

Annex 3 – Segmentation Analysis

Segmentation Analysis for Supply Chains for Neglected Tropical Diseases

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List of Acronyms

CDD	Community Drug Distributors
EPI	Expanded Programme on Immunization
FLHW	Frontline Health Workers
HAS	Health Surveillance Assistants
HC	Health Center
HF	Health Facility
ILS	Integrated Logistics System
ITN	Insecticide-Treated Nets
MDA	Mass Drug Administration
MEDA	Mennonite Economic Development Associates
MSD	Medical Stores Department
NTD	Neglected Tropical Disease
PSI	Population Services International
SDP	Service Delivery Point
SIA	Supplemental Immunization Activities
WHO	World Health Organization

Executive Summary

Segmentation is a commercial sector approach for determining the right mix of supply chain policies for delivery of a diverse set of products. The underlying idea is that supply chain strategies and procedures should be tailored to the commodities and health services they support. When applied to Neglected Tropical Disease (NTD) last mile supply chains, segmentation can help determine whether it is feasible or appropriate to integrate all or part of the NTD supply chain into existing public health supply systems.

In support of global efforts to strengthen last mile NTD supply chains and meet the London Declaration on Neglected Tropical Diseases goals to control and eliminate NTDs, this report presents a segmentation framework that is applicable to NTD supply chains, and applies the framework in Malawi and Tanzania. Report authors then discuss extending this analysis to other country NTD supply chains, based on global guidance. A summary of findings is below.

The greatest opportunities for NTD supply chains to integrate are with bednet campaigns, nutrition campaigns, and immunization campaigns, as opposed to supply chains that require routine re-supply of commodities (such as anti-retroviral therapy or essential medicine supply chains). This is because the processes and infrastructure required for periodic campaigns differ significantly from those required for routine re-supply operations.

In considering “piggybacking” on these supply chains, it need not be an all-or-nothing decision.

Opportunities for NTD programs to leverage existing capacity can occur at specific tiers and/or geographies and could theoretically include full managerial integration or simply sharing of infrastructure. Specifically, findings from Malawi and Tanzania demonstrate that while NTD and non-NTD campaign programs may include the community level, they are not always held at the same service delivery locations or conducted at the same time.

In considering “piggybacking”, local considerations must be taken into account. Due to differences in timing (i.e. during the school year for school-based programs, before the rainy season, after the harvest), geographic endemicity, and concerns regarding treatment efficacy and adverse drug reactions, it may not be possible to merge all NTD campaigns, much less integrate them completely with another campaign program.

One key area for potential integration is distribution. Other campaign supply chains may have distribution assets that are underutilized during certain times of the year. If the timing of other campaigns complements those of the NTD program, the NTD program may be able to access these assets and simply fund their operating costs, thereby avoiding the need to purchase and maintain dedicated assets. For example, in Malawi, one of the NTD control program managers has an agreement with the Director of the Expanded Programme on Immunization (EPI) program to borrow EPI vehicles when they are not otherwise being used. Under this arrangement, the NTD control program funds the operating costs of the vehicles.

Many NTD programs are already “piggybacking” on elements of other public and private sector supply chains. In addition to utilizing EPI transport resources in Malawi, the NTD program also relies on the Central Medical Stores Trust and private sector warehouses to store NTD drugs.

While ad hoc, many of these solutions help to fill critical supply chain gaps. **Using segmentation analysis, countries can identify opportunities for integration or resource sharing, and weigh the costs and benefits of each to find the most appropriate solution.**

Segmentation is not a “one-and-done” proposition. Within a specific country context, it is important to carefully investigate programs to better understand their potential and capacity to support current gaps in the NTD supply chain, while considering the likely challenges and risks to co-implementation. In particular, many of these systems and processes date back several decades, and thus will require significant advocacy and policy work, guided by evidence presented in the segmentation analysis, in order to be successful.

