Linking Human Resource Investments to the Global Health Supply Chain: Lessons from the USAID|DELIVER Project and Other USAID Investments

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1.1. Executive Summary

The U.S. Agency for International Development (USAID)|DELIVER Project involved over 30 years of technical assistance programming, funded by USAID and implemented by John Snow, Inc. Its goal was to strengthen the public health supply chain systems of developing countries to ensure that health commodities, particularly for family planning and malaria, were available for patients.

The objective of DELIVER's Task Order 4 (TO4), which began in 2010 and ended in 2016, was to "*increase the availability of essential health supplies in public and private services through strengthened supply chains and supportive environments for commodity security*", as well as improving "*essential health commodity supply chains by strengthening logistics management information systems, streamlining distribution systems, identifying financial resources for procurement and supply chain operation, and enhancing forecasting and procurement planning.*"

As TO4 ends, USAID has deemed it timely to assess the logic and level of success of its collective investments and interventions in human resources (HR) for supply chain management (SCM) in regard to overall supply chain performance. The aim is for USAID and the development community at large to be able to not only understand successes and areas for improvement from the TO4 portfolio to date, but also to design future interventions based on an evidence base and deliberative systematic thinking.

To this end this report aims to establish a theory of change (TOC) for TO4's HR for SCM interventions, and then to use this TOC as a basis for determining: a) how the project might be evaluated in regard to its HR for SCM performance; and b) the degree to which USAID can perform a retrospective evaluation of TO4.

In order to establish a TOC for TO4's HR for SCM interventions this report analyzed two main sources of data: a) notes from key informant interviews conducted in spring 2015; and b) a desk review of literature from the project, as well as literature from related USAID projects.

Using this data emergent themes were categorized around the following interrelated research questions:

1. How did USAID supply chain projects define problems in discussions about human performance in SCM?
2. What solutions did USAID supply chain projects suggest and/or implement?
3. What did USAID supply chain projects define as a success in HR for SCM?

Once a set of common themes emerged, a coding set was established and applied to both interview notes and remaining documents until there was enough evidence to support a TOC that linked levers of change and outcomes/impacts (improvements in respect of problems, and successes).

The overarching objective of TO4's HR for SCM interventions was commodities being available at service delivery points (SDPs). TO4 aimed to achieve this overarching objective through individual interventions, leading to inputs, outcomes and impacts. The levers for change, of TO4's interventions were identified as:

- leadership;
- collaboration and coordination;
- organization optimization;
- education and competency; and
- performance management.

These levers of change cascade up to concrete outcomes and eventually to impacts and the overarching objective. Similarly, they link downwards to specific interventions in the form of activities, policies, and investments.

This report ultimately concludes that an evaluation of TO4 would not satisfy the main criteria of plausibility, utility, and feasibility for a retrospective performance evaluation that would be based off indicators that were not initially presented in the design of its HR for SCM interventions.

Future-facing indicators and metrics presented in this report are able to help program designers, activity managers, and researchers determine patterns of impact that interventions have on supply chain impacts. As such, this paper is expected to contribute to developing measurable and evaluable interventions for USAID's future investments in HR for SCM. In addition, this report represents the first step toward making a business case which will enable the international development community to quantify the return on investment for investing in human resource interventions for supply chain management.

1.2. Key Terms

While the literature uses mostly consistent terminology, there are several closely related terms whose meanings overlap and whose inconsistent use could result in confusion. The definitions given below are therefore somewhat false separations and serve a conceptual function, rather than a real practiced limit. For the sake of this paper, the following definitions are given to describe terms associated with various contexts of capacity building. The first three relate to the three levels discussed by Jensen (2009):

- **Human resources** (HR) will generally refer to interventions aimed at individual capacity building meant to improve skills and competency for individuals regardless of their role within the supply chain. HR interventions include training and mentorship.

- **Organizational development** refers to interventions that seek to enhance or expand a supply chain organization's capacity for managing workloads or for developing cadres. Organizations might be logistics management units (LMUs), district offices, or a training institute. Interventions might be the creation of job descriptions, LