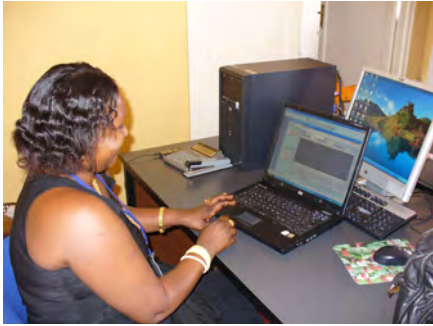




Supply Chain Integration: Seamlessly Linking the Pieces



USAID | DELIVER PROJECT

Data visibility is a key characteristic of an integrated supply chain.

The focal point of any supply chain integration effort needs to be performance—on improving customer service.

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What is Supply Chain Integration?

When people think of integration, they often think about it as integrating health services. According to the U.S. State Department's Global Health Initiative:

Integrating health services at the point of contact ensures the delivery system is designed to meet the holistic needs of an individual when they go to a health facility. Upstream integration ensures joint programming among... institutions to increase efficiency and effectiveness.¹

Integrating these services should improve the overall care an individual receives at a facility. As health care facilities increasingly offer integrated health care packages, all the products required for provision of these services need to be available. Historically, this has contributed to an understanding of integration as putting all products together on one truck. However, integration is not only about providing holistic health services or distributing products together on the same truck; it can be a framework to characterize supply chain improvements within public health.

Our perspective on integration is twofold. "Product integration," combines the management of some or all logistics functions (e.g., procurement, storage, distribution, and logistics management information systems [LMIS]) for different commodity categories (e.g., family planning, HIV, malaria, and tuberculosis [TB]) into one shared supply chain. The most commonly merged functions are those of storage and distribution. The starting point for this type of integration is the assumption that disease- or program-specific supply chains are inherently wasteful and inefficient. For example, it is inefficient for a health facility to receive a delivery for family planning products on Tuesday and then receive a delivery for TB drugs on Thursday. The purpose of integration,

¹ USAID. 2010. *Implementation of the Global Health Initiative: Consultation Document*. http://www.usaid.gov/our_work/global_health/home/Publications/docs/ghi_consultation_document.pdf

Segmentation for Product Integration

It is important to consider the implications of special product characteristics (e.g., cold chain and shelf life) when combining supply chain functions because one size does not fit all. Tools, such as a supply chain segmentation framework, can be useful to those engaged in product integration design.

then, is to combine supply chain functions with the goal of increasing efficiencies and reducing cost. However, focusing on the integration of supply chains for different programs in and of itself does not automatically improve performance; ultimately, a more systemic approach is required.

We believe that the focal point of any supply chain integration effort needs to be performance—on improving customer service. An important aspect of performance is efficiency, but simply reducing costs and waste does not necessarily mean better performance. For example, a supply chain that is characterized by stockouts and non-availability of products can be made more “efficient” by lowering costs, but it may still achieve the same subpar performance, and the true goal of integration, improving customer service, will not be met.

Supply chain integration is a performance-improving approach that develops seamless linkages between the various actors, levels, and functions within a supply chain to optimize customer service. The objectives of supply chain integration are to improve efficiency and reduce redundancy while also enhancing product availability. Supply chain integration strives to better connect demand with supply, which can both improve customer service and lower costs. However, it is not always possible to simultaneously achieve all these various objectives; a designer may need to make tradeoffs and balance competing priorities while working toward the ultimate goal of better serving customers.

Supply chain integration needs to make overall supply chain performance better. To do so, we examine the features that *contribute to a well-functioning supply chain* and, as a corollary, the characteristics *exhibited by a well-functioning supply chain*. A well-functioning supply chain should not be characterized simply by whether or not products are delivered in the same trucks or stored in the same warehouse. These design features may be important but they are not the fundamental traits that need to be in place to improve customer service. Rather, well-functioning (integrated) supply chains are characterized by clarity of roles and responsibilities, agility, streamlined processes, visibility of information, trust and collaboration, and alignment of objectives. This paper describes these characteristics and how they contribute to a seamlessly linked supply chain.



Clarification of roles can help improve communication and accountability.

Figure 1. The Logistics Cycle Functions

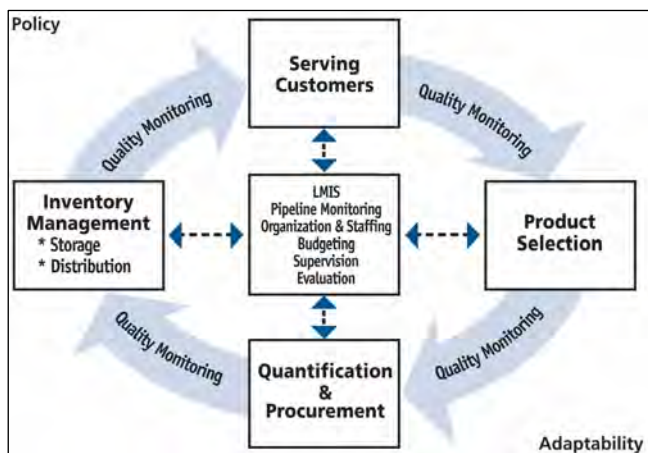


Figure 1 depicts supply chain operations as a cycle of basic functions, including product selection, quantification, and inventory management. These functions are performed by particular actors at various levels; to be efficient, the cycle must be driven by accurate and timely logistics information. Serving customers is at the top, or starting point, of the diagram.

These functions must be linked seamlessly. For example, product selection decisions must be connected to the quantification process; the correct products need to be forecasted. Similarly, there needs to be linkages between LMIS and quantification; collected logistics data should be used to inform the quantification process. Furthermore,

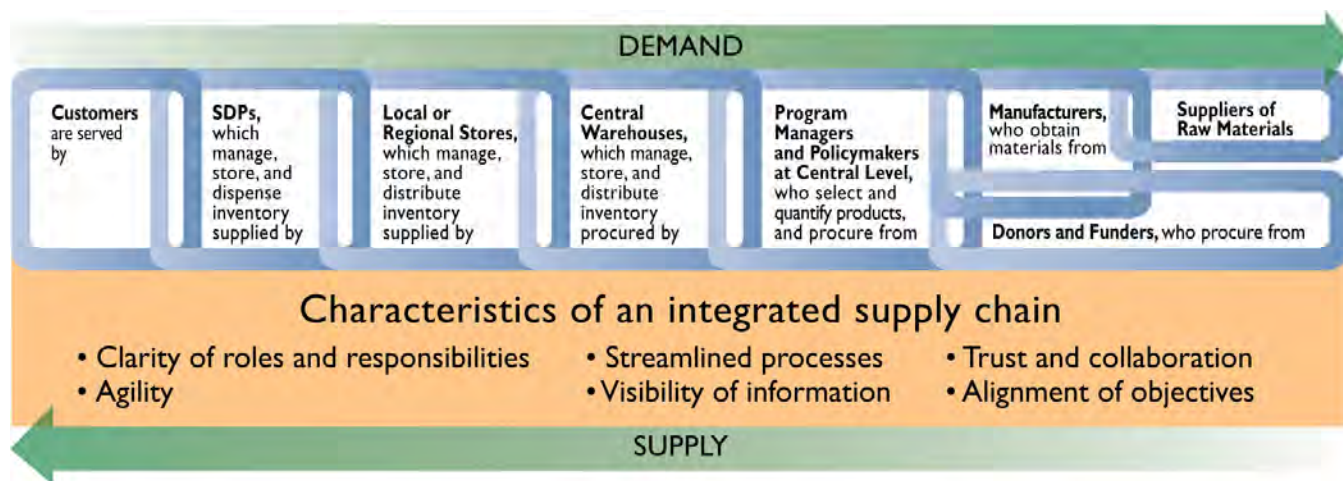
product selection can have an impact on storage and distribution, as the characteristics of new products—be they large dimensions or particular handling instructions—can change warehouse and transport requirements. Monitoring and evaluation activities should identify recommendations for system improvements, and they should be acted on. Seamless linkages also describes the communication and information sharing that helps ensure stakeholders are working under the same assumptions and with consistent information in order to make their decisions.

As these functions are assumed by actors at different levels, we present a new vision of an integrated supply chain that connects customers (demand) with products (supply) and narrows the gap between them by improving the flow of products and information. A key element of supply chain integration is improving the linkages between supply and demand. Better knowledge about demand can contribute to improved planning and less waste. Better information about supply can facilitate product selection, budget planning, and resource allocation. Frequent and accurate communication among chain partners regarding demand and supply can help reduce uncertainty and enhance collaborative planning, such as sharing results from forecasting exercises. Ultimately, the result of an integrated supply chain is seamless linkages that connect demand and supply throughout the supply chain to better serve customers.

Figure 2 is a graphic of an integrated supply chain that has a number of levels through which products and information pass, with actors performing particular functions at each level. This diagram depicts “actors” as the people involved throughout the supply chain, including government staff working at health facilities and Central Medical Stores (CMS), drug selection committees, nongovernmental organization program implementers, donors, and others. “Levels” include the service delivery, subnational (provincial, regional, district, etc.), national, and international levels within a given health system. “Functions” refer to the steps in the logistics cycle (i.e., product selection, quantification, procurement, inventory control, storage, distribution, and LMIS). Products (“supply”) travel through the supply chain, and integration efforts are undertaken in order to improve the efficiency and effectiveness with which these products ultimately reach customers. The chain is seamlessly linked and extends from suppliers of raw materials to customers served by services delivery points (SDPs).

Cutting across the actors, functions, and levels are the characteristics of an integrated supply chain. Some of these characteristics can be considered as both “inputs” (i.e., the conditions and traits that enable and drive toward an integrated supply chain) as well as “results” (i.e., the key attributes that are present in an integrated supply chain). For the sake of consistency and clarity, we describe the characteristics in the next section as the features that need to be in place in order to achieve an integrated supply chain.

Figure 2. An Integrated Supply Chain



While a more traditional graphic might place the suppliers at the top and the customer at the bottom (or the suppliers on the left and the customers on the right), this diagram starts with the customers and then moves along through the SDPs, warehouses, and ultimately to suppliers of raw materials. In order for the customer to be served, each level in the chain must function effectively. To do so, the actors and levels must establish clear roles and responsibilities, be agile, streamline their processes, share information, and collaborate with one another.

What are the Key Characteristics of an Integrated Supply Chain?

The overall goal of integrating the actors, levels, and functions in the supply chain is to improve customer service for public health commodities. Integration strives to take a holistic approach that acknowledges the dynamic elements in a system and how the various characteristics are interconnected. Figure 2 illustrates six key *characteristics* for an integrated supply chain, which are further described subsequently and are illustrated by examples of how a specific country or program is working toward supply chain integration. Also included in each section is a set of activities or interventions that contribute to achieving the integration characteristic. In-country supply chain managers can use this list to assist in workplan development: to identify, prioritize, and implement key activities or interventions that work toward the goal of supply chain integration.

Clarification of Roles, Responsibilities, and Processes

This includes establishing and publicizing roles, responsibilities, and processes (such as reporting or resupply procedures) up and down the supply chain. These should be developed according to the various logistics functions as shown in Figure 1. Such clarification can be achieved through drafting and disseminating job descriptions and contracting documents, or conducting a process mapping exercise. Clarification can help expedite communication and improve accountability, which should translate into improved customer service.

In Zambia, for example, the Ministry of Health (MOH) established a logistics management unit (LMU) at the central warehouse. The LMU helps ensure exchange of information between the central and provincial levels about consumption, resupply, and performance, and supports training and supervision activities. It manages a number of commodities, including antiretroviral (ARV) drugs, laboratory commodities, and essential medicines, and has staff employed at both the central and provincial levels. Their responsibilities, which are clarified by specific job descriptions, include managing the computerized LMIS; receiving, reviewing, and approving reports; analyzing data; and sending feedback reports. An organizational chart maps out respective roles and reporting structures. Furthermore, standard operating procedures (SOPs) for Zambia's ARV drug logistics system outline the roles and responsibilities of personnel at the different levels of the system. Staff members have been trained on the SOPs, which helps them complete their responsibilities in a timely and effective manner. Copies of the SOPs have been disseminated to the SDPs for reference and ongoing clarification, as needed. Staff members have also developed central-level SOPs, which clarify the roles and responsibilities of staff at the LMU and other central-level stakeholders.

Roles, Responsibilities, and Processes are Clarified When the Following Activities/Interventions have Occurred/are Occurring:

- Job descriptions for all key logistics positions written and disseminated
- Contract documents circulated, with appropriate tasks and activities clearly documented and outsourced to third-party logistics providers, as appropriate
- System design conducted
- SOPs for logistics system developed, disseminated, and followed, for each level of the system
- Tasks shifted to optimize staff time
- LMU established
- Process mapping and situation analysis conducted
- Supervision guidelines developed and supervision visits undertaken as scheduled.

Agility

In order to respond to fluctuations in supply and demand, or a changing policy environment, a supply chain must be agile and carry out its functions with speed and flexibility. Logistics tasks should be performed quickly, accurately and effectively. The faster that products, information, and decisions move through a supply chain, the faster it can respond to customer needs.

Procurement should be able to rapidly respond to demand and bring the products needed to clients. If STGs change, for example, requiring a different ARV regimen for treatment of HIV, the procurement process should be agile enough that it can quickly obtain and supply the appropriate medicines in country. However, demand for medicines may be unpredictable, leading to inaccurate forecasts and stockouts or overstocks. Where procurement processes are slow and unwieldy—as is often the case for public procurement—with long lead times, bureaucratic delays, and little or no means to respond to emergencies, errors in forecasting are compounded. However, policies and procedures can be put in place to increase the flexibility of the procurement process, such as supplier prequalification, framework contracts or emergency procurement protocols.

Public financing can have rigid budget cycles and slow fund disbursement; therefore introducing a diverse mix of financing—including donor support, cost recovery and revolving drug funds (RDFs)—can enhance the flexibility and responsiveness of the procurement process. For example, in response to fluctuating donor support for contraceptives, the MOH in Burkina Faso implemented a resource diversification strategy whereby the government uses multiple public-sector funding streams in tandem—internally generated funds, basket funds, World Bank credits, and cost recovery fees—to finance regularly planned contraceptive procurement as well as swiftly respond to delay. If waiting for the release of government funds will delay procurement, cost recovery fees can be accessed promptly to ensure products are available. In many countries, diverse funding streams, each with different disbursement schedules, create a flexibility that helps the supply chain adjust to changes in supply or demand.

In addition, the supply chain needs to be able to handle new products and new SKUs. The LMIS and ICS must be flexible enough to incorporate additional products within a reasonable amount of time. As more countries begin to introduce electronic LMIS, products can be inserted into software relatively easily. But with a paper-based LMIS, it may take months to print new order forms and stockkeeping records. However, there are ways to simply add products to forms. When forms are printed, there should be blank lines where additional products can be written. In Ghana, when the MOH integrated new nutritional products into its supply chain, it instructed staff to handwrite the products onto the existing LMIS forms, until there was time and budget to print new forms.

In terms of distribution, most capacity-limited settings do not have the ability to undertake emergency distribution. In general, distribution schedules are set in advance, with monthly delivery being the most frequent distribution possible (some sites may receive shipments bi-monthly or quarterly). A truly agile

distribution system would be able to deliver on a more frequent basis, daily or weekly, but obviously costs may preclude this. One possibility to improve agility is to use a courier service for emergency distribution, in addition to the regular distribution schedule.

An agile supply chain should be able to respond to results from continuous monitoring; it should have the capacity to quickly act on feedback from reports to improve performance and better serve customers. Agility and flexibility improve the manageability and efficiency of the supply chain.

Agility is Apparent When the Following Activities/Interventions have Occured/are Occuring:

- Procurement processes are flexible and lead times are shortened
- Forecast periods are short
- Supply plans are flexible and can be modified if necessary
- Financing is diversified, funds can be disbursed quickly, and with different disbursement schedules
- There is a system to provide emergencies distribution, including SOPs, trained staff and courier service or emergency vehicles
- Warehouses or containers can be rented or renovated to accommodate additional products
- Storage facilities can maintain lower inventory, if data quality and distribution are assured
- LMIS is robust enough to provide timely consumption data

Streamlined Processes

This entails eliminating bureaucratic hurdles that can separate supply and demand information, or actions or processes that do not add value to the supply chain, which impede the flow of information and commodities. Such hurdles may include cumbersome and lengthy order approval processes, duplicative LMIS forms, inventory management procedures, or financial management. Streamlining the number of levels in a system can help shorten the pipeline to the end user and improve efficiencies by bringing the supplier closer to the user, decreasing stock levels, and reducing redundancies. Furthermore, the fewer “touches” in the resupply process, the better in terms of responsiveness, timeliness, and accuracy.

With the Delivery Team Topping Up system in Zimbabwe, for example, a delivery truck brings product directly from the central warehouse to facilities. In this two-level system, delivery team leaders have been trained to complete reports, calculate resupply quantities, and deliver product all in one visit, thus reducing the lead time, decreasing the amount of stock on hand at a facility, and task shifting responsibilities. Consequently, facility staff are able to spend more time serving customers and less on completing logistics forms.

