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Addressing In-Country Supply Shortages of Malaria Commodities

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A logistics worker manages artemisinin-based combination therapies (ACTs) in a clinic in Zambia. Given the life-saving nature of ACTs, uninterrupted product availability must be a priority.

Many countries continue to struggle with maintaining a fully supply of key malaria commodities. This brief explains some options to manage in-country supply shortages.

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A full supply of health products means that enough products are available in-country for anyone who needs them. Products must be in full supply for a logistics system to function as designed. A maximum-minimum inventory control system allows for objective resupply decisions based on quantities consumed, with the ultimate goal of having product availability whenever and wherever it is needed.

Demand for artemisinin-based combination therapies (ACTs), the standard for malaria treatment, continues to grow. Given the life-saving nature of ACTs, uninterrupted product availability must be a priority. In reality, many countries continue to struggle with maintaining a full supply of key malaria commodities for a variety of reasons; including inaccurate quantifications, inadequate financing to procure all required commodities, weak supply chain processes, and manufacturers' difficulties in meeting global ACT demand. If facilities do not receive the quantities requested, or if the quantities received will not last until the next resupply, users may lose confidence in the system. Most important, clients will not be served and illnesses will go untreated. This technical brief offers some options for managing in-country supply shortages.

What is rationing?

Rationing is used where there are shortages in product supply. In a rationing system, supplies are allocated based on a given set of criteria—for example, to serve vulnerable populations (e.g., children)—to treat a certain percentage of the priority disease burden in a region, or to ensure that a certain product accounts for no more than a certain percentage of the available budget. For in-country supply chain managers, even in a rationing system, the goal is to reduce stockouts at the service delivery points (SDPs). Although stockouts anywhere in the system should be avoided, it is better to stock out at the central level—or even the intermediary

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levels—than at the SDPs, because this is where clients are served. Sophisticated calculations and mathematical models can be used to make allocation decisions in rationing. With many systems increasingly using technology to support established logistics system processes, possibilities for applying these types of advanced calculations should be explored, if applicable. The guidance offered in this document is appropriate for situations and systems where these advanced calculations cannot be applied. The guidance is based on general supply chain principles that can be applied in a variety of settings; many are specific to malaria treatment rationing.

To effectively apply any of the strategies offered later in this brief, it is important for managers to determine the extent of the non-full supply. In a logistics system, stockout data are critical for monitoring the performance of the supply chain and for highlighting supply gaps. In malaria programs, a stockout of ACTs means that a patient cannot receive treatment; which greatly increases morbidity and, possibly, mortality. Collecting and reporting the total number of days each product was out of stock can inform resupply decisions and can more accurately forecast future consumption. Logistics management information system (LMIS) reports should include a section for the SDP to report the total number of days that each product was out of stock.

Strategies

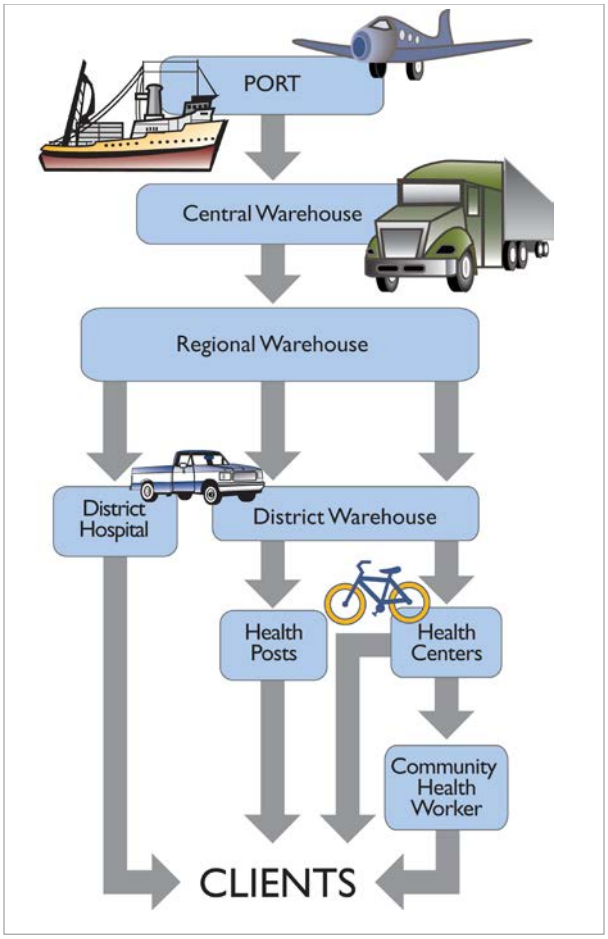
Some of the strategies listed below can be long-term measures, involving restructuring of the system; or short-term solutions, to address more immediate short-supply situations. Often several strategies can be combined. The right set of strategies will depend on the country context.

1. **Review system parameters and reduce the quantity of stock held in the system.**

The length of the in-country supply pipeline (determined by adding the maximum stock levels at each level of the system) is a key consideration in commodity management; it is particularly important for non-full supply situations. Each level in the pipeline keeps safety stock, potentially tying up limited financial resources in stock quantities, and stock held in inventory rather than dispensed to clients. The in-country supply pipeline can be reduced in two primary ways.

The first is to reduce the number of levels in the supply pipeline (see figure 1). This is perhaps the most common strategy for ensuring relatively shorter in-country pipelines. It is also, typically, the most effective in streamlining the supply chain, because it moves the source of supply closer to demand, and it is usually a long-term measure. In some countries, intermediate levels, such as regional and/or district levels, have been eliminated; and products move directly from the central level to the SDPs. Managers could adapt the system so that either the regional or district warehouse bypasses the flow of supply.

Figure 1. Sample In-Country Supply Pipeline



For example, the in-country supply pipeline in figure 1 has a regional warehouse and a district warehouse. If one or both levels are eliminated, that would free up a significant amount of stock. Table 1 shows illustrative

maximum stock levels for each level, and how removing these levels would affect the amount of stock held in the system.

Table 1. Eliminating Levels in the Supply Pipeline

Level of the Pipeline	Stock Level of a Sample In-Country Supply Pipeline		Stock Levels After Eliminating a Level	
	Minimum	Maximum	Minimum	Maximum
Central	6	12	6	12
Regional	5	8		
District	3	6		
Health post	2	3	2	3
TOTAL:	**16**	**29**	**8**	**15**

By bypassing the regional- and district levels, the maximum stock level for the entire pipeline was reduced from 29 months to 15 months; the minimum was reduced from 16 to 8 months (see table 1). Although this approach results in less overall stock being held in the system, it may require more resources for transportation and adequate warehousing.

Another way is to reduce key system design parameters—safety stock or review period—and thus influence the minimum and maximum stock levels. By reducing the review period, facilities hold less stock and report more often. By reducing the safety stock, the minimum stock level and maximum stock level are reduced, so that facilities hold less stock overall. However, holding less safety stock may make the facilities more vulnerable to fluctuations in demand. Safety stock can only be reduced if supply and demand is assured. In reality, in a short supply situation, facilities are unable to maintain any safety stock. It is better to run out of safety stock than deny service to a client.

2. **Keep safety stocks at intermediary levels, reducing the safety stock held across all SDPs and/or the central level.**

Supply chain managers can decide to reduce the safety stock held at one level (whether SDPs or at the central level), and move that safety stock to the intermediary levels, for two reasons: intermediary levels should be able to resupply facilities faster than the central level (because they are, theoretically, geographically closer to facilities), and safety stock quantities are reduced or not held at every SDP. This does not necessarily add a level to the system; rather, for the central level it is dividing the higher level stock into another location(s); for the facility level, it is consolidating lower level stocks into a higher-level location (for example, districts or regions) to enable access from multiple facilities. However, implementing this type of system change means that the intermediary level must be able to closely monitor stock levels at both the central and SDP levels, and they must be able to quickly respond to any emergency orders or resupply requests from the facilities. Enough resources must be allocated to transportation to ensure a rapid response.

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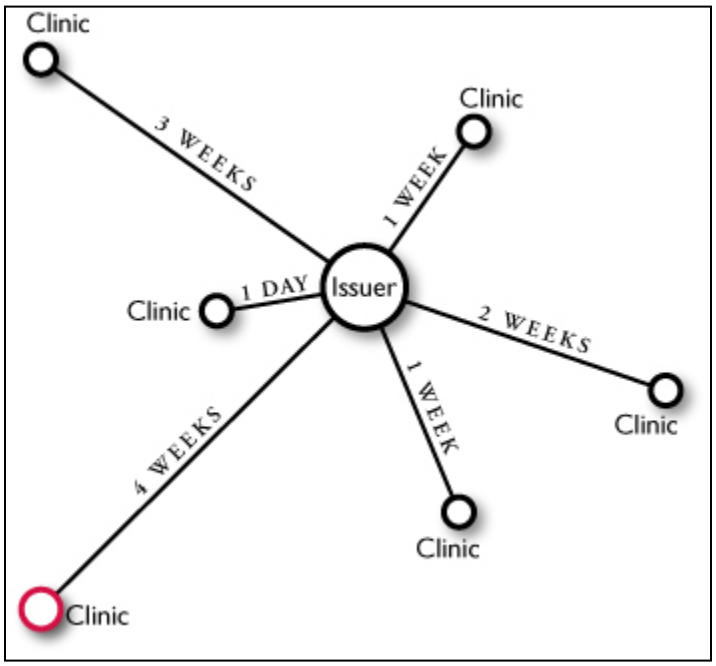
ACTs in Tanzania

3. **Segment SDPs in the system based on lead times; resupply accordingly.**

Lead time is the time between when stock is ordered or issued and when it is delivered and available for use. The lead time stock level, therefore, is the number of months of stock used after an order is placed, or an issue determined, and before the new order is received. In a traditional logistics system design, to set inventory levels, the same lead time is used for all SDPs. However, in reality, not all SDPs have the same lead times. SDPs further away from resupply points have longer lead times (see figure 2), usually from one day to four weeks. For non-full supply, supply chain managers can resupply clinics that are further away (such as the clinic with a four-week lead time), up to the maximum stock level. Clinics closer to the issuer (such as the clinics with one-day or one-week lead time) can be resupplied up to the minimum; plan to resupply those facilities more often. This prevents in-demand stock from languishing in facilities where it may not be used immediately. For the SDPs that do not receive full supply, the stock levels must be closely monitored and clear emergency order procedures established.

Figure 2. Lead Times



4. **Closely monitor stock levels to redistribute stock between facilities.**

A standard operating procedures (SOP) manual for the system should provide specific guidance to staff on how to fulfill their logistics tasks and responsibilities, including assessing stock status. An SOP manual guides staff on procedures to take if they are overstocked, understocked, or at the emergency order point (EOP) for any particular product. Often, the guidance states that if a facility is overstocked, or at the EOP, facility staff should contact their supervisors at higher levels for appropriate action. If facility staff members are regularly monitoring their stock status and communicating this to their supervisors, and if supervisors are available to take action based on that information, stocks can be redistributed between facilities. Stocks can be taken from facilities that are overstocked and moved to those facilities that are understocked. Depending on the country context, this can be challenging, particularly if there are financial considerations, such as decentralized drug budgets. If a facility has purchased the products, it can be difficult to redistribute stock among facilities.

5. **Establish and disseminate procedures for borrowing stocks between facilities.**

In many logistics systems, stock can be moved, as needed, between facilities. For example, if one facility is running short of a particular product, they often borrow stock from neighboring facilities. To ensure that the borrowing is standardized, as much as possible, supply chain managers can establish and disseminate procedures for borrowing stock between facilities. These procedures should be part of the SOP manual for facility staff, and they can be particularly helpful when staff at a higher level cannot manage the redistribution of stocks between facilities. This movement of stock between facilities should be documented on stockkeeping records and reported on LMIS reports as *adjustments*. Higher-level staff can monitor the frequency and volume of products moving between facilities.

6. **Focus supply where the burden of malaria is greater.**

Often, the burden of malaria is not equally distributed throughout a country. Some geographic areas may have high levels of malaria throughout the year, others may be malaria-free, and others have only seasonal malaria. In these cases, supply chain managers may want to manage stocks differently, based on where the burden of malaria is greatest. These options can be particularly important to consider in cases of non-full supply.

Other options include—

- Do not routinely supply malaria-free facilities; instead, if anything is supplied, only supply a small quantity of buffer stock.
- During the malaria season, distribute more frequently to facilities in the epidemic zones, but remain in constant contact with areas that have malaria all year. This plan may increase transportation costs and require more trucks to be available for more frequent deliveries.

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A clinic in Zimbabwe is stocked with ACTs before the rainy season.

- Establish different maximum and minimum stock levels for different parts of the country. Tailoring minimum and maximum levels to different areas could help ensure that facilities are at reduced risk for either stocking out or overstocking. For example, for areas that have only seasonal malaria, the minimum and maximum levels could be higher, or they could change at different times of the year. For areas that rarely have malaria cases, these levels could be set much lower, while those with year-round malaria could have stock levels that remain constant.

Different designs for different geographic areas undoubtedly increases the complexity of the logistics system, particularly for those at the higher levels that are collecting, analyzing, and interpreting logistics data; conducting stock status analyses; or calculating resupply quantities. Whenever possible, use automated systems to facilitate the decisionmaking processes for these staff.

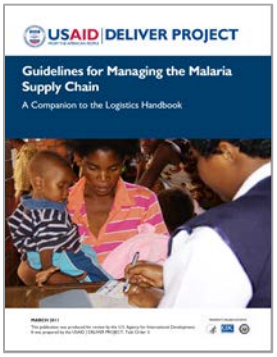
7. **Resupply a percentage of the total requirement.**

A common approach to rationing is for staff at the resupply point to simply calculate a percentage of the total requirement, which is also called the *equal misery* approach. All the facilities receive less than the quantities they need, but by the same percentage. For example, staff approving resupply quantities could approve 80 percent of the total requirement. It is important to note that the total requirement should be based on consumption during the previous time period, adjusted for any days out of stock.

Other strategies used for rationing are not discussed above. For example, managers could establish a flat quantity that each type of facility (health post, health center, district hospital, etc.) would receive. However, it would not be based on any consumption data or be a reflection of the real demand at the facility level. If consumption information is not available, this option should be considered. Other types of *self-rationing* strategies could be used: if facilities do not submit reports, they are not resupplied. Or, only facilities that actively follow up and pursue resupply receive the needed commodities. Although these strategies could be an incentive for reporting; they do not consider account consumption, disease burden, or facility characteristics, such as distance to resupply point.

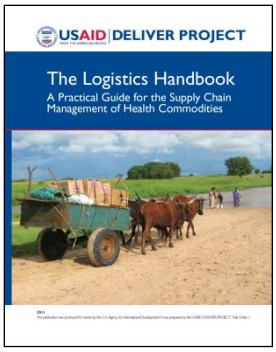
No matter which strategy is utilized, monitoring is the most important element. This includes monitoring of stock status of individual facilities, as well as the national supply. To enable supply chain managers to make informed decisions about immediate resupply and long-term forecasting, data on number of days stocked out should be collected and reported.

Collecting, reporting, and using data is important to improve program management and, ultimately, logistics system performance. Data should indicate when a product is no longer in non-full supply. After a product is in full supply, the supply chain managers can resume resupplying facilities based on actual need and established maximum stock levels. Improving program management and system performance are critical for improving customer service, managing short-term supply shortages, and ensuring commodity security. This will ensure that clients have the products whenever and wherever they need them.



For more information on logistics activities and terms, see *The Logistics Handbook: A Practical Guide for the Supply Chain Management of Health Commodities*.

For more information on supply chain management considerations for malaria products and programs, see *Guidelines for Managing the Malaria Supply Chain: A Companion to The Logistics Handbook*.



Key terms used in this document:

pipeline. The entire chain of physical storage facilities and transportation links through which supplies move from the manufacturer to the user: port facilities; central warehouse; regional warehouses; district warehouses; all service delivery points (SDPs); and transport vehicles, including community-based distribution networks.

maximum-minimum inventory control system. Informs the storekeeper when to order or issue, how much to order or issue, and how to maintain an appropriate stock level of all products to avoid shortages and oversupply.

service delivery point. Any facility where users receive supplies related to health services. SDPs are usually hospitals and health centers, but may also include mobile units, community-based distributors, laboratories, and health posts. These facilities are called SDPs because services are provided and products are used or dispensed at these locations.

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John Snow, Inc.

1616 Fort Myer Drive, 16th Floor

Arlington, VA 22209 USA

Phone: 703-528-7474

Fax: 703-528-7480

Email: askdeliver@jsi.com

Internet: deliver.jsi.com