Introduction

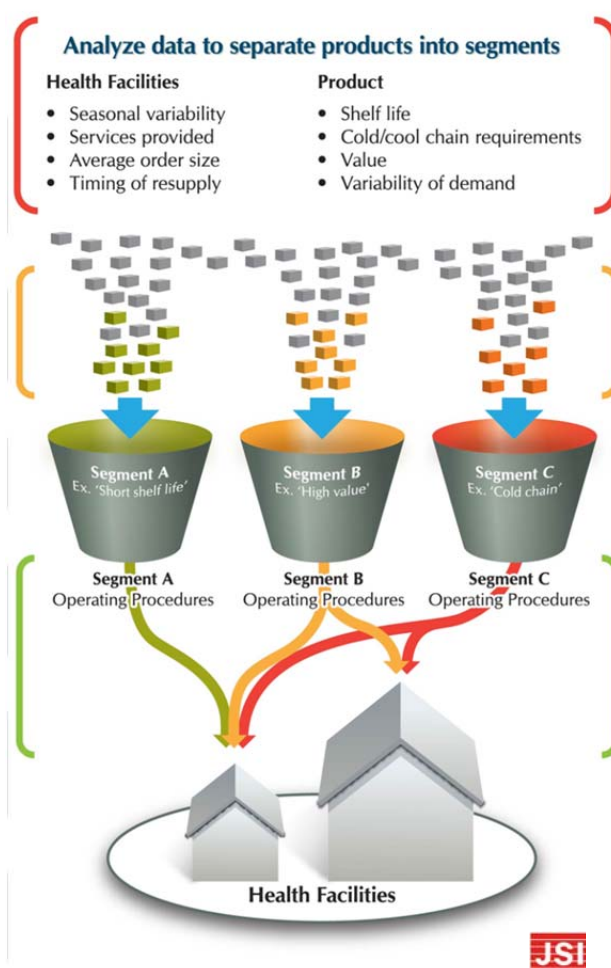
Strengthening supply chain performance by adding an under-performing program to the operations of a better-performing system should be considered carefully when pursuing rapid performance improvements. Country contexts may impact the feasibility and potential benefits of this approach, but it is worthwhile to analyze the potential for integrating product streams either by consolidating assets and management or having one set of commodities “piggyback” on the supply chain for another. This analysis must be conducted carefully to ensure that the system to be used to deliver an expanded set of commodities is well suited to an expanded scope of work and to meeting any unique requirements of the additional program.

Segmentation is a commercial sector approach for determining the right mix of supply chain policies for delivery of a diverse set of products. Segmentation arose from the understanding that a single set of supply chain operating policies cannot efficiently and effectively manage a group of products that have inherently different requirements. For example, a grocery chain in a developed economy may be responsible for ensuring the in-store availability of both fresh produce and bulk cereals. In order to cost-effectively manage both, the company may elect to implement separate procedures to handle these two product groups. The company may have frequent small shipments of the short shelf-life produce and large, less frequent shipments of the bulk cereals. These distinct procedures would have been chosen to directly support the logistics characteristics of these two product groups as well as the buying patterns of customers (Fisher 1997). Fundamentally, segmentation helps to manage the inherent tradeoff between *responsive* and *efficient* strategies, aligning supply chain policies with the requirements of customers and commodities.

In terms of health commodities, segmentation analysis is the process of analyzing data on customers' needs and products' characteristics to determine which segments – or groupings of products – make most sense to procure, store or deliver together (JSI 2013). This process is shown in Figure 1 above.

Given the breadth of commodities and customers handled, developing country healthcare supply chains are good candidates for segmentation. For example, in 2006 Zambia designed and implemented a

Figure 1. Segmentation Analysis



segmented approach to resupplying laboratory commodities. Using this approach, separate ordering and delivery procedures for fast and slow-moving products helped to achieve both rapid delivery of reagents (which have a short shelf life) and more efficient management of slower-moving products (JSI 2013).

Last-mile supply chains for Neglected Tropical Disease (NTD) programs present another distinct perspective on segmentation. Currently NTD supply chains display the following characteristics:

- NTD supply chains are predominantly operated as periodic mass drug administrations (MDAs) to endemic populations and geographies rather than as routine health commodities. As such, they do not need to maintain constant levels of inventory across the system but instead require periodic peaks of warehousing, transportation, and management capacity.
- MDAs usually involve community-level volunteers to support dispensing of drugs to recipients, as well as other tasks.
- MDAs support delivery of at most six relatively stable drugs that do not have special handling requirements such as active cooling. In addition, these drugs have long shelf lives, which means that specialized warehousing or distribution capacity is not required.
- NTD programs typically rely on the district level of the health system to implement MDAs, meaning that the NTD supply chain must deliver commodities to this level. Other commodity programs often bypass the district level in order to reduce in-country inventory pipelines and reduce decentralized order fulfillment capacity requirements.
- NTD supply chains require distribution capacity serving the community level of the health system.
- NTD supply chains are based on top-down estimates of commodity requirements rather than bottom-up requisitions. As such, they do not have a critical need for detailed data on quantities dispensed, quantities on hand, and losses and adjustments.
- Drugs delivered through MDAs are provided at a global level by major pharmaceutical corporations with World Health Organization (WHO) coordination for quantification, order verification, and placement.
- There is variability in the timing and degree of integration between MDAs for different NTDs. In addition, in many countries the various NTD control programs continue to act without managerial or operational integration.
- Resources and infrastructure for NTD programs in general, and NTD supply chains in particular, are limited compared with many other public health programs.
- The number of distinct MDAs and the number of diseases treated during MDAs varies depending on the national burden of disease as well as the level of effective integration between respective NTD programs.

This report first presents a segmentation framework that is applicable to NTD supply chains. It then applies the framework in Malawi and Tanzania, using data collected through in-person surveys that followed the structure of the segmentation framework. In each country, survey teams visited central

level partners responsible for management of national bednet and immunization programs. These two programs were targeted because of their campaign focus and national coverage. Additional public health supply chain systems were not included due to resource and time constraints and the conclusion that routine systems would not offer viable integration opportunities with NTDs. Report authors then discuss extending this analysis to other country NTD supply chains, based on global guidance.

Segmentation Framework for Last Mile Supply Chains: Identifying Systems that Could Support NTDs

Following the basic premise that a supply chain's design should purposefully accommodate the commodities and customers it serves, conducting a segmentation analysis requires an understanding of the commodities themselves as well as the service delivery characteristics that impact demand. These parameters comprise a basic framework to help decision-makers understand the true supply chain requirements of NTD programs as well as identify the other last mile supply chains that are most appropriate for potential NTD integration.

The framework includes qualitative and quantitative indicators and is summarized in Table 1 below. Significant knowledge of the local NTD system and a general understanding of supply chain management are required to answer framework questions and analyze results. Stakeholders should then answer the framework prompts for those supply chains to better understand the possible benefits or challenges of integration.

Table 1. Segmentation Analysis Framework

Qualitative Indicators	Quantitative Indicators
Commodities: <ul style="list-style-type: none"> • Shelf life • Special handling 	<ul style="list-style-type: none"> • Total cubic volume of annual demand • Variance of annual demand • Frequency of in-country delivery
Customer/Demand at Service Delivery Point: <ul style="list-style-type: none"> • Predictability of demand • Seasonality of demand • Where products dispensed to users • Capacities of service providers 	

Qualitative Indicators

Qualitative indicators include those related to commodities (each commodity handled within the systems of interest), customers (service delivery points), and demand, all of which affect capacity requirements of a supply chain.

Commodities

- **What is the shelf life once received in-country?** Commodities must be delivered and consumed by health system users within their viable life. This requires that in-country pipelines be shorter than the shelf life at central level receipt. Most essential medicines and public health commodities have shelf lives of between two and five years, but commodities with particularly

short lives (such as laboratory reagents) may need shorter pipelines. Product manufacturers, suppliers, and procurement specialists can provide this information for specific commodities.

- **Are there special handling considerations?** Many commodities in tablet or suspension form require storage at temperatures above freezing but below 25 degrees Celsius, which in tropical climates requires some form of active temperature management. Others may require dedicated assets and policies for cold chain management. Product manufacturers, suppliers, and procurement specialists can provide this information for specific commodities.

Customer/Demand at Service Delivery Level

- **Is demand predictable or unpredictable?** Achieving product availability targets for commodities with unpredictable demand requires higher levels of safety stock with routine monitoring of demand and responsive resupply. Campaign-based programs have highly predictable demand, and can be accommodated with pre-planned quantities, (or “pushed”), distribution. Program planners and system staff can render qualitative judgments about demand predictability.
- **Is demand seasonal or constant?** Periodicity of demand influences the level of effort and capacity requirements throughout the supply chain. Campaign-based programs only require distribution capacity for specific periods during the year, while routine health services require continuous cycles of order fulfilment and delivery.
- **At what service delivery levels and at which geographic locations are the products dispensed to users?** Adding new delivery locations or levels to an existing system may require additional effort beyond that of delivering higher volumes, as delivery modes, transport contracts, and delivery procedures should reflect the commodity destinations.
- **What capacities do service providers have to record and submit consumption or stock status information?** The educational levels, specialization, and access to resources of staff involved in stock management at the service delivery level may guide the approach to logistics data collection. Program planners, augmented by information collected through direct interactions with service delivery level staff can provide needed information.

Quantitative Indicators

Quantitative indicators include those related to demand which affect supply chain capacity requirements. Ideally these should also be incorporated into the segmentation process, but stakeholders may not have enough data to include these indicators, in which case they should be approximated qualitatively.

- **What is the total cubic volume of annual demand?** If this can be determined by product, it can provide an estimate of the total annual storage and distribution requirements of the program, and can demonstrate whether total volume is largely driven by a subset of products. When comparing different programs, total cubic volume can illustrate whether inclusion of one program’s commodities in the other represents a drastic increase in capacity requirements. Cubic volume can be estimated by multiplying known quantities for distribution (from historical records) with per unit or per carton cubic volumes (typically obtainable from the supplier or also

from the USAID | DELIVER PROJECT at deliver.jsi.com). Knowing the cubic volume per individual period is also helpful.

- **What is the variance of annual demand?** Demand variance can be estimated quantitatively with access to sufficient historical records. For routine resupply systems, calculating the standard deviation of demand per period can provide the likelihood that demand will fall within a certain range, and inform comparison between multiple programs. Adding a set of commodities with highly variable demand to a system with low variability, especially if that demand is considered unpredictable, could cause challenges.
- **How frequently are products delivered through the in-country pipeline?** Historical records and knowledge of current system designs can show the level of effort required in terms of order fulfilment and delivery frequency.

Results Interpretation – How Do Responses Inform Decision-Making?

These indicators, as they relate to current NTD distribution systems and target systems for potential inclusion of NTD commodities, provide a sense of the strategic and operational compatibility between the two. Key questions to ask before considering a complete integration include:

- Would the overall strategies and approaches of the target systems support the supply chain goals of NTD programs?
- Would inclusion of NTD commodities in another system fill currently underutilized assets or require new investments?
- Are there specific elements of the target system that could be leveraged to support NTD commodity management?

Integration can also potentially occur for specific functions in isolation, as integration of certain functions may be easier and more beneficial than others (Yadav 2013). For example, stakeholders could decide to preserve an independent information system for NTD commodities while integrating last mile storage and delivery with another system, given the relative ease of integrating those functions. These questions can be considered once potential candidate systems have been identified, and should be answered for all NTD and candidate systems to the degree possible.

- What is the current distribution structure between the central level and last mile?
- Do distribution timings coincide with or complement one another?
- How would distribution timings affect storage and distribution capacities if commodities were integrated?
- Is there available capacity that could be utilized or contracted, or would new assets have to be purchased?
- If central level storage is to be integrated, how do national receipt timings coincide with or complement one another?

Field Results: Malawi

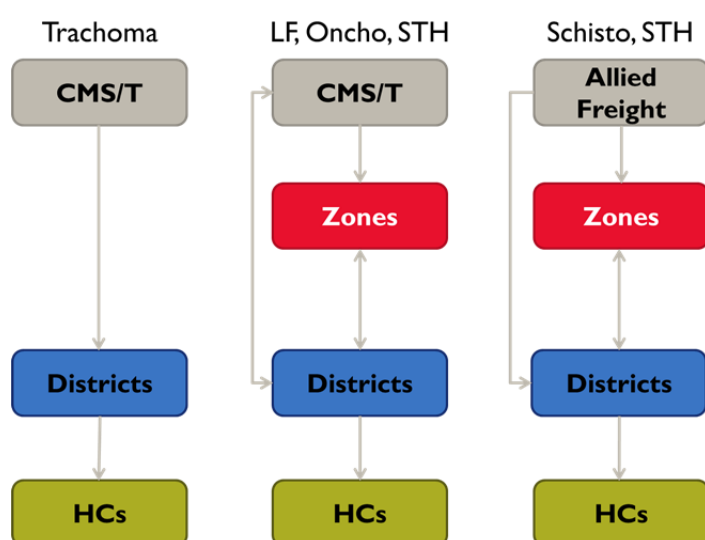
NTD Programs

Malawi's health system operates three separate MDA-driven supply chains for NTDs (see Figure 2).

These include MDAs for:

- trachoma, delivering Zithromax capsules
- lymphatic filariasis, onchocerciasis, and soil transmitted helminthes, delivering albendazole and ivermectin
- schistosomiasis, delivering praziquantel and albendazole

Figure 2. Distribution Channels for NTD drugs in Malawi



Commodities

- Shelf life: Most of the relevant products have between two and five years of shelf life when properly stored (WHO 2014).
- Special handling considerations: None besides typical temperature requirements for tablets and capsules.

Customer/Demand at Service Delivery Level

- Predictability of demand: Commodity distribution through annual MDAs with variation only occurring at the lowest levels of the system during implementation.
- Seasonality of demand: 'Demand' timings driven by campaign cycles, which only occur once over several weeks each year.
- Geography and service delivery level of product dispensing: All districts included, with products being delivered to the health center level before distribution to Health Surveillance Assistants (HSAs) who dispense commodities in the community.

- Service provider capacity for logistics reporting: HSAs have limited capacity in this area, currently only coverage and population data are recorded.

Interpretation

Malawi's NTD supply chains are driven by short-term annual MDAs, meaning that capacity requirements are generally predictable but present a seasonal spike. A highly responsive, requisition-based delivery approach is not required, but finding storage and distribution capacity on a short term basis is a challenge. Based on this, only last mile supply chains with campaign-based delivery were surveyed for potential integration with NTD supply chains. Opportunities for integrating with established supply chains could include systems that have excess capacity at health system tiers on the way to the health center level, or systems that have a seasonal dip in capacity requirements that could be complemented by MDA timings. Alternatively, a system that has well-established contracts for storage and distribution could potentially increase its requirements rapidly and efficiently.

Bednet Distribution Campaigns

Population Services International (PSI) is a private health organization which implements health projects in developing countries. In Malawi, PSI has responsibility for last mile distribution of insecticide-treated nets (ITNs) as part of its antimalarial programs. In total this might include approximately 3.4 million ITNs per year, donated by the Global Fund for AIDS, TB, and Malaria and the United States President's Malaria Initiative, and distributed both routinely and as part of an annual campaign.

Commodities

- Shelf life: Up to five years depending on the manufacturer.
- Special handling considerations: Although relatively bulky, ITNs do not require additional temperature control. It should be determined whether local policies require that storage spaces or vehicle beds can handle drugs for oral consumption without previous cleaning.

Customer/Demand at Service Delivery Level

- Predictability of demand: Quantities for delivery are predetermined based on HSA estimates of pregnant women and women with children under five, which should be relatively stable year to year.
- Seasonality of demand: Campaigns occur once per year and are deliberately timed to precede the influx of mosquitoes during the rainy season.
- Geography and service delivery level of product dispensing: Bednets are delivered to schools, community events, and health centers, particularly antenatal care clinics. Geographically, bednets are distributed across the country, as every household in Malawi is technically eligible for the program.
- Service provider capacity for logistics reporting: HSAs ensure final delivery to the community with Ministry of Health supervision.

Interpretation

Although the last mile bednet supply chain for PSI does not include the district level in the distribution chain, it does cover much of the country down to the health center level. According to PSI staff, renting storage space is relatively easy in Malawi, as there is periodically underutilized capacity in the local tobacco industry. It would be important to ensure, however, that pharmaceutical-grade warehousing standards can be established to ensure that the basic storage requirements of these commodities are met. Currently, PSI operations also support storage of commodities used by other health projects. Private sector distribution capacity is also reported to be available, although careful contract management would be required to ensure performance. In summary, it may be possible to leverage potential storage lessons and resources from these bednet campaigns, if not the physical structures themselves.

Nutrition and Vaccination Campaign

Malawi's health system delivers supplemental immunization activities (SIAs) to increase coverage beyond the coverage achieved by routine immunization. Specifically, this includes measles and polio vaccines, injection materials, vitamin A tablets and de-worming tablets. Vaccines are handled by the vertical Expanded Programme on Immunization (EPI) distribution system, going from the national EPI store to regional and then district EPI stores (or sometimes EPI refrigerators at the District Medical Store). Along the way they are transported on EPI trucks until delivery to health centers on district vehicles. Nutrition commodities effectively "piggyback" on these campaigns by using EPI storage and distribution assets and paying for required fuel.

Commodities

- Shelf life: Both the measles and oral polio vaccine have a shelf life of 24 months when properly stored (WHO 2014).
- Special handling considerations: The measles vaccine requires sustained storage temperatures of between two and eight degrees Celsius. This requires dedicated cold chain storage capacity and coolers for transport or refrigerated trucks. The oral polio vaccine only requires storage at 20 degrees Celsius.

Customer/Demand at Service Delivery Level

- Predictability of demand: Campaign vaccine quantities are ordered separately from vaccines for routine immunization, and target children under five who were not reached by routine immunization, making the quantities relatively predictable.
- Seasonality of demand: SIA campaigns only occur once every two to three years because routine immunization coverage is relatively high in Malawi. The campaigns occur during the dry season.
- Geography and service delivery level of product dispensing: Commodities are delivered to health centers throughout the country as well as to outreach clinics and temporary sites.
- Service provider capacity for logistics reporting: HSAs dispense commodities, while EPI staff track and manage inventory at the EPI storage locations.

Interpretation

Vaccine campaigns already share some capacity with NTDs, namely the use of EPI trucks at the national level by the schistosomiasis program. Additionally, in some cases the district NTD focal person is also the district EPI coordinator, providing shared visibility across the two programs at that level. While the EPI cold chain capacity is not required for NTDs, the campaign approach and shared destinations does facilitate straightforward sharing of transport capacity as long as the NTD program provides operating costs and NTD volumes do not exceed EPI capacities.

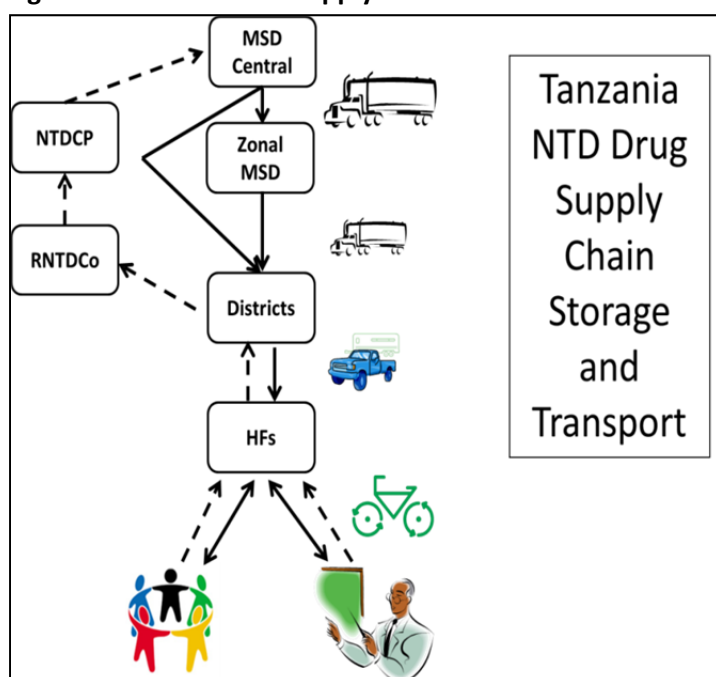
Field Results: Tanzania**NTD Programs**

Tanzania's NTD control programs deliver five drugs through annual MDAs. The NTD program is already "piggybacking" on the existing public health supply chain, as the delivery of NTD drugs occurs partly through Tanzania's integrated national supply chain. First, NTD drugs go through the Medical Stores Department (MSD) central and zonal stores (which handle other commodity programs), and are then delivered to districts and then health facilities, where they are picked up by community-level health workers for ad-hoc transport to schools and communities (see Figure 3). The central level delivers to zones, zones deliver to districts and so on based on distribution lists provided by the national NTD office. The timing is set in advance and drugs are distributed within weeks of the start of the campaign. From the district level the NTD drugs are delivered to health facilities using District Medical Office vehicles and resources. The delivered drugs are Zithromax (tablets and powder for oral suspension), mectizan, praziquantel, and albendazole.

The cycle of deliveries from MSD through the national supply chain occurs in line with MDA timings rather than through the predominant requisition calendar for commodities routinely supplied through the Integrated Logistics System (ILS). NTD distribution plans are based on centrally-determined, population-based algorithms and are designed to meet timings of the MDAs, unlike the ILS, which is a consumption-based system whereby facilities order supplies based on the total product consumed during the reporting period.

Commodities

- Shelf life: Most of the relevant products have between two and five years of shelf life when properly stored (WHO 2014).
- Special handling considerations: None besides typical temperature requirements for tablets and capsules.

Figure 3. Tanzania NTD Supply Chain Product Flow**Customer/Demand at Service Delivery Level**

- Predictability of demand: Forecasts are dependent on population data (i.e. number of school-aged children in a given district) and although several challenges regarding estimating annual populations for each catchment area have been noted, population-based demand is relatively predictable and accurate.
- Seasonality of demand: Distribution capacity requirements are driven by the annual MDA campaigns, so are relatively predictable.
- Geography and service delivery level of product dispensing: Nation-wide but depending upon endemicity in each district and community, not throughout the entire country (i.e., not all districts are included depending on epidemiology) therefore less predictable
- Service provider capacity for logistics reporting: MDAs rely on volunteer Community Drug Distributors (CDDs) and Frontline Health Workers (FLHWs). CDDs in particular are not fully trained and are responsible for completing several complex reports, leading to limited data quality.

Interpretation

Tanzania's NTD MDAs present predictable, annual distribution capacity requirements for the public health system. These MDAs require that commodities reach health facilities (and subsequently villages) across the country. Although Tanzania's NTD drugs are already integrated into the broader public health supply chain at the central and zonal levels of the supply chain, distribution capacity at lower levels could be strengthened through additional coordination with other systems when capacity exists and NTD performance is below expectations. Partners should consider other similarly timed, campaign-

driven systems with excess (or easily expanded) capacity that support the lowest levels in a way that is compatible with NTD MDAs, or systems with under-utilized capacity during MDAs.

National Malaria Control Program Bednet Distributions

Mennonite Economic Development Associates (MEDA) manages country-wide distribution of ITNs intended for all Tanzanians. The nets are produced locally in Arusha and delivered directly from the factory to communities across the country, using third-party distributors to manage transportation.

Commodities

- Shelf life: Up to five years depending on the manufacturer
- Special handling considerations: No temperature restrictions, but local policies may require that storage and transport equipment be cleaned before handling drugs for oral consumption.

Customer/Demand at Service Delivery Level

- Predictability of demand: High, as quantities are based on household enumerations, although coverage can be constrained by funding.
- Seasonality of demand: Low, as distributions are not campaign-driven. Instead, distributions occur gradually throughout the year, covering each community once.
- Geography and service delivery level of product dispensing: Per the availability of funds for commodity purchase, bednets are delivered to all communities in the country.
- Service provider capacity for logistics reporting: Village and Ward Executive officers are responsible for receiving and dispensing bednets to the community, and should have basic capacity for reporting quantities dispensed.

Interpretation

The system used by MEDA to deliver bednets in Tanzania does not offer many opportunities for integration with NTD delivery. Although deliveries extend to the community level annually, they roll-out gradually throughout the year, meaning that deliveries would only overlap with MDA timings in a few areas in the country. Additionally, the origin of the bednet deliveries (Arusha) does not match the point of origin for the NTD supply chain.

Immunization and Vaccination Development Program

Tanzania implements several campaigns to support immunization coverage across the country. To reach children not covered by routine immunization services, Tanzania implements a National Immunization Week, a Child Health Day, and a National Immunization Day/Measles campaign. These campaigns deliver six vaccines: the pentavalent vaccine, rotatrim, PCV, BCG/measles, OPV/polio, and tetanus toxoid. Commodities are delivered to districts through a national supply chain for routine immunization (which includes national and subnational order fulfilment and delivery), and then campaign quantities are drawn from remaining stocks already held at health facilities. This means that capacity mobilization for the immunization campaigns predominantly occurs at the lowest levels of the system.

Commodities

- Shelf life: Most of the relevant products have between two and five years of shelf life when properly stored (WHO 2014).
- Special handling considerations: The pentavalent vaccine, rotatrim, PCV, and BCG vaccines should be kept in cold storage (between 2 and 8 degrees Celsius), while the OPV and tetanus toxoid only need to be kept at 20 degrees Celsius (WHO 2014).

Customer/Demand at Service Delivery Level

- Predictability of demand: Relatively high – the campaigns serve to vaccinate the small percentage of children not covered by routine immunization services.
- Seasonality of demand: High – these campaigns only occur during other pre-scheduled campaigns, and they occur at the same times across the country.
- Geography and service delivery level of product dispensing: The campaign vaccinations occur across the country at health centers and community events.
- Service provider capacity for logistics reporting: High – trained FLHWs administer the vaccinations, though those that occur in the community must take place without electronic resources for recordkeeping.

Interpretation

The supply chain for vaccine campaigns offers some potential overlap of requirements with NTDs, particularly at the health facility and community levels of the supply chain. While one of the periods for immunization campaigns occurs during Child Health Week, this may not be the case for NTD campaigns, meaning that vaccine distribution capacity may be underutilized outside of their campaign timings. While the cold chain capacity that supports vaccines is not needed for NTDs, at the lowest levels of the supply chain vaccines might travel in passive coolers inside of larger vehicles, offering the opportunity to transport other commodities. This idea is supported by recent analyses in Tunisia and Senegal, which focused on identifying opportunities to integrate elements of immunization supply chains with other public health supply chains. The study found that from an immunization perspective, integration of transportation at the last mile was feasible and would lead to more effective route planning and vehicle utilization. However, the study cautioned that such decisions would require extensive changes in deeply entrenched processes and practices, so would likely face resistance by relevant stakeholders. (Yadav P. et al, 2013)

Global Guidance for NTD Programs: Using Segmentation to Identify Integration Opportunities

While the prior examples illustrate segmentation analysis based on specific country examples, the segmentation framework can provide general insight for considerations of NTD supply chain strengthening globally, and for applying this analysis in additional countries.