Processes are Streamlined When the Following Activities/Interventions have Occured/are Occuring:

- System assessment conducted and used to inform system design
- Process mapping conducted
- A system designed and implemented that better connects supplier and user, reducing the number of levels in the system
- Transportation analysis undertaken and new routings identified and implemented
- Warehouse assessment conducted and new layout and flow designed and implemented
- Cost analysis undertaken and costing tool utilized.

Visibility of Information

An integrated supply chain is one in which data are visible up and down the chain, from end to end. Different actors and different levels should be able to “see” where products are and what demand is. In this way, the virtual gap between supply and demand is reduced and transparency of data and information is improved. Strategies to improve visibility include using technology to collect, analyze, and share data, and

establishing mechanisms that support planning and coordination. Furthermore, improving visibility of total supply chain costs (i.e., costs of all the partners up and down the chain) helps actors make rational decisions to help avoid unnecessary costs or duplication of costs.

Information on contraceptives is often “invisible” in both national and global supply chains. Manufacturers and donors may not know what real demand is, in-country partners may not know who is buying what and when, SDP staff may not know what is stocked in their district or central warehouses, and the MOH may not know how much is stocked in SDPs. The Coordinated Assistance for Reproductive Health Supplies (CARhs) group is a coalition of international organizations that focuses on reproductive health and coordinates to prevent national stockouts of contraceptives. The CARhs group increases visibility of information through the Procurement Planning and Monitoring Report (PPMR) and the RHInterchange. The PPMR is a monthly report that describes national stock status of contraceptives; it includes commodity security updates and stock status data. By providing visibility into information about national contraceptive supply chains, it supports planning, coordination, and strategic allocation of resources. The RHInterchange is a website that helps coordinate contraceptive orders and shipments by gathering and storing data from the central procurement offices of major contraceptive donors and governments, and providing access to timely information that can be used for pipeline monitoring, commodity management, and planning. These two tools help improve visibility of information among global and national partners. As actors become more willing to share their information and increase data visibility, it builds trust among partners; with greater trust comes even more comfort in sharing information. Subsequently, donors and governments are able to make better informed decisions about timing and quantities of shipments, responses to emergency orders, and allocation of resources.

Information is Visible When the Following Activities/Interventions have Occured/are Occuring:

- Data from monitoring and evaluation activities used to design and implement supply chain improvements
- LMIS and contraceptive LMIS, where appropriate, have been introduced and include feedback reports
- Technology is appropriately used to facilitate LMIS data aggregation, analysis, and sharing of data with stakeholders
- Quantification is informed by product selection decisions and LMIS data
- National quantifications facilitated and supply plans regularly reviewed and updated
- Routine logistics system performance reports are generated and shared up and down the supply chain
- Procurement and financing plans and timetables are developed, updated, and shared
- Data from supervision reports are shared and used to identify interventions for improvement.

Trust and Collaboration

Trust and collaboration need to be present between the actors and levels, both within institutions and among organizations participating in the end-to-end supply chain. Nurturing a collaborative environment can help to break down existing functional and organizational barriers to improve supply chain performance.

In Rwanda, for example, a number of different partners work on family planning activities. In early 2005, the Family Planning Technical Working Group was formed to improve coordination and minimize duplication of efforts. The working group’s members come from governmental and nongovernmental institutions, private sector, and partner agencies such as the U.N. Population Fund and the U.S. Agency for International Development. Prior to the group’s formation, there was no communication or collaboration between donors, programs, or the levels of the supply chain. However, through regular meetings and sharing information, the group has fostered trust among partners. Greater trust and collaboration have significantly contributed to considerable improvements in the situation for commodity security in Rwanda: forecasts and procurements are executed in a timely manner, new family planning methods have been introduced, stockouts are

minimized, more providers are trained, and facilities are upgraded throughout the country. Rwanda has seen an increase in modern contraceptive prevalence rate from 10.3 percent in 2005 to 17.4 percent in 2008.

Trust and Collaboration are Fostered When the Following Activities/Interventions have Occurred/are Occurring:

- Logistics technical working groups and committees have been established, meetings are regularly held, and minutes are documented, disseminated, and used for program planning.
- Promised funds from stakeholders are disbursed, used as agreed on, and shared with technical working groups and committees.
- Information is being shared through mechanisms such as in-country LMIS, RHInterchange, PPMR, CARhs, etc.

