district District stores may feed all facilities in the district Existing district stores may be sufficient or may need expansion and upgrading	Storage network design varies Existing district stores used, though these may need supplementing depending on volumes School store room/ head teacher's office used to store before distribution	Storage network design varies Health facilities may act as feeder stores Community stores ITNs in leader's or volunteer's house, or in other facility if local (health facility, school)

Supply Chain Characteristics	Mass Campaign	Health Facilities (e.g., ANC, EPI)	Schools	Community Networks
Transport	Transport is every few years Transport outsourced to 3PL providers National or regional logistics companies used at higher levels Ad hoc informal personnel used at low levels, particularly in difficult to reach areas or complex operating environments. These contexts and the lack of insurance among such personnel makes accountability more challenging	Transport is annual, semi-annual or quarterly to districts Districts supply ITNs based on consumption data Sub-district transport and storage plans vary: • During routine supervision • Partners may support transport • Health facilities may collect ITNs	Districts and partners may support transport within districts but for annual distributions, numbers are high so this is often outsourced to 3PL providers	Transport is annual, semi-annual or quarterly to districts District transport and storage plans vary: • Health facilities may feed communities • Partners may support • Communities may collect resupply stocks
Beneficiaries and their identification	Number of nets for which households are entitled is fixed or linked to household size Registration exercise for identification of beneficiaries Opportunities to inflate beneficiary numbers ('ghosting') and steal the surplus are fairly high and numbers involved may be high	Pregnant women at their first ANC visit Infants receiving immunization (at an agreed point in schedule, often at 9m or 1y) Beneficiaries are identified during routine visits; health cards may be checked for previous ITN receipt Opportunities for 'ghosting' fairly high though numbers involved smaller than in mass distributions	Certain grades are selected; every child in that grade level is eligible School personnel may also receive ITNs Beneficiaries are identification using the class lists; teachers know the children Opportunities for 'ghosting' fairly high and numbers involved may be high when distribution is in one off campaigns	Eligibility criteria aim to identify families in need of additional or replacement nets Ease of identification varies by criteria; may be harder than in health facility, campaign or school-based distributions Opportunities for 'ghosting' fairly high though numbers may be lower than in large campaign distributions
Proof of delivery	Beneficiaries sign, mark or thumb print the registration sheet	Recorded in health facility register and possibly on ANC / EPI card	Beneficiaries sign, mark or thumb print the registration sheet	Beneficiaries sign, mark or thumb print the registration sheet A coupon or voucher duplicate may be additional POD

Methodology

Information for this report was gathered through literature reviews and key informant interviews.

Twenty-three documents were reviewed (*Documents Reviewed* section). They were found through Internet searches; reviews of reference lists of key documents; and requests for document recommendations from key informants.

Internet searches included both an Internet search engine (Google) and more targeted searches that used combinations of the following terms, with one from each line below included in each search term:

- LLIN; long lasting insecticidal net; ITN; insecticide treated net; health products
- Logistics; supply chain (management); loss; theft; diversion; fraud; accountability.

In addition, websites for the following donors and programmes were searched for relevant guidance manuals or tools that may not have shown up in the initial Internet search: USAID; President's Malaria Initiative (PMI); the Department for International Development (DFID) UK; United Nations Children's Fund (UNICEF); Global Fund to Fight AIDS, Tuberculosis and Malaria (GFATM); Population Services International (PSI); John Snow, Inc. (JSI); and the USAID | DELIVER PROJECT.

The authors interviewed 13 key informants. The list of informants was developed through an iterative process following discussions between Tropical Health LLP, Johns Hopkins University-Center for Communication Programs (JHU-CCP), and PMI. Selected informants work globally providing guidance or oversight to ITN distribution programs, and/or are directly involved in planning, managing, and reporting on ITN distributions. The list includes those with experience in both campaign and CD channels.

To focus the compilation of experience and lessons, four countries were selected: Tanzania, the Democratic Republic of Congo (DRC), Uganda, and Nigeria. These countries represent a range of distribution channels, implementation contexts, and challenges. Table 3 summarizes the types of distributions undertaken in these countries.

Two key informants were selected from each country, with a focus on those involved in or directly overseeing implementation. A standard discussion guide was used during the telephone interviews with the main key informants. Follow-up questions and queries were conducted by email, including with additional key informants proposed by the main key informants.

Table 2. Summary of ITN Distributions in Selected Focus Countries

Country	Types of ITN Distributions Undertaken	Main Donors of ITN Distributions	Main Implementing Partners
DRC	Campaign CD: ANC, and EPI	GFATM, PMI, and DFID	NMCP, UNICEF, PSI, SANRU
Nigeria	Campaign CD: ANC, EPI, schools, and community directed	GFATM, DFID, PMI, and World Bank	NMEP, Malaria Consortium, JSI, FHI 360, HC3, Carter Center, and SFH
Tanzania	Campaign CD: ANC voucher system (linking ANC to private sellers),and schools	GFATM, PMI, and DFID	NMCP, PSI, MEDA, and Swiss TPH
Uganda	Campaign CD: ANC	GFATM, PMI, and DFID	NMCP, Malaria Consortium, and JHU-CCP

Findings

Results from interviews and document reviews were organized in three main ways. First, descriptions of the types of risks at various points in the supply chain, the frequency of loss events, and the magnitude of risk are described.

Next, a list of the current practices for preventing and identifying fraud, theft, and diversion are listed, followed by current practices for mitigating the impact of such events.

Finally, current guidance documents are described, including the topics they cover. Topics with insufficient guidance are identified.

Risk assessment of the ITN pipeline

In this section, the information from the document review and the key informant interviews are combined to provide a risk assessment of the different points of a generic ITN supply chain—from arrival at the port of entry to the point of handover to the beneficiary. It highlights different risks at discrete stages in the supply chain, examines the potential impact of a loss event, and discusses options for mitigating risk at each point.

This section provides food for thought as planners work through their more-detailed risk assessments of context-specific ITN supply chains. Risk assessments can then be used to inform and implement risk management plans.

Prior to arrival in-country

The procurement process and factory-to-port-of-arrival stage of the ITN supply chain present a number of opportunities for corruption and fraud, including corruption in the procurement process and the introduction of fake or sub-standard products. Various donor requirements, guidance documents, and tools are available to help reduce these risks and support sufficient accountability and transparency during these stages. These include GFATM's *Integrity Pact* guiding supplier behavior and Article 9 of the United Nations Convention Against Corruption, which requires that systems be based on "transparency, competition, and objective criteria in decision-making for all UN-related procurements." Also, to protect the assets and finances of donor agencies—for example, the Office of the Inspector General (OIG) USAID—independent authorities are responsible for identifying and addressing possible corruption cases during procurement.

Quality control and quality assurance are particularly important at this stage in the supply chain, and approaches, such as pre-shipping testing, are helpful if done well and are based on best practice procedures. The risks at these stages are important, but are beyond the scope of this document, which focuses on issues for the in-country ITN supply chain.

Point of arrival

The arrival of ITNs in-country is often the last stage of the procurement cycle. Procurement agencies usually engage the services of a 3PL. The 3PL providers work with customs authorities to support port clearance and they may have additional roles (see *Box 2*).

After ITNs are cleared, they can be immediately received into a central store (centralized delivery), or the procurement contract may include delivery in pre-defined consignment sizes directly to mid-level stores (regional or district stores, for example); these stores are then the point of arrival (decentralized delivery). In some settings, central stores are used for smaller quantities of nets; but, larger quantities for mass campaigns are increasingly contracted for delivery straight to the mid-level. In some countries, almost all procurements are contracts with delivery to mid-level stores.

Decentralized delivery (see *Box 2*) has important advantages and disadvantages.

Storage network

Storage networks vary considerably between countries; good planners also tailor the design of the network appropriately *within* countries. Where concerns about security are higher, mid- or lower-levels, the alternative levels may be emphasized, ensuring known weak points are avoided as far as possible. In general, good supply chain practice is to limit the number of storage points, as much as possible.

Box 2: Advantages and Disadvantages of Decentralized Delivery

Advantages of decentralized delivery:

Avoids the need for a massive storage capacity at the central level. For campaigns, the total consignment of ITNs may be in the millions, and finding a central store or stores may be impractical.

Avoids the risk of major theft when many ITNs are stored in one place.

Reduces the risk of storage between central- and mid-level by avoiding the need for offloading and repackaging quantities.

Allows a single 3PL to be contracted for all the ITNs down to the mid-level before additional larger numbers of contracts are needed with in-country logistics companies.

Disadvantages of decentralized delivery:

Requires careful quantification at the point of procurement to specify how many ITNs should be delivered to specific mid-level stores before any registration process for a campaign has been done.

May result in the need to shift ITNs between regions within the country if quantification is inaccurate. This can be extremely expensive, and can lead to political difficulties if the impression is given that one region is awarded a certain number of ITNs and then *deprived* of them. Countries often make conservative estimates of ITN needs for each region, then hold buffer stock at the central level, which is later used to feed down additional ITNs to each region, as required (after a registration exercise has taken place, for example). This option appears to work well practically, although it brings its own costs.

Note that both these *disadvantages* may also be issues for a system where centralized delivery is used; for example, where distribution to lower levels is conducted prior to the registration campaign. However, for decentralized delivery of ITNs, these challenges are inevitable.

Table 3: Risk Assessment at Central Storage Level

Potential types of loss: theft or fraud.

One example was a large-scale theft occurring with the full knowledge of the local police force, which was unable to intervene for political reasons. This large-scale theft is more of a risk at both central and mid levels of storage, where the quantities involved make it easier.

Risk Component	Level of risk	Explanation
Potential for a loss event occurring, with explanations	Medium	At the point of delivery, when stores personnel sign documents, they can falsify the numbers of bales received. Large quantities make it harder to detect falsified documentation because spot-checks and visual audits can be difficult to complete accurately, especially when best-stacking practice is not followed.
Frequency of losses experienced	Low	Systems and facilities at this level (the first point in the supply chain) tend to be higher quality and more strictly adhered to, hence losses tend to be less common. For example, volumes are high at this level which often times involve the services of a 3PL for warehousing. The contract terms are tight, which makes the frequency of loss low. Furthermore, personnel are provided with constant inventory management training and increased monitoring and supervision at this level.
Potential impact of a loss event	Medium-high	If a theft occurs at this point, the potential impact for large-scale loss is high because of the large quantities involved. Stores at this level often have good insurance cover.
Level of risk	Medium	Potential for large-scale loss is offset because of the insurance coverage, low frequency of experienced losses, and medium potential for loss events.
Ease of mitigation and mitigation approaches	High	In some cases, where central stores are a major point of risk, decentralized delivery is used for both mass campaigns and CD. Security cameras have been used in several countries' central stores to deter theft and investigate theft events. Insurance should be in place for stores. **Standard storage best practices** helps mitigate risk, and includes— • Insist on stacking best practice to aid visual checks and counts • Use standardized stock records and ensure personnel are well trained and well supervised • Require two personnel to be responsible for ITNs at all times (sign in, sign out, counts, locks) • Reduce the number of personnel with access to the ITNs. Reducing the time ITNs are in storage. This depends on having a detailed logistics plan in place well in advance of the arrival of the ITNs in-country.

Central storage
Despite the growing trend toward decentralized delivery, numerous countries have significant numbers of ITNs stored centrally, and they may hold buffer stocks centrally, even if they use decentralized delivery. Given the large quantities of ITNs involved, government stores are often too small, and the country commonly uses private central stores.

Mid-level stores (regional/state/district)
Mid-level storage points, at the regional- or district-level, are not a single central store, but are feeder points to lower-level stores. The extent of the mid-level network varies, based on geography, ITN volumes, and the distribution channel.

Table 4: Risk Assessment at Mid-Level Stores

Potential types of loss: Theft, fraud or diversion.

Examples:

- Bales have been stolen; bales are unaccounted for; and numbers on inventory documents falsified.
- Political interference in the destination of nets can lead to diversion.
- Surplus nets often end up at this level and may be an opportunity for loss when careful oversight of the commodities ends after a campaign.

Risk Component	Level	Explanation
Potential for a loss event occurring, with explanations	High	Risk of loss events is fairly high. Numbers remain quite large, yet the quality of stores personnel and facilities may be lower than at the central level. Opportunities for diversion include ITNs being diverted for political motives.
Frequency of losses experienced	Low–medium	Experience shows that loss events are fairly few at this level. Systems are variable but may be good; and oversight is often high by the disease teams at district or provincial level.
Potential impact of a loss event	Medium–high	Volumes are still high, especially for campaign distributions.
Level of risk	Medium	Potential for large-scale loss and the high risk of a loss event occurring is offset by the low frequency of losses at this point.
Ease of mitigation and mitigation approaches	High	Fairly easy to bypass this level if it is a concern. Keeping ITNs in containers as long as possible as they move through the supply chain reduces risks associated with loading and off-loading during transport. Districts retain containers for other uses afterward. Assessment of stock on a weekly basis before mass campaigns. Insurance should be in place for stores. Practicing standard storage best practices (See *Table 3*)

In campaign distribution, mid-level storage is very common, given the high volumes flowing through the supply chain. These volumes also mean it is often necessary to use *temporary* stores at mid-level. These

include privately hired warehouses. Alternatively, temporary storage may be possible if the delivery containers are retained and security is provided for these.

In CD, with lower ITN numbers and more flexibility over quantities, it is often feasible to omit this level and deliver directly to districts, although many countries still include this level. Lower volumes make it possible to use the existing Ministry of Health (MoH) stores, in many cases.

Low-level stores and storage at distribution points

In mass campaigns, for easy access, a number of distribution points are used to move the ITNs closer to beneficiaries. Some distribution points use smaller health facilities, while others use schools, religious structures, and/or houses of respected community leaders to store ITNs. A massive number of stores are required at this level to support a universal coverage campaign, meaning the quality of stores and supervision is often, inevitably, compromised.

In CD, health facilities store ITNs for distribution at ANC centers and EPI clinics. Because ITNs are not classified in the same way as medicines, often, they are not stored in the health facility pharmacy store—which tends to be well managed—but, instead, in another storage area that may not be so well managed. Schools store their ITNs for at least a day or two before distribution, using storerooms or the head teacher's office, for example. Community-based distributions use a mix of community structures and formal health care delivery service structures; health facilities may act as low-level feeder stores to community-based distribution points, such as community leaders' houses or health posts.

The combination of these multiple low-level structures complicates how the ITNs are managed.

Table 5: Risk Assessment at Low-Level Stores and Distribution Points

Potential types of loss: Theft, fraud, or diversion

Examples:

- Small-scale theft of a few ITNs from bales has occurred with falsified proof of delivery (POD). Theft of whole bales was not reported, perhaps because most distribution points and low-level stores hold only a few bales.
- Diversion has been seen at this level, with personnel manipulating or relaxing eligibility criteria to divert ITNs to non-target groups for personal or political reasons.

Risk Component	Level	Explanation
Potential for a loss event occurring	High	This level appears most prone to leakages for campaigns and CD. Many locations mean a high potential for a loss event, even if such events only occur at a small percentage of points. Often insurance coverage is not available for warehousing at this level. Most handlers are contracted temporarily, and, in some cases, do not have a strong contractual agreement with the authorities. Have a low capacity of informal transporters to manage logistics, despite training. Often a lack of efficient oversight, even when a supervisory framework is in place. Local policy makers or leaders can represent an important threat if they see an opportunity to use the ITNs for political purposes. Late arrival of paperwork for tracking (i.e., after the arrival of the ITNs) raises opportunities for fraud when it is completed later.
Frequency of losses experienced	Medium	
Potential impact of a loss event	Low	Very low numbers are involved in each individual loss.
Level of risk	Medium	Largely driven by the very high numbers of low-level stores and distribution points.
Ease of mitigation and mitigation approaches	Medium	Logistics training should be emphasized for both campaign and CD. In campaigns, the current practice is for stand-alone logistics training. Reducing the time ITNs are in storage depends on having a detailed logistics plan in place well in advance of the ITNs' arrival in-country. Most standard storage best practices (*Table 3*). At most distribution points, it may be harder to have two people responsible for ITNs at all times, because one person or volunteer is often the only staff. Similarly, nets stored in community members' houses are, theoretically, accessible to everyone who visits or lives there. Involving the community in accountability as independent observers.

Distribution event

Distribution takes place at different places for different distribution channels.

For mass campaigns, distributions often take place at a central point that several local communities can access, including the site of a health facility, health post, or school, for example. Major points of risks are related to crowd control during community distributions.

Table 6: Risk Assessment of Distribution Events

Potential types of loss: Fraud, theft, and diversion

Examples:

- Small- to medium-scale instances of theft at distribution points by crowds.
- Suspected diversion or theft linked to obvious cases of fraudulent POD.
- Unaccounted-for surpluses (for example, when ITN quantities assigned to a distribution point were more than needed, but no surplus is reported or returned. Surpluses may occur when nets are delivered in rounded up quantities or in intact bales. Fraud may occur during the repositioning of excess nets between distribution points. When ITNs are delivered in discrete pieces, the possibility of counting error unfolds and DPs with surpluses tend to manipulate inventory records.

Risk Component	Level	Explanation
Potential for a loss event occurring, with explanations	Low–medium	Beneficiary numbers may be inflated (*ghosting*) and the surplus stolen. Chaotic arrangements on distribution days during campaigns can provide small-scale opportunities for theft by staff. Crowds at campaign distribution points can be a threat. Any lack of contractual agreement between temporary staff and authorities creates opportunities for theft and/or an inability to follow up loss events. Complete oversight and supervision is impossible at this scale. ITN surpluses resulting from lower than expected uptake provides an opportunity for theft or diversion when the surplus is not returned for re-programming. Failure to return a surplus may be because the supervisors did not return to collect it, or to political issues—the surplus is not returned from the region to the central level. Late arrival of paperwork for tracking (i.e., after the arrival of the ITNs) offers an opportunity for fraud when it is completed after-the-fact.
Frequency of losses experienced	Low–medium	
Potential impact of a loss event	Medium	Opportunities for losses of varying size, with no option for recourse to insurance at this point. Ghosting and large-scale fraud of PODs means sizeable theft is possible.
Level of risk	Medium–high	High numbers of distributions and opportunity for losses on a significantly large scale.
Ease of mitigation and mitigation approaches	Medium–high	Well-planned distributions, including sufficient crowd security during distribution. Ensuring commodity supplies are sufficient to reduce crowd control issues. Ensuring the community understands the allocation system. Detailed plans and timings can help avoid crowd control issues. Involving the community in accountability as independent observers.

For continuous channels, distributions take place during routine activities—for example, as part of an ANC individual or group consultation; at the time of an infant's immunization; or, for school distribution, during class. For channels like this, the risk of crowds disrupting distribution is very low.

Community-based distribution channels have more diversity in how distribution takes place. Often community agents identify beneficiaries, who are then given a coupon to access ITNs from a community distribution point; alternatively, community members who believe they are eligible will visit the community distribution point independently. Occasionally, a community agent will distribute ITNs directly to a household. Distribution in this channel has more variation and, potentially, involves more people, possibly increasing the risk of diversion or fraud.

Stop Malaria Project staff assist government workers with the distribution of Global Fund long-lasting, insecticide-treated mosquito nets in Uganda. © 2012 Kim Burns Case/JHUCCP, Courtesy of Photoshare

Transport network

This document groups all transport stages together in this section for analysis, given the similarity of the issues involved. Some issues, however, that relate only to specific aspects or stages of supply chain transport are discussed.

Countries and partners often contract out transport of ITNs to 3PL providers, as far as possible. At lower levels, smaller volumes mean that transport can be integrated with other health or governmental deliveries, although this is not possible for campaign distributions. *Last mile* transportation for campaigns often includes large numbers of informal transporters, such as local business people or individuals, offering to transport a bale or two by motorbike, bicycle, or on foot. These people may have low literacy and little to no logistics skills, leading to challenges in ensuring adherence to SOPs.

Table 7: Risk Assessment of Transport Stages

Potential types of loss: Theft through fraud

Examples:

- Theft from sealed containers between ports and regional warehouses.
- Proxy deliveries (i.e., cases where the transportation vendor arranges with the receiving officer to deliver to locations other than the actual delivery address). Cases of theft during transportation are often associated with proxy deliveries.

Risk Component	Level	Explanation
Potential for a loss event occurring, with explanations	Medium–high	At a higher level, when bales are still in containers, theft is possible from *sealed* containers by tampering with seals. Opportunity for blame-shifting between transporters and receiving personnel. Collusion and/or bribery between transporters and receiving personnel. Many informal, low-skill transporters are used for last mile delivery during campaigns.
Frequency of losses experienced	Medium	
Potential impact of a loss event	High	May involve high numbers and may be compounded by difficulties accessing insurance coverage if blame shifting between contractors is possible.
Level of risk	Medium–high	Numerous instances of loss are linked to the transport network; some can be large-scale losses.
Ease of mitigation and mitigation approaches	High	Ensuring clear roles and responsibilities are clearly stated in the logistics plan, with an emphasis on hand-over points. Using standardized best practice transport documentation, as much as possible, using waybill formats already in use in the country. Weighing of containers on arrival to verify contents. Making strong contracts with formal transporters, including requirements for delivery in full and requirements for adequate insurance cover. Keeping ITNs in containers for as long as possible as they move through the supply chain (i.e., using containers instead of stores and providing security for the containers). This reduces risks associated with loading and off-loading during transport. Using conveyor personnel to escort each distribution trip, if security is known to be a particular concern. Requesting serial numbering of bales at the time of procurement, and using these during transport documentation. Using GPS to track trucks used by transport companies. Having a clear, detailed, and widely shared logistics/transport plan.

Reverse logistics

Reverse logistics is the process of sending ITNs back up the supply chain; it is, generally, only applicable to campaign distributions. When allocations to a distribution point are more than are needed, the ITNs should

be sent back up the pipeline. Decisions about the use of excess nets varies from country to country and they will have been made during the planning stage. Excess ITNs can be sent only as far as the nearest health facility and included into CD, or they can be sent back to the district, or even regional or central level, for redeployment at a later date.

Reverse logistics should use the same procedures—including documentation—as logistics down the supply chain; but, often due to a lack of planning, training, or funds for this activity, it presents specific risks.

Table 8: Risk Assessment of Reverse Logistics

Potential types of loss: Theft, fraud, or diversion

Examples:

- Most examples are of surplus that is unaccounted for, or loss resulting from a lack of funds to collect surpluses. It is unclear whether these reflect instances of true theft or diversion.

Risk Component	Level	Explanation
Potential for a loss event occurring, with explanations	Medium–high	Some may think that excess ITNs are surplus and more *up for grabs* than ITNs still destined for delivery or beneficiaries, and are, therefore, more likely to be diverted or stolen by personnel involved in the campaign. This feeling may be exacerbated if supervisors fail to remind distribution points about the need to return the ITNs, or if logistics for this has not been discussed or put in place. Oversight of documentation and other procedures may be weaker for reverse logistics, offering more opportunities for theft. Planning for transport for ITNs returning up the supply chain is frequently weak or non-existent. Where planning has been done, the budget may not be sufficient. Planning a reverse logistics budget is very challenging because of the difficulties in predicting surpluses.
Potential types of loss	Theft, fraud, or diversion	Most examples are of surplus that is unaccounted for, or loss resulting from a lack of funds to collect surpluses. It is unclear whether these reflect instances of true theft or diversion.
Frequency of losses experienced	Unclear, unsubstantiated reports only	
Potential impact of a loss event	Low–medium	Will depend on the level of oversupply.
Level of risk	Medium	High potential but limited volumes, though difficult to estimate at this point in the supply chain.
Ease of mitigation and mitigation approaches	Medium	Stressing the importance of accounting for excess nets in the logistics plan, and having a clear reverse logistics plan. Emphasizing reverse logistics in the logistics training. Ensuring clarity around responsibility for reverse logistics. Using all documentation associated with logistics down the pipeline in the same way for reverse logistics (i.e., transport waybills, warehouse stock sheets, inventory control cards, and tally sheets). While budgeting for reverse logistics is difficult, the logistics chapter in the AMP campaign guidelines provides some tips that may help.

Other cross-cutting areas of risk within the supply chain

Up to this point, the *Risk Assessment* section has provided an overview of supply chain risk at different stages. In this sub-section, other, more cross-cutting aspects of the supply chain are briefly discussed. While they have been mentioned at different stages in the supply chain risk assessment, they are worth revisiting here as general points.

Personnel: People perpetrate theft, fraud, and diversion. The people involved in managing and implementing the supply chain are, therefore, central to an assessment of risk. In general, the fewer people involved in implementing the supply chain, the lower the risk of theft. However, at times, having more people involved can be beneficial—for example, requiring two people to access a store—one with a door key, one with a padlock key—or to certify stock or movement documents.

Skilled logistics personnel are required at each level of the supply chain to ensure competent completion of storage and transport tasks, including adhering to SOPs and maintaining accurate paperwork. It is, however, very common for trained logistics personnel to be involved at only a few points in the supply chain, with the bulk of supply chain tasks undertaken by personnel who have received, at most, one or two days of training; and, more often, no training.

In addition to logistics, good accountability also requires other skills during the planning and management of distribution. For example, program management teams will need the support of administrators who can undertake sound, transparent selection of 3PL providers and develop robust contracts with them, and who can keep other government personnel accountable.

Complexity of the supply chain: In general, the fewer contacts in the supply chain, the lower the risk—for example, a small number of storage points is safer than a long network of multiple storage sites.

Level of integration into other government structures or existing programs: Integration into existing structures brings important opportunities for streamlining; cost savings; and, possibly, improved sustainability, but it may also bring challenges. How important these challenges are will depend on the level of integration. While clear, robust contracts with 3PL providers are an important way to mitigate risk, they are less straightforward to implement when supply chain tasks are undertaken within existing government systems. Options are, however, available to use some form of formalized agreement, and to ensure insurance coverage is in place.

Current Practices and Recommendations

This section presents approaches used and recommended by partners to prevent, identify, and mitigate the impact of fraud, theft, and diversion of ITNs.

The following general recommendations apply to both campaign and continuous distributions. Specific recommendations for different channels are included when there is substantial variation in implementing these recommendations between channels.

Prevention

Preventing all instances of fraud, diversion, and theft can be difficult. ITN distributions occur in areas with weak health systems where fraud and theft may be common problems. Widespread strengthening of health systems, procurement, and supply chains will go a long way toward preventing these issues, but this requires long-term, incremental change. Meanwhile, national malaria control programs and implementing partners should use practical steps at each stage to prevent loss events.

Planning

During the last 15 years, ITN distributions have increased in scope, variety, and complexity. Campaigns have shifted from targeted populations to universal campaigns, while the number of potential CD channels have increased. Early and complete planning can help ensure that distribution targets are met and accounted for.

Recommendations

1. Conduct a risk assessment of the ITN supply chain. Use standard risk assessment tools to guide the process, but emphasize a review of the specific country context and ITN distribution channel (See *Annex B* for an example from Sierra Leone). The risk assessment should inform the logistics plan, and revisit as the plan develops.
2. Conduct an assessment of selected storage facilities after the initial high-level decisions about the storage network has been made. It will inform the logistics plan and, in doing so, help ensure that sufficient high-quality storage is available in each district.
3. Ensure that supplies for trainings and sensitization and—critically—documentation for tracking ITN flow is available well before the ITNs arrive in-country. It is equally important to have the following in

CCP staff observe storage conditions at the national warehouse in Dar es Salaam, Tanzania. © 2016 Claire Gillum, Courtesy of Photoshare

place in advance of the ITN arrival: padlocks for stores/containers; torches and batteries for night guards; pallets for appropriate stacking; stacking guides for store keepers; and transparent sacks for trash, particularly during campaign distribution days; etc. Continuous distribution supplies include net coupons, ITN distribution forms, and HMIS forms (if applicable, as may be the case for health facility-based distribution)

4. Undertake the contracting of 3PL providers after the storage and transport network is planned. Review the contracts with the 3PL providers to ensure they are aware of the conditions. See *Mitigation* for suggestions on what to include in 3PL contracts.
5. Put formal agreements of responsibility in place if public-sector personnel are involved in the distribution (common examples include public-sector employees in charge of regional or district stores, or health-facility distribution points).

In some settings where partners have experienced serious incidents of fraud or theft in government channels, the decision has been made to bypass all governmental channels and build separate supply chains through a **parallel system** known to have stronger internal controls. (Note that not all uses of parallel systems were because of concerns around government corruption or lack of internal controls.)

Personnel

ITNs are not as tightly classified as drugs, which means they are handled by people who are often less skilled/trained than those who handle medicines. Trained stores staff may be involved at the higher levels with a limited number of stores; however, lower-level storage points and final distribution points are often manned by community volunteers who cannot be expected to be held to the same standards as professional logisticians.

Recommendations:

1. Emphasize selecting personnel with logistics training for selections, if these people are available. Those with skills in drug supply chain management and stock management are preferred; at lower levels, good literacy is important.
2. Clearly define roles and responsibilities to reduce the possibility of blame shifting when responsibilities are unclear. This is particularly important at the point of handover of ITNs at different stages in the supply chain.
3. Conduct personnel selection and training in advance of distribution, but no earlier than 1–2 months prior to the start.

Training

Training is seen as key to preventing theft, fraud, and diversion. Logistics is considered the single most important aspect of training; it is important for campaign personnel to have more intense training in logistics. This is because many of the tasks they are expected to do would ideally be undertaken by skilled logisticians, and few such people are actually involved.

Recommendations:

1. Provide in-depth logistics training. In campaign distributions supported by the International Federation of Red Cross and Red Crescent Societies (IFRC), logistics training is now held separately, with all other aspects of the campaign being combined in an overarching training. Continuous distribution trainings, on the other hand, tend to hold one training with a large emphasis on logistics and documentation.
2. Logistics training should include—
    - Discussion of the importance of, and approaches to, preventing, identifying, and mitigating the impact of theft, fraud, and diversion

- Emphasis on the importance of dedicating time to supply chain management, documentation, reconciliation of data, and cross-checking
- The schedule for monitoring and supervision
- Practical sessions with tracking and documentation tools
- Discussion on how to troubleshoot situations (for example, when a distribution team forgets to obtain signatures from some recipients, or materials are not available at the ANC to record distribution, or space on a tally sheet runs out)
- Brainstorming/experience sharing sessions to allow open discussions of problems, pressures, practices, and opportunities for dealing with these (shared experiences might include being pressured by local politicians to divert ITNs, dealing with crowd pressure, and dealing with instances of colleagues suggesting improper activities)
- Processes involved in reverse logistics.

3. A number of processes and tools are used to attempt to verify deliveries or identify losses (see *Identifying fraud, theft, and diversion*). Making these plans clear during training and supervision is important in discouraging attempts at theft, fraud, or diversion.

Quantification and resupply

Partners report that accurate quantification of need is important to help prevent loss, theft, and diversion. If not enough ITNs are available to meet the need, lower- and community-level theft may be more likely. With an oversupply of ITNs, two problems are foreseen: increased likelihood of direct theft; and increased likelihood of theft or diversion of the excess, instead of returning to the regional or central stores for re-distribution.

To ensure accurate quantifications during campaigns, the general practice is to first conduct a macro-level quantification, then a micro-level quantification supported by detailed community-level data, perhaps through house-to-house census taking/registration. This information informs distribution planning; however, micro-level data may not be available at the time of procurement. If shipping agents are contracted to deliver ITNs down to a mid-level, then macro-quantification is often relied on to inform the distribution plan to that point, with micro-quantification used later to inform lower-level distribution. To ease this process, partners usually include a buffer at mid-level to avoid redistributing between the mid-level stores.

Recommendations:

1. Validate the micro-quantification data. School distributions use student registers to quantify the number of nets to be delivered to schools. To validate this data, compare the number of students from the previous year's ascending classes. Similarly, for campaigns, validate registration data by comparing other sources of community data, such as mapping conducted by other organizations or government personnel for providing certain services.
2. For health facility distributions, quantifications will be more accurate if eligibility is tied to a specific service. It is easier to identify fraud, theft, and diversion, for example, if nets were supposed to be distributed only to children receiving the measles vaccine, instead of all children under five years of age.
3. For health facility and community-based distributions, general practice is that resupply amounts are based on the numbers of nets actually issued rather than a pre-allocated amount.

Storage and Transport

Nets are most frequently lost during transport and during low-level storage, although the loss of nets at the transport stage has the greatest potential impact. Fortunately, there are feasible mitigation approaches for all stages.

Transport Recommendations:

1. Develop a detailed transport plan as part of the overall logistics plan, including details of partners, contractors, distances, routes, and timelines. Do it well enough in advance to allow contracting of transport to be undertaken and contingency plans to be explored in case appropriate contractors cannot be identified. The storage and transport network should have the minimum number of contact points.
2. Ensure that the partners use robust contracts with 3PL providers that clearly specify which SOPs must be followed, timelines to meet, and how to account for all ITNs. This includes the appropriate completion of all paperwork. Contracts should detail the financial consequences if all ITNs are not accounted for.
3. Consider asking the international agencies contracted to ship the ITNs to transport them down to mid-level distribution points. This reduces the number of companies involved in the supply chain and simplifies the transport and supply chain management process. This can result in decreased costs due to the use of more direct transport routes. However, additional costs can be incurred when storage containers are purchased to transport and store nets at the mid-level distribution points. A detailed logistics plan to be submitted with the ITN order so appropriate cost estimates can be made. This plan should be based on previous ITN distribution experiences and specify route feasibility and the availability of appropriate storage.
4. Identify minimum standards for selecting criteria for transporters. This may be feasible only for transport to the regional- or district-level; in many cases, partners find it necessary to lower standards for transport during campaigns, when a vast number of *last mile* transporters are required at the end of the supply chain. It is usually possible, however, to avoid using informal transporters for CD supply chains.
5. Carefully plan delivery schedules. Build in buffers, especially for hard-to-reach areas. Deliver nets during the daytime and the hours when staff are in attendance and available to receive goods.
6. Stakeholders must carefully coordinate the arrival, clearance, and onward transport of ITNs to avoid undue delays and leakages. Alert all storage and distribution points of the quantity of ITNs they should expect to receive.
7. In places known to be at high risk for tampering with container contents, engage security personnel as escorts for consignments moving from the port to mid-level stores.
8. Budget for reverse logistics and manage them as carefully as logistics down the ITN supply chain. This is an important area of risk for the loss of ITNs; emphasize this during planning, training, and implementation.

Packaging Recommendations

1. In procurement contracts, include the request that bales of ITNs be serially tagged, based on total number of bales expected per container. For example, for a container carrying 750 bales, each bale carries a serial number between 1 and 750 (1 of 750, 2 of 750, etc.). Clarify this during training, because after the container loads are divided, these labels lose their meaning and may cause confusion. Where possible, add bar codes for each bale in the procurement contracts.
2. Keep the bales in containers, as much as possible; also, keep ITNs in bales as far down the chain as possible.

Storage Recommendations

1. Include a detailed storage plan as part of the overall logistics plan. It should describe the quantities, volumes required, access issues around dates and times, security levels required, etc. It should be informed by storage assessments and developed sufficiently well in advance of consignment arrival to allow contracting of private storage and refurbishment of existing storage spaces.

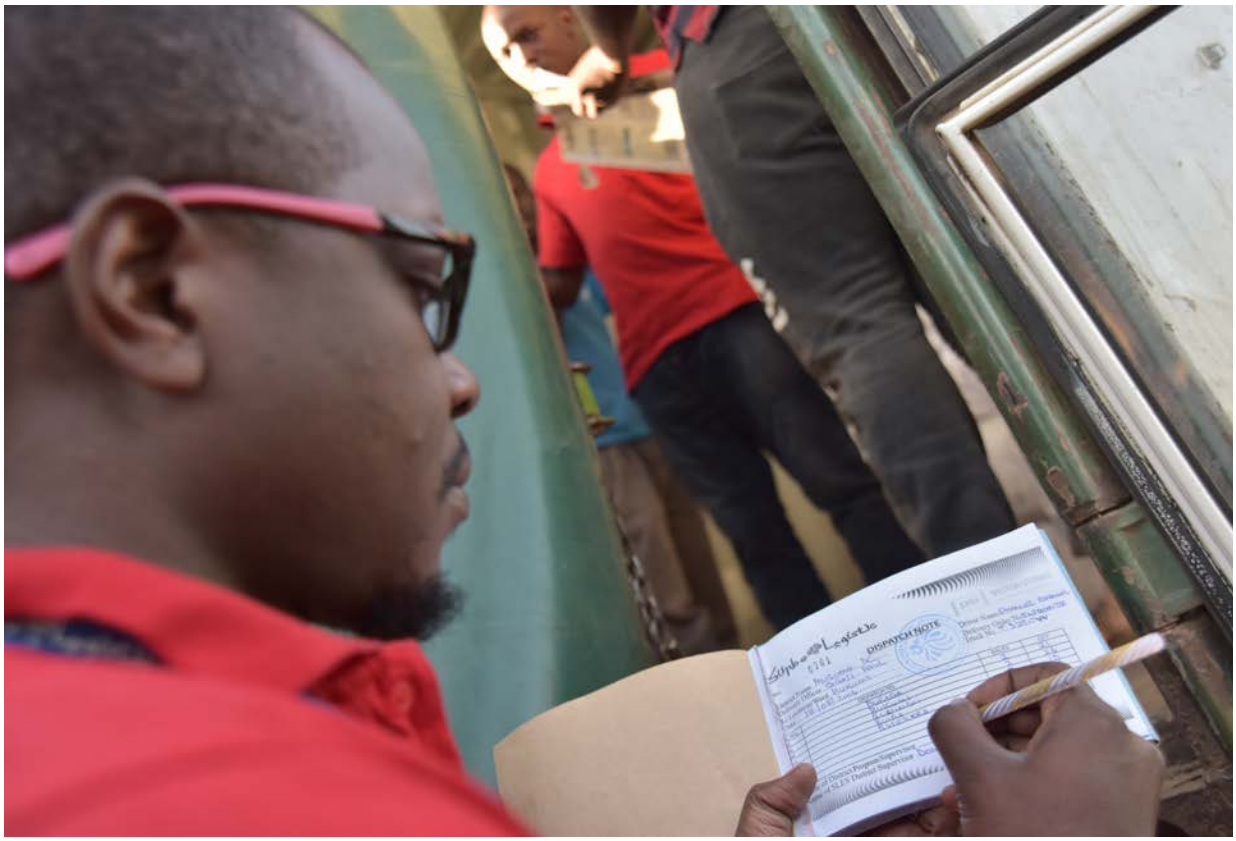
2. Conduct warehouse assessments well ahead of deliveries. The assessments should assess whether storage space and conditions are adequate and whether good warehousing practices are used.
3. When nets are in stores, put several measures in place:
    - Restrict access for unauthorized personnel, particularly during loading and offloading.
    - Engage additional security personnel if the existing warehouse security is considered insufficient.
    - Use a two-key system: two keys, held by different people, are required to enter the warehouse.
    - Use alarm security and video surveillance at all times; this is most common at the central level stores, because the mid-level and below, generally, cannot affordable it.
    - Do not allow personnel entering stores to carry personal bags; ensure that all trash bags are transparent.
    - Use proper systematic bale stacking to facilitate rapid inventories (frequency of inventories should be county specific and should align with the monitoring and support supervision exercises).
    - Plan deliveries and onward transport so that storage times are as short as possible.
    - Use counters to ensure accurate bale count, while ITNs are loaded and offloaded.

Supervision

Supervision supports adherence to SOPs; but it is expensive. The appropriate level of supervision—that is, where the cost/benefit ratio shifts from positive to negative—is rarely agreed on. This will, of course, be different in different settings, but with the lack of evidence on how useful supervision is, partners find it hard to develop cost-effective supervision plans.

Recommendations:

1. Develop and cost out a supervision schedule. Consider and include types of lower-cost supervision, such as regular phone calls and mobile phone reminders, in supervision plans, as well. Provide supervision as frequently as possible.
2. Whenever possible, integrate supervision for ITN distribution into existing supervision activities and structures. Integration is more common in CD programs.
3. Ensure that SOPs for tools or checklists are adhered to; in particular, they should guide the supervisor to conduct effective visual stock checks and documentation review.
4. Supervisors should follow tools and templates to improve the consistency and rigor of supervision visits. Include these tools in the SOPs and include hands-on practice with these tools in trainings.
5. Engage community groups and community leaders in common oversight as a helpful risk prevention measure.
6. Use process evaluations to determine which elements are most useful for improving the quality of supervision. Consider issues—quality of tools and trainings for supervisors, quality of communication across levels of supervision, best practices used by high-performing supervisors, and frequency of supervision activities—and use them to inform planning for future activities.



Simba logistic staff checks the number of insecticide-treated nets to be delivered for distribution at a school in Musoma district, Tanzania. © 2016 Riccardo Gangale/VectorWorks, Courtesy of Photoshare

Documentation

The integrity of the document trail is essential for demonstrating accountability for ITNs. Inaccurate or incomplete documentation makes it difficult to track the percentage of ITNs that went to their intended destinations.

Recommendations

1. Fill out tracking documents—specifically, waybills, store records, tally counts, and distribution registers—at each point of movement along the supply chain. Simplify the documentation as much as possible and use the existing in-country document formats where feasible (e.g., standard waybills and store cards already in use, inclusion of ITNs in standardized registers, and HMIS reports for routine health facility–based distribution, etc.).
2. Use a standard system to complete the documents and ensure they cannot be misread (such as permitting either a tick or a cross). Include SOPs as part of the trainings.
3. If specialized tracking documents are introduced (such as coupons for community-based distribution), include a plan to resupply the tracking materials. If vouchers or coupons are used to redeem the ITNs, ensure they are difficult to duplicate (for example, security printed or embossed and serialized).
4. Stress the importance of a clear and accurate paper trail during training, supervision, and in contracts and evaluations.
5. Some partners consider greater visibility of information (such as reporting back and publishing reports), as helpful in preventing fraud, diversion, and theft. This is particularly feasible and effective for

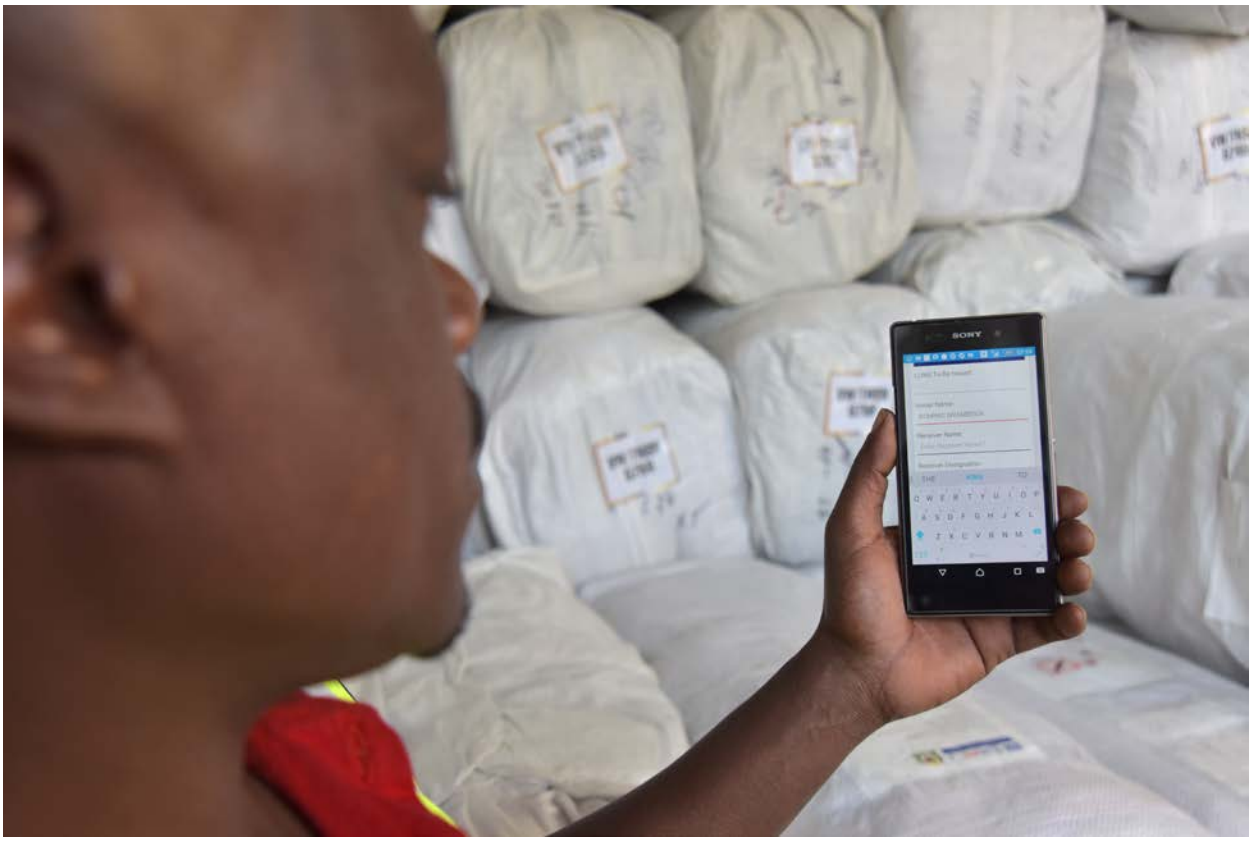
CDs, where the numbers of ITNs received and distributed by health facilities, schools, or community groups can be routinely reported.

6. Wherever possible, consider using electronic methods. Bar code scanners and cell phone reporting systems allow for real-time monitoring and can reduce the reporting burden and ease coordination (see Box 3).
7. Use the same procedures for reverse logistics—including documentation—as for logistics down the supply chain.

Advocacy and Communication

Raising awareness of delivery plans and the purpose of distributions is a way to ensure understanding among stakeholders, leaders, and the community. This can be a deterrent to fraud or theft, as well as a way to identify losses.

In addition, engage political, law enforcement, and community leaders and influence groups at all levels to increase the likelihood that instances of theft or diversion are reported and discouraged.



Dominic Nyamboga from Simba Logistics uses a mobile app on his phone to check the number of bed nets already delivered to a school in Musoma district, Tanzania. © 2016 Riccardo Gangale/VectorWorks, Courtesy of Photoshare

Box 3. Bringing accountability systems into the 21st century

Tanzania's continuous distribution program is using technology to increase accountability for insecticide-treated nets. It is a striking example of how the public sector can partner with the private sector to streamline ITN distributions.

To sustain high levels of ITN coverage, the Tanzania National Malaria Control Program has asked the VectorWorks project to carry out school and health facility-based distribution in 7 of its 10 regions. In these regions, nets are being issued to pregnant women attending ANC services and children receiving a measles vaccine, as well as to selected school classes once a year. The VectorWorks project is led by the Center for Communication Programs (CCP) of the Johns Hopkins Bloomberg School of Public Health, with PSI as a partner supporting logistics. In 2016, VectorWorks will distribute 1.15 million nets through 5,244 schools and 433 health facilities. The project partnered with a transport company, Simba Logistics and Equipment Supplies. This choice enabled the project to streamline coordination, tracking, and reporting.

Simba uses a real-time mobile phone and web-based system to ensure that deliveries are being made to the right locations in the right quantities. When a transporter arrives at the school or health facility, the app checks the location's GPS coordinates to ensure it is at the right delivery site. The mobile app then informs the transporter how many nets they should deliver. The transporter keys in the quantities delivered and the name and contacts of the receiving personnel. This information is automatically sent to a central, cloud-based database, which VectorWorks and Simba staff can use to monitor deliveries in real-time.

Working with Simba has also reduced the amount of time that government and VectorWorks staff spend on coordinating deliveries. The computerized system automatically sends pre-delivery short message service (SMS) messages to Ward Education Coordinators (WECs) (who supervise two to six schools in each ward) notifying them when the nets will arrive, how many each school will receive them, and asks for someone to be available to receive and sign off for them at a specific time. The WECs are then responsible for communicating these notifications to the heads of schools. Similarly, upon completion of delivery, the system sends automatic post-delivery SMS messages to the WECs and calls the head teachers to confirm receipt.

The system sends similar pre- and post-delivery notifications to health facility in-charges when delivering nets. As a final check, Simba staff call the facility's in-charge immediately after a delivery has been made to confirm whether they received nets, how many were received, and what challenges, if any, they had.

Simba's electronic monitoring system has not replaced paper forms. The government still requires physical documents so Simba collects signatures on proof-of-delivery forms, goods received notes, loading tally sheets, and dispatch notes. After receipt and review of these forms, VectorWorks staff download delivery data from the electronic database into Excel, compare the numbers of nets allocated to the amounts delivered, then authorize the payment for Simba's invoices. This apparent "limitation" could be viewed as an opportunity to check against electronic forms and increase the confidence in an electronic system and inform decisions to move away from paper-based systems.

Regardless of this limitation, VectorWorks Tanzania's partnership with Simba Logistics demonstrates how well the public and private sector can work together and use technology to streamline operations, decrease staff burden, and ensure timely documentation and accountability for nets. Other countries should consult private logistics companies to determine if electronic monitoring systems are available in their areas.

Identification

Despite efforts by public health donors and governments to improve and strengthen supply chain systems, theft or diversion still occurs when ITNs are distributed. Identifying these instances is important to refine approaches and allow accurate reporting on the impact of public health funds.

Some instances of loss are easy to identify: clear cases of theft may be reported at the time, or ITNs intended to be free of cost may be found for sale in commercial markets. However, at times, possible indicators of fraud are harder to confirm. For example, paperwork errors may be uncovered; these might indicate fraudulent activity— falsifying proof of delivery to cover up theft, for example—but might, also, reflect genuine mistakes or poor practice. Interviewees report many examples of seemingly fraudulent or suspicious paperwork that might, instead, result from a poor understanding of forms; problems completing forms due to low literacy; beneficiaries being reluctant to sign; a forgotten registration form (particularly during routine health facility work); and forms being back-filled with *signatures* or thumb prints. None of these examples are good practice, but they are not because ITNs were stolen. In these examples, paperwork may *suggest* a theft occurred, but the ITNs may, in fact, have reached the beneficiaries.

Another problem with identifying instances of theft, fraud, and diversion are the weak systems that are often in place. Weaknesses and differences between areas or countries also mean it can be difficult to understand the scale of the problem in any one place. There are a number of possibilities in terms of how much theft, loss, or diversion may be detected and how this relates to the true scale of what is actually occurring:

- No loss is detected and no loss is occurring.
- No loss is detected, but loss is occurring at a small or large scale.
- Loss is detected, but it does not reflect the true scale of the loss occurring.
- Loss is detected, but reflects mistakes or bad practice in recordkeeping, rather than true loss.

This also means that those countries reporting many loss events may, in reality, have no more loss than countries reporting few; they may simply have more robust reporting systems.

Current practices and recommendations around identification of theft, fraud, and diversion include (a) check the document trail, (b) visually verify, and (c) evaluate and audit.

Checking the document trail

One approach commonly used to detect theft, fraud, or diversion is verifying that quantities on the distribution plan align with waybills; that waybills align with stock records; and that proof of distribution documentation aligns with summaries of distribution.

Checking is done at different points in time, as summarized in Table 10:

Table 9: Time Points for Documentation Checks

Time Points for Documentation Checks	ITN Distribution Channel	
	Campaigns	Continuous
During monitoring and supervision visits, when supervisors check records at storage sites and distribution points	√	√
At intervals, often monthly or quarterly, when standard reports are transmitted to higher levels		√
After distribution events, when all documentation from the paper trail can be compiled for review*	√	√
When electronic, real-time monitoring systems are available, checking can be done throughout the transportation phase, as transporters submit electronic verifications through cell phones or scanners, or as GPS-tracking verifies the presence of transporters on the agreed-upon routes	√	√

* *For some partners undertaking campaigns, donors require that all POD documentation be reviewed (manually) to confirm that there is POD for the complete quantity of ITNs thought to have been distributed, and that PODs are submitted to the donor. This is a time-consuming exercise and partners report problems with it—for example, with paper documentation being lost or unreadable. The time and effort involved in reviewing POD for every ITN delivered is significant.*

Make several kinds of comparisons during these checks:

- Ensure that documents are complete and not tampered with.
- Compare waybills against expected delivery quantities on receipt of the ITNs; before accepting consignments, follow up by phone with supervisors for any discrepancies.
- Compare tallies of receipts against any waybill discrepancies, discuss with transport staff, and investigate further if the reasons for discrepancies are not satisfactory.
- Compare tallies of stock loaded for transport with distribution plans and with stock cards, and investigate discrepancies.
- Compare the number of eligible beneficiaries to other population data to validate registration or quantification data; similarly, compare the number of nets being distributed to the number of eligible beneficiaries (*Box 4*).
- Compare the number of nets distributed to recipients (registers, voucher stubs, etc.) and then to number of remaining nets with the amount delivered to the distribution point.

Box 4. Monitoring continuous distribution

Compare the number of nets being issued through health facilities to the **expected** and **actual** number of eligible pregnant women and children **over time**, as well as to the numbers of nets in **stock**. During the planning stage, planners from all the relevant ministries and partners should agree on acceptable levels of variances. When the variance exceeds a certain level, supervisors should be mandated to investigate. This kind of monitoring is easier in places where the health and logistics management information systems are actively being used and where efforts are underway to improve or maintain data quality.

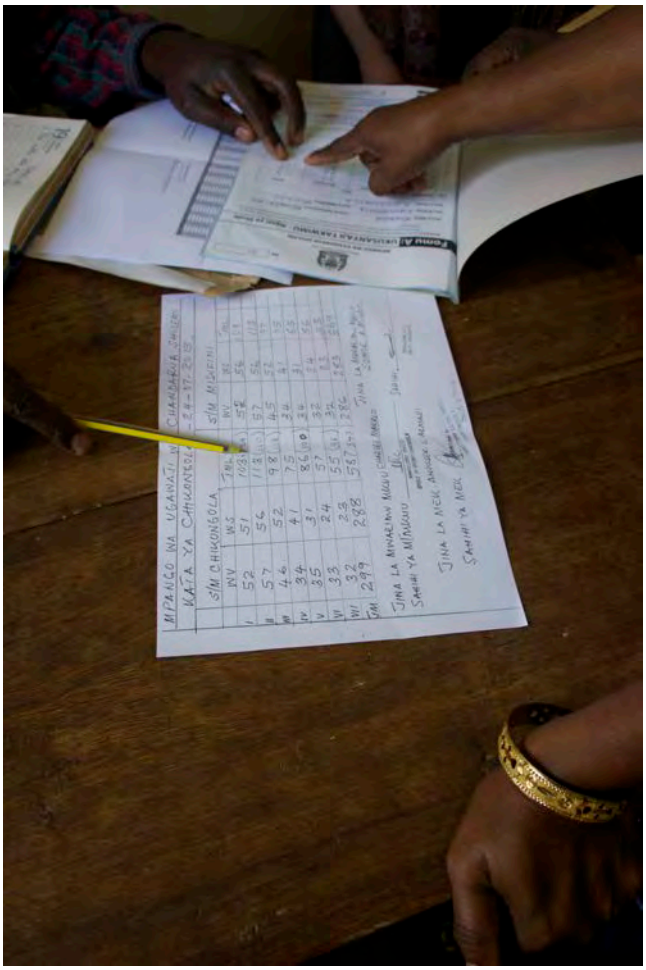
Below are examples of comparisons that can be made with this data, and the actions supervisors should consider:

- More nets are reported distributed than reported eligible beneficiaries—assess for the possibility of theft or diversion, or poor recordkeeping.
- More beneficiaries are reported than there are nets distributed—assess health workers' understanding of the eligibility criteria; confirm if the expected number of nets are in stock.
- The numbers of actual and reported eligible beneficiaries and nets distributed dramatically increase over time—assess for changes in the eligibility criteria (or health workers' understanding of the eligibility criteria), tampering with the data, and theft and diversion. If available, review MOH data to determine if there has been a massive adjustment to the expected number of pregnancies in the population, or check population data to see if there has been a major influx of new residents (such as in a refugee crisis).

Discrepancies identified during any of these checks are either ignored or followed up for further investigation. The decision to follow up is made case-by-case and depends on a many factors, including, but not limited to, the place the problem is identified, partner involved, donor involved, setting, practical logistics, cost of investigation, and scale of suspected loss.

Factors that tend to lead to follow up are listed below. They often appear to be driven by practical factors.

- The discrepancy is detected during a supervision visit, so the supervisor can directly investigate it on-site. Investigations are done via discussion with personnel responsible for the paperwork, their supervisors, and—in the case of health facility distribution where ITN distribution is a regular event—clients on-site. Such responsive, on-site investigations have often discovered that the suspicious paperwork is, in fact, the result of poor training or poor practice, no further action is taken, and minimal or no real loss is assumed. If the supervisor suspects true fraud, theft, or diversion, further action is taken (see *Current Guidance Documents*).
- The discrepancy involves large quantities. What is considered a *large* quantity varies, but commonly losses of more than 500 ITNs are followed up.
- The discrepancy is higher up the supply chain and, therefore, easier to investigate.
- The partner has a high expectation of being able to mitigate the potential loss—for example, if the discrepancy is the responsibility of a contractor with whom the partner has a clear and sound contract, rather than an informal transporter with whom the partner has little means of redress; or if the discrepancy happens in an area where the partner has faith in the responsiveness and effectiveness of local law enforcement.



Data is cross-checked between program documents at a school net distribution in Mtwara, Tanzania. © 2015 Claire Gillum, Courtesy of Photoshare

Visual verification

- Visual spot checks of ITNs in storage facilities are often carried out as part of supervision visits to storage sites. They have been useful in identifying discrepancies in actual versus expected stock quantities. They can be carried out quickly, even for very large stock quantities if bales are stacked following best practice procedures. However, such visual verifications can be difficult or impossible if good stacking practice is not followed; and, in these situations, theft may be more likely. Partners, therefore, report some limitations in the usefulness of this approach in some settings. Spot checks can also only happen if a small percentage of the stores are being used.
- USAID | DELIVER PROJECT's Logistics Handbook (listed in Annex A) stock status assessment section has been a useful tool for some partners when conducting stock assessments of ITNs at the central (and lower) levels. It can be useful to guide assessment of stock availability against an understanding of needs and helps to predict stockouts and inform resupply planning. It can also

highlight unexpectedly low stock levels, which may indicate a need for an investigation into potential losses.

Evaluations and audits

- Commodity Management Audit (CMA). These identify any issues with accountability or transparency of an ITN distribution. Instances of theft, fraud, or diversion are likely to be detected. The findings of the CMA can be used as a tool to inform redesign of systems and practices to improve accountability. It is recommended that CMAs be implemented at least two weeks after a mass campaign has taken place, but they could also be used to review CD. A CMA examines whether—
  - Standard and adequate tools are used to properly track ITNs; the operation is based on the SOPs.
  - A clear and complete audit trail from the manufacturer to the beneficiary is available for the ITNs; this includes a scrutiny of the paper trail documenting transport of the ITNs throughout the supply chain.
  - Correct filing and reporting of supply chain documents is carried out.
  - Logistics and distribution reports include accurate figures supported by proper tracking documents.
  - Detailed and consolidated logistics and distribution reports exist in sufficient quantity and quality to provide full accountability and transparency for the distributions.

  If the CMA finds that distribution reports are complete (they cover all distribution points) and reliable (they are supported by corresponding waybills, stock sheets, and tally sheets), it may conclude that these reports effectively and truly reflect the results achieved in the campaign.

  A CMA is also expected to answer the following accountability questions:

  - How many ITNs were received and distributed for campaigns?
  - How many of the ITNs reached the targeted beneficiaries?
  - How many ITNs are unaccounted for during the campaign?
  - How many ITNs should be left?
  - How many ITNs should be left, but are unaccounted for, after the campaign?
  - How many ITNs are going to be transferred to other ITN distribution channels?

- Net tracking surveys are commonly conducted following ITN distributions, and they have been conducted for school distribution. These follow a small sample of ITNs that were recorded as delivered back to the beneficiaries to confirm that they have, in fact, been received. This helps detect the use of ghost beneficiaries in ITN registration forms. Net tracking surveys are, however, usually conducted in only a few sites and, therefore, may not detect fraud or theft that occurred somewhere else. Some informal net tracking can be done during monitoring visits, when supervisors build in some time to track a small number of ITNs during their routine visits to facilities, community distribution agents, schools, and other distribution points. However, this can raise supervision costs.
- PMI's *End-Use verification (EUV) survey* is commonly used to assess the availability of malaria case management commodities at health facilities, but it can be adapted to include ITNs when ITNs are distributed through health facilities. This has a wider purpose than just detecting potential losses. The survey examines the availability of malaria commodities to beneficiaries. Causes of stock-outs, such as quantification, procurement, and logistics, are discussed. Activities include gathering information similar to that required for an audit, reviewing documentation, and examining adherence to SOPs at the distribution point (including storage, accountability, and reporting). This

tool may help detect losses at the lowest levels. However, the method of sampling is not necessarily representative or random, and thus not generalizable to all health facilities.

- Audits by the OIG of major donors or governments. They can be conducted reactively if there are concerns about a specific program; they can happen randomly or on a predetermined cycle. For some donors, countries undertaking ITN mass campaigns will be flagged for an OIG audit during that year because of the financial scale of the activities. OIG audits are conducted by bodies completely independent of distribution. They examine overall accountability and transparency from procurement to delivery; look at document trails and conduct visual audits. Some features of a commodity management audit (described below) are also included in an OIG audit, but the OIG exercises go beyond the scope of a CMA. The reports of OIG audits are publicly available on the appropriate donor's OIG website.

Mitigation

Partners and donors have a number of responses to fraud, theft, and diversion. For example, steps taken by implementing partners include conducting an internal investigation, taking disciplinary action (if staff or subcontractor's staffs are involved), notifying the donor promptly, submitting an incident report to the donor, and filing a police report. An effort is then made to replace the lost nets, either through the insurance company or by the responsible contractor, if identified. For example, USAID's responses are tailored to the particular circumstances of the events in the country in question. USAID's standard follow-up response is to inform the OIG/Investigations and engage the State Department of the country in question, to address problems through appropriate diplomatic channels. USAID OIG works closely with local government and law enforcement in investigating and prosecuting cases of theft and fraud. Similarly, the Global Fund respond on a case by case basis to instance of fraud, theft or diversion, the scale of the event will determine the response which may range from supporting local disciplinary processes, to engaging with the police or brining in the Global Fund OIG to investigate more thoroughly and provide recommendations. These recommendations can sometimes extend to halting grant disbursements until measures are put in place to reduce the likelihood of repeat instances.

To mitigate the impact of loss events, partners currently practice and recommend the following:

1. Use 3PL providers to transport nets and transfer liability for possible losses, diversion, or theft. Contracts with 3PL providers should—

    - Be legally binding
    - Commit 3PL providers to an appropriate level of insurance cover
    - Make it clear that payment will be withheld if the exact required number of commodities cannot be accounted for at any time
    - Be reviewed with 3PL providers on signing
    - Cover both transport and storage providers.

    Many countries follow international best practices when selecting and engaging 3PL providers, but there are weaknesses. Some partners put strong, detailed contracts with 3PL providers in place that include financial penalties if ITNs are not delivered in full; others have less robust contracts that miss opportunities to mitigate the impact of a potential loss. One area of weakness in both the selection processes and contracting covers conditions for 3PL providers that subcontract activities to local warehouse/transport personnel who constitute a major risk to the ITN pipeline.

2. Use insurance companies to mitigate loss.

3. Build partnerships, perhaps even formal task forces, at key levels, including with—

- Security agencies, such as the army and the police, where appropriate, to support a rapid investigation of instances of fraud or theft and increase the likelihood that any stolen goods will be recovered.
- With the community—including civil society or youth groups—to promote early reporting of thefts and facilitate identification of culprits and return of any stolen ITNs.

4. Review experiences at least annually, or as appropriate, in line with the planning and implementation cycle; and use to refine the logistics plan and other policies, systems, and practices involved in the ITN supply chain. Some partners have been able to adapt systems as a result of these reviews. Examples include bypassing central storage in contexts where risks at this level have proven too high or expensive to manage; moving to a requirement for a two-key system to access stores; raising the level of insurance coverage required by 3PL providers; and expanding the length and detail of logistics training, making it separate from other trainings. Some partners report, however, that events of theft or diversion sometimes lead to little change, with opportunities for improvement ignored or lost.

Current Guidance Documents

Overview

A number of documents and tools are available to guide planners in ITN supply chain management. Many of these include specific guidance on preventing and mitigating fraud, theft, and diversion. Best practice guides for malaria or health commodities are also available. While ITNs supply chains need to be tailored to the bulky and high-value nature of ITNs, much of the guidance regarding supply chain management of other health products can also be applied to ITNs.

Table 11 summarizes the types of available guidance. Some guidance is for risk assessments, although it would have to be adapted to ITNs. Available documents on supply chain management of health commodities, including ITNs, amply cover practices that can prevent loss incidents. However, little to no guidance is available on how to analyze and interpret monitoring data, or other tracking documents, to identify potentially significant incidents of fraud, theft, or diversion in real-time (during supervision visits or routine submission and collation of waybills). Some scattered guidance is also available on mitigating the impact of loss.

Table 10. Types of Guidance Documents Available

Topic	Available	Key Sources
Prevention: Risk assessments	No	Can be inferred/adapted based on this report and/or the Chartered Institute of Management Accounts report
Prevention: Supply chain management of malaria or health commodities	Yes	USAID | DELIVER PROJECT, various documents (see below)
Prevention: Supply chain management of ITNs distributed through mass campaigns	Yes	Alliance for Malaria Prevention Toolkit
Prevention: Supply chain management of ITNs distributed through CD	Yes	VectorWorks *Continuous Distribution Toolkit*
Identification of fraud, theft, or diversion	Some	No guidance on how to analyze or interpret documentation during supervision visits or collation of delivery/storage reports. Some guidance is available for post-distribution assessments.
Investigating instances of fraud, theft, or diversion	No	No specific guidance; countries and partners have their own approaches. Audits or documentation review are a form of investigation and are described in the Current Practices section.
Mitigation	Some	Several references in the *Alliance for Malaria Prevention Toolkit*

Guidance on risk assessments

No guidance is available on risk mapping and assessment of ITN-specific supply chains.

While it is not a public health-specific guide, the International Chartered Institute of Management Accounts *Fraud Risk Management: A Guide to Good Practice*, includes an excellent section on Risk Assessments. This could be extracted as a tool to guide country malaria control programs and their partners in developing risk assessments and *risk response strategies*. Specific contextual factors that need to considered include—

- Donors with a low tolerance to risk
- The extent to which one can avoid that risk by opting for another commodity
- The extent to which strong supply chain management practices can be maintained
- The ability to rely on insurance coverage, at some points, in the supply chain.

Guidance on preventing theft, fraud, and diversion

Broad general guidance documents are available for health commodities and CD, and detailed guidance exists for campaign distribution of ITNs. SOPs should be tailored to the setting and delivery channel.

ITN-specific

- *AMP campaign distribution toolkit*

  The AMP toolkit focuses on ITN campaigns. It includes a detailed chapter on logistics with a focus on developing a strong logistics plan. All the recommendations would support better prevention of theft, fraud, or diversion, and many of them are applicable to CD. The chapter includes—

  - Key logistics recommendations covering early planning, training, the campaign, and post-campaign activities
  - Guidance for conducting logistics training, including guidance for format and content
  - Guidance on developing a logistics plan of action
  - Guidance managing the supply chain, including details on appropriate documentation and various other recommendations (templates provided)
  - Guidance on procurement issues, including how to decide whether to plan for centralized or decentralized delivery of ITNs
  - Guidance on reverse logistics planning and management (including how to budget for it)
  - Guidance on warehouse assessment (including a sample guide to warehouse assessment)
  - Guidance on risk mitigation planning (including sample risk mitigation documents).

- *VectorWorks Continuous Distribution Toolkit*, available at: http://www.continuousdistribution.org/.

  The USAID/PMI VectorWorks project compiled a toolkit to support the planning and implementation of continuous ITN distributions. Broad guidance is available in quantification, transport, storage, and accountability and supervision. Examples of tools used in the field are provided.

General health or malaria-specific, but not ITN-specific

- *The Logistics Handbook: A Practical Guide for the Supply Chain Management of Health Commodities*. USAID | DELIVER PROJECT (2011), available at: http://deliver.jsi.com/dlvr_content/resources/allpubs/guidelines/LogiHand.pdf.

  This excellent handbook provides practical step-by-step guidance, although much of it is more relevant to supply chains for medicine. The most relevant sections are—

  - Section 2, which gives details on the documents and tools required in a strong logistics management information system
  - Section 8, which gives standard best practice guidance around planning and establishing solid storage and distribution networks that limit the risk of theft and fraud activities.
  - Section 9, which gives guidance on monitoring and evaluation, detailing a number of best practice approaches that help detect theft, fraud, or diversion (see below).

- *Guidelines for Managing the Malaria Supply Chain: A Companion to the Logistics Handbook*. USAID | DELIVER PROJECT (2011), available at: http://deliver.jsi.com/dlvr_content/resources/allpubs/guidelines/GuidManaMalariaSC.pdf

  This guideline is a companion to the logistics handbook above, but gives guidance specific to artemisinin-based combination therapy (ACTs) and rapid diagnostic tests (RDTs) for malaria. It explicitly does not include challenges and issues related to ITNs, for the stated rationale that ITNs do not usually flow through the medicines supply chain. Nonetheless, it has some useful tips in the sections starting on pages 45 and 53, where issues around storage and distribution and monitoring and supervision are discussed. Many of the recommendations are relevant to ITN supply chains.

- *Optimizing Supply Chains for Improved Performance*. USAID | DELIVER PROJECT (2014). Available at: http://deliver.jsi.com/dlvr_content/resources/allpubs/logisticsbriefs/OptiSuppChai.pdf.

  This short briefing note offers guidance on techniques to *optimize* supply chains—for example, comparing a range of possible transport routes to examine potential cost or resource efficiencies from alternate plans. This type of assessment and planning approach could equally be applied to designing a storage and distribution network with reduced risk for fraud, theft, and diversion—for example, to create a system with minimal *touch* points, fewer disparate transport carriers, etc.

Guidance on identifying theft, fraud, and diversion events

The guidance documents described above include information on monitoring and supervision that should help detect instances of fraud, theft, and diversion. They generally describe the need to review documentation for inconsistencies, the usefulness of visual spot checks during monitoring and supervision visits, and opportunities for conducting full audits; however, they do not go into much more detail when discussing the detection of theft, fraud, and diversion. This suggests that there is little to no guidance on how to analyze and interpret monitoring data or other tracking documents to identify potentially significant incidents of fraud, theft, or diversion.

Other tools are more specifically useful in detecting loss events following a distribution. These could be used during CD, but they are not designed to provide rapid information to support timely response. These tools include Commodity Management Audits, EUV surveys, post-distribution or net tracking surveys, and donor audits (see *Evaluations and Audits*).

Guidance on investigating suspected theft, fraud or diversion events

Little to no guidance is available on what actions to take when theft or fraud is suspected. Country programs, partners, and donors have different approaches to this (see *Current Practices*) and no standard tools or templates are available to guide investigations.

Audits are sometimes conducted as a response to concerns, and could be considered a way to investigate suspected losses. A number of guides and tools are available for planning audits (see Annex A). Similarly, documentation reviews could be conducted as a type of investigation, but, as mentioned above, there is no guidance on how to analyze data from waybills and other monitoring data.

Guidance on mitigating the impact of theft, fraud, or diversion events

Little to no guidance is available to support partners in mitigating the impact of theft, fraud, or diversion.

The AMP toolkit includes some recommendations that are important in mitigating the impact of potential losses. They are not grouped together; rather, they can be found throughout the toolkit. They include decentralized delivery to ensure that responsibility for any losses remains with a non-country partner up to a sub-central level; and the importance of having strong contracts with 3PL providers that includes insurance cover. Several additional approaches used by partners are described in the *Current Practices* section.

Conclusions and Recommendations

Summary of risks of fraud, theft, and diversion

The risk assessment revealed fairly consistent levels of risk at each stage of the supply chain. Loss events are likely to occur at all levels. Nets are most frequently lost during transport and during low-level storage, although loss of nets at the transport stage has the greatest potential impact. Fortunately, feasible mitigation approaches are available for all stages. High-impact mitigation strategies include (a) early and detailed planning, (b) establishing robust 3PL, transport contracts, and (c) providing sufficient insurance cover during transport and storage.

Table11. Risks at Each Level in the ITN Supply Chain

Supply Chain Point	Potential for Loss Event Occurring	Frequency of Loss Events Seen	Potential Impact of a Single Loss Event	Ease of Mitigation
Central storage	Medium	Low	Medium–high	High
Mid-level storage	High	Low–medium	Medium–high	High
Low-level storage and distribution points	High	Medium	Low	Medium
Distribution event	Low–medium	Low–medium	Medium	Medium–high
Transport stages	Medium–high	Medium	High	High
Reverse logistics	Medium–high	Unclear	Low–medium	Medium

Main strengths and weaknesses in current guidance and current practice

Current Practice

Country programs and partners increasingly emphasize the importance of strong logistics planning and management. The main areas of weakness are ensuring that the best practices reflected in the SOPs are translated into practice during implementation. Some countries have improved performance in this area using better and more formalized monitoring, but monitoring and supervision can only extend so far; it will always have significant gaps in coverage during campaign distributions where activities are widespread. On these occasions, increased political engagement, and wider support and understanding of the process from communities, appears to help maintain a spotlight on activities, even when formal supervisors are not present. Moves to simplify and align implementation, supervision, documentation, and reporting tasks with existing in-country practices or routine systems also appear to have been helpful—particularly in preventing losses—but, also in improving identification and mitigation of the impact of these losses. Harnessing technologies, such as delivery tracking numbers; GPS tracking of transport fleets; and use of handheld devices, such as phones or scanners, to process and send data and notifications, should also be considered.

Systematic efforts to identify theft or diversion have the greatest general weaknesses. Some countries have made progress in this area, primarily by emphasizing supervision and regular documentation review in planning, training, and budgeting; many others fall short.

Mitigating the impact of any loss is an area where clear, good options are linked to strong contracting, insurance coverage, and strong partnerships; but, in practice, donors, multinational implementing

partners, and some country programs are clearly different. Supporting better practice in-country and at lower levels should be fairly easy to do, and it is an important step in mitigating the impact of theft or diversion.

One area of concern to implementers is the time- and resource-intensive requirements around proof of delivery verification following campaigns. Many donors require paper proof of receipt for every ITN. When campaign distributions involve millions of ITNs, the resources required to provide this can be very high. It would be useful to discuss the cost/benefit ratio for this method, including options for streamlining the process.

Current Guidance

Risk assessments to support the development of risk management plans are an important tool, but no detailed guidance on conducting risk assessments specifically for ITN supply chains is available. This report provides some information to support planners in this process, but it is not intended to be a detailed guide or tool.

Many supply chain management guidance documents are available, but many of these are not specific to ITNs. These non-ITN-specific guidance documents contain many useful lessons for planners; but working with them and extracting the relevant guidance may be too inefficient for time-pressed government planners—meaning they are probably of limited practical use.

Some ITN-specific guidance documents exist, most notably the AMP toolkit for campaigns, which includes a wealth of information to guide strong logistics planning. Much of this is applicable to continuous, as well as campaign, distributions. The PMI CD toolkit focuses on overall planning and management, with less detailed logistics information than the AMP toolkit. More detailed guidance on logistics planning for CD would be helpful.

The document review also revealed major gaps in guidance on identifying losses and mitigating their impact. Monitoring of activities and documentation of commodity flow are the main sources of information for detecting losses. Current guidance on these activities, while fairly extensive in terms of how and when these activities should happen, is very limited in terms of how monitoring findings should be interpreted, when and which documentation should be compared, and how the outcomes of these activities should be interpreted and acted on. Partners report determining when an inconsistency or inaccuracy is actually the result of fraud, theft, or diversion as an area of confusion and difficulty, and guidance is not available on how to follow up on these issues or determine whether the cost of investigating is appropriate.

Mitigating the impact of fraud, theft, or diversion within the ITN supply chain is touched on only briefly by current guidance documents, but is an area with a fairly strong consensus on basic good practice.

Recommendations

The recommendations that follow focus on what countries report having worked well, or what they are aiming for. They are divided into measures that would be undertaken at the international level or through multi-country involvement, and those that should inform country planning and implementation.

International

The *Continuous Distribution Toolkit* could be enhanced with more details on logistics and monitoring, including risk mapping and risk management planning, as well as details on storage, transport, supervision, and document review.

The AMP tool kit could be expanded to include more guidance on targeted monitoring, review of tracking documents, and what should raise suspicion of fraudulent activity. The guidance could also consider including Lot Quality Assurance Sampling (LQAS) as a way to strengthen the monitoring framework used in household registration exercises (important opportunities for the listing of *ghost* beneficiaries).

Guidance or generic templates for contracting 3PL providers would be beneficial. Country programs tend to have weaker contracts than donors or some implementing partners. Contracts that specify contractors' liabilities, insurance requirements, *goods in transit* conditions, and penalties for failures to meet terms are pivotal in mitigating the potential impact of losses.

Conducting cost-benefit analyses can help further identify the best practices in the prevention, detection, and mitigation of ITN losses. Such analyses should compare different levels of supervision, different frequencies of monitoring, and different requirements for a visual review of all the PODs from ITN distributions. They should also consider the differences between channels and contexts.

Partners may want to explore technological options that would support lower cost and time inputs for POD within the supply chain and/or at the point of delivery. Adding barcodes to items, or at least bales, has been suggested, as has the use of digital devices to record the receipt of ITNs. Such technologies are used in the supply chains of other commodities, but can present major challenges around cost and maintenance. The benefits and feasibility would vary from country to country and between channels.

Country-Level

Country-level recommendations are described in detail in the *Current Practices* chapter. Recommendations emphasize best practices in supply chain management, including, but not limited to, early and detailed planning, carrying out risk and storage assessments, emphasizing logistics during training, maintaining strong contracts with 3PL providers, minimizing transport and storage points, and ensuring a documentation review and CMAs.

Cost and potential impact of main recommendations

Table 12 summarizes the recommendations described above. It is worth noting that most recommendations take little time, but have a medium to high impact. In-country recommendations that have low costs, but high impact, include strong contracting with 3PL providers, early and detailed planning and budgeting, streamlining documentation requirements, and timely communication with storage points about the number of nets that are due to receive. On the global level, guidance and tools on robust contracting with 3PL providers is needed, as well as guidance on how to analyze documents and monitor data to identify possible losses.

Table 12. Cost and Potential Impact of Main Recommendations

Recommendation	Cost/ Time	Impact	Timeline
International			
Expanding the CD toolkit to include more detail on logistics management, loss investigation, and impact mitigation	Low	Medium	In process
In-depth guidance on interpreting monitoring data and documentation issues to identify and investigate possible losses.	Low	Medium	Short- to medium-term, to allow time for consensus around this (sometimes difficult) issue
Developing tools on contracting with 3PL providers. Contract templates could support stronger contracting of 3PL providers by the MoH or partners to ensure all appropriate requirements, conditions, and penalties are included.	Low	High	Short-term
Performing cost-benefit analysis of various approaches that may help prevent, identify, or mitigate the impact of losses.	Medium	Medium	Medium-term and will have limitations
In-Country			
Remaining responsive and regularly updating the logistics plan.	Low	Medium	Short-, medium-, long-term
Early and detailed planning of distributions.	Low	High	Short-term
Building strong partnerships.	Low	Medium	Short-, medium-, long-term
Developing a budgeted and time-lined logistics action plan that acts as a living document to be updated and used for continuous and campaign distributions.	Low	High	Short-term
Warehouse assessment.	Medium	High	Short-term
Risk assessment.	Low	Med–high	Short-term
Robust contracting of 3PL providers.	Low	High	Short-term
Making formal agreements of responsibility with public sector personnel.	Low	Medium	Short-term
Ensure documentation follows general best practices, is as simple as possible, and aligns with existing in-country tools/templates	Low	High	Short-term
Ensure personnel attend standalone logistics training with practical sessions and guided discussions	High	High	Short- to medium-term
Ensure storage and transport network includes as few steps and contact points as possible	Low	Medium	Short-term
Specify logistics best practices in plans and trainings	Low	Medium	Short-term
Ensure supervision and monitoring follow tools and templates and	High	High	Short- to

Recommendation	Cost/ Time	Impact	Timeline
emphasize adherence to SOPs and review of documentation			medium-term
Inform all stores/distribution points of the numbers of ITNs they should expect to receive	Low	High	Short-term
Undertake visual spot checks of stores as often as possible	High	High	Short- to medium-term
Conduct CMAs within two weeks of a campaign and once annually for CDs	Medium	Medium	Short- to medium-term

Legend: Green indicates a high-value approach (low cost, high impact), orange is medium (mid-cost & medium-level impact), and red indicates higher cost, lower impact approaches.

Annex A. Tools and Resources

General supply chain management

Guidelines for Managing the Malaria Supply Chain: A Companion to the Logistics Handbook. USAID | DELIVER PROJECT (2011). Available at: http://deliver.jsi.com/dlvr_content/resources/allpubs/guidelines/GuidManaMalariaSC.pdf (Accessed: 10.02.16)

The Logistics Handbook: A Practical Guide for the Supply Chain Management of Health Commodities. USAID | /DELIVER PROJECT (2011). Available at: http://deliver.jsi.com/dlvr_content/resources/allpubs/guidelines/LogiHand.pdf (Accessed 10.02.16)

ITN distribution planning and management including tools and templates

AMP Toolkit 2.0 for Campaign Distributions. In particular, Chapter 5: Logistics: Available at: http://allianceformalariaprevention.com/amp-tools/amp-toolkit/

VectorWorks Continuous Distribution Toolkit; contains a wealth of tools and templates. Available at: www.continuousdistribution.org

Risk assessments

Fraud Risk Management: a Guide to Good Practice. Chartered Institute of Management Accounts (2008). Available at: http://www.cimaglobal.com/Documents/ImportedDocuments/cid_techguide_fraud_risk_management_feb09.pdf.pdf. (Accessed on: 10.02.16)

Risk Mitigation Framework. Sierra Leone National Malaria Control Program and Alliance for Malaria Prevention (2014). Available at https://www.dropbox.com/s/0j75eomqt3vewsf/Risk%20Mitigation%20Framework%20_March%202014.xlsx?dl=0 (Accessed on: 31.01.16)

Commodity Management Audit

The protocol and data collection tools are currently being revised but are available upon request. A sample report for a mass campaign is available at: http://allianceformalariaprevention.com/wp-content/uploads/2015/10/CMA-Report-Nasarawa-2jun15.pdf

Annex B. Documents Reviewed

AMP toolkit 2.0 for campaign distributions. AMP (2012). Available at: http://allianceformalariaprevention.com/amp-tools/amp-toolkit/ (Accessed on: 15.01.16)

Approach and Steps to Counter Theft and Diversion of Medicines. U.S. President's Malaria Initiative (PMI) (No Date). Available at: http://www.pmi.gov/docs/default-source/default-document-library/tools-curricula/malariadrugs_counteringtheft.pdf?sfvrsn=4 (Accessed on: 25.02.2016)

Commodity Management Audit Briefs. AMP (2015).

Commodity Management Audit, Nasarawa State, Nigeria. Alliance for Malaria Prevention (AMP) (2015). Available at: http://allianceformalariaprevention.com/wp-content/uploads/2015/10/CMA-Report-Nasarawa-2jun15.pdf (Accessed on: 26.01.2016)

Control Measures Greatly Reduce Leakage of LLINs in Liberia. USAID | DELIVER PROJECT (2011). Available at: http://deliver.jsi.com/dlvr_content/resources/allpubs/logisticsbriefs/LR_LLINDistrContrMeas.pdf (Accessed on: 31.01.2016)

Good practice in donors' anti-corruption strategies. U4Brief (2010). Available at: http://www.u4.no/publications/implementing-a-transparency-and-accountability-policy-to-reduce-corruption-the-gavi-alliance-in-cameroon/ (Accessed on: 29.01.2016)

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