Table 2 below applies the segmentation framework to NTD programs in general, with the intention of identifying the most appropriate systems for integration at the country level.

Table 2. Qualitative commodity and costumer/demand characteristics for NTD segmentation

Commodities	
Shelf life:	Normally between 3 and 5 years given adequate storage conditions
Special handling considerations:	None beyond normal room temperature requirements typical of most essential medicines
Customer/Demand at Service Delivery Level	
Predictability of demand:	High – once forecasted based on demographic and incidence data, ‘demand’ is predetermined and delivered through a distribution campaign
Seasonality of demand:	High – though the number and timings of NTD MDAs varies by country, they typically occur once per year for each NTD program
Geography and service delivery level of product dispensing:	The geographies that require annual MDAs vary by country, and the exact dispense locations may also vary, but they will typically be at the primary health care center or community level
Service provider capacity for logistics reporting:	Capacity will vary by country depending on general education levels and staff involved in logistics reporting, but this will generally be fairly low at the community dispensing level

The overall trend indicates that NTD program partners looking for opportunities to have NTD delivery integrate with other existing delivery systems should consider systems that can cost-effectively incorporate storage or delivery of annual spikes of commodity volumes to the community level. These solutions do not need to comprehensively support NTD management from the port of entry to the end recipient as long as they strengthen performance in key areas. However, this global guidance will focus on potential major opportunities for NTD programs. The following table summarizes, at a high level, the potential opportunities provided by common developing country public health supply chains to NTD MDAs.

Table 3. Potential opportunities for support to NTD MDAs

Common Programmatic Last Mile Delivery System	Opportunity for NTD MDA Delivery
Essential Medicines and Family Planning Programs	Low – these programs support routine resupply to secondary, primary, and sometimes community levels
Malaria Control Programs (anti-malarials)	Low – these programs support routine resupply to secondary, primary, and sometimes community levels
Malaria Control Programs (ITNs)	High – these programs support seasonal, annual campaigns to hard-to-reach communities. May have to consider temperature

	suitability of storage and transport assets
Anti-Retroviral Therapy Programs	Low – in many cases these programs support routine resupply, but testing or male circumcision campaigns may mobilize one-off supply chain capacity
Immunization Programs	Medium to high – in many cases these programs occur as periodic campaigns with delivery to the primary or community health levels, although cold storage is not necessary for NTDs
Nutrition Programs	High – these programs may already occur in conjunction with NTD MDAs through child health days.
Integrated Maternal and Child Health Programs	Low to medium – these programs support routine resupply, though they may support the community health level directly.

In general, supply chains which manage annual or periodic mass distributions of commodities to peripheral communities – bednet, immunization, and nutrition campaigns – offer potential for shared resources with NTD programs. Of course, these opportunities must be examined at a country level to see how actual geographies and timings overlap or complement each other, and compare cubic volumes for storage and delivery where possible. Additionally, it should be noted that in many countries, individual NTD programs themselves are not integrated with one another, so these may present opportunities given their shared supply chain characteristics.

Finally, even when a delivery system has been identified to have characteristics similar to NTD programs, the challenges of combining or coordinating parallel supply chains can be significant. Barriers can include community acceptance of drug provision, the burdening of limited resources such as community volunteers, and sacrifices in ideal timing for targeting specific population subgroups. However, a well-considered segmentation exercise can ensure that only realistic opportunities are pursued.

Conclusion

Given the urgency of supply chain strengthening efforts to support the goals of NTD control and elimination, stakeholders should consider transitioning under-performing NTD supply chain activities to better functioning supply systems in-country through increased integration, “piggybacking” and resource sharing. This would allow NTD programs to tap into existing commodity distribution systems and infrastructure instead of consuming time and resources to develop internal capacity.

As a tool for identifying supply chain strategies that align with product and delivery considerations, segmentation can serve as a guiding framework to help judge the potential effectiveness of such integration, as seen in the case studies later in this report. Using segmentation logic, stakeholders can better understand the theoretical supply chain requirements for NTD programs, and see how these compare with existing in-country capacities. This exercise must, however, analyze the logical and practical feasibility of transitioning operations responsibility.

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