Alignment of Objectives

This refers to having aligned vision, goals, and objectives across organizations (partners, clients, stakeholders) and levels in order to ensure consistency in direction within the chain. All too often, stakeholders focus on their own interests and priorities and disregard those of partners, resulting in poor supply chain performance. Misaligned objectives can contribute to excess inventory, stockouts, inaccurate forecasts, and poor customer service. Stakeholders must recognize that a problem exists and then determine its root cause and introduce, align, or redesign objectives.

In order to align objectives of different stakeholders, the incentives of these stakeholders must be acknowledged. The various actors must be motivated to complete their respective tasks in a manner that is consistent with the common goal, recognizing that the performance of the supply chain is dependant on how well all the links in the chain work together, not on how well each one performs independently. For example, a donor may want to introduce a parallel reporting mechanism for an ARV therapy program it is supporting. The donor's incentive is to report on the number of clients treated with the medicines it is providing in order to justify expenditures and advocate for additional resources. Meanwhile, the MOH wants to institute a single, streamlined national reporting structure. Its incentive is to reduce the reporting burden on health delivery staff. Both the donor and the MOH share the same overall objective of putting clients on treatment, but they may have different strategies and incentives to achieve that objective.

Differing incentives must be managed so that common objectives can be reached. Properly aligned supply chains can lead to lower costs, less stored inventory, higher quality, and improved service. In order to create alignment, risks, costs, and rewards should be distributed fairly across the system.

The LMU mentioned earlier exemplifies a mechanism that can help align objectives. In many countries, there is a misalignment of objectives between the CMS and programs within the MOH. The role of a CMS is to procure and distribute medicines; the MOH is responsible for ensuring the right medicines are available at the point of use. The CMS may fill orders without being incentivized to ensure these orders are for the products that are actually needed. That is considered the job of the MOH, outside the responsibility of the CMS. The LMU—an organization whose clear objective is to ensure products are available at point of use—can bridge this gap between the MOH and the CMS and help to align their objectives around reducing stockouts, ensuring product availability, and striving for greater efficiency in the supply chain.

In Zambia, *The Health Logistics Press* is an MOH newsletter that highlights the logistics reporting rates of facilities throughout the country. The newsletter publishes the rankings of the different “leagues” (categorized by HIV test kits, ARVs, and essential drugs) in terms of logistics reporting rates, thus fostering competition to place at the top of each division. The newsletter also highlights an outstanding health worker at a particular facility. This strategy of positive reinforcement and peer pressure can motivate health workers to submit reports promptly as well as incentivize them to support the MOH's goal of improving Zambia's logistics system.

In Nepal, there was a misalignment of incentives whereby warehouse managers were penalized for disposing of expired products; consequently, storage facilities became disorganized and cluttered with unusable commodities. Managers had no incentive to clean out their facilities because they would be reprimanded for wasting products; in the meantime, the system suffered due to space constraints and strained inventory control systems. Recognizing the problem of excessive inventory, the government sanctioned a massive dejunking activity. Managers were able to clear their stores without fear of adverse consequences. Available storage space was increased by regularly scheduling removal of unusable commodities and broken equipment, and introducing regulations that facilitate instead of impede write-off of useless goods. Thus, the different levels were able to align themselves around the goal of establishing an efficient storage system.

Objectives are Aligned When the Following Activities/Interventions Have Occured/are Occuring:

- Supply Chain Master Plan developed collaboratively and consultatively with all stakeholders
- Performance management plans and indicators agreed on and developed
- Indicators regularly shared with stakeholders
- Joint strategic planning workshops have been undertaken
- LMU quarterly meetings are supported and actively attended.

These fundamental building blocks of clarity of roles and responsibilities, agility, streamlining processes, visibility of data, trust and collaboration, and alignment of objectives are key to improving the main functions within the supply chain: namely, product selection, quantification, procurement, inventory control systems, storage, distribution, and LMIS. Different actors within the supply chain may have different priorities and motivating factors; however, an integrated system is able to collect sufficient, accurate information about demand and supply and ensure that this information flows to the right people at the various levels, in a timely manner, so that supply chain decisions are fully and consistently informed.

For a list of tools and resources that can help provide guidance in implementing the activities and interventions highlighted in this document, visit www.deliver.jsi.com.

The authors' views expressed in this publication do not necessarily reflect the views of the U.S. Agency for International Development or the U.S. Government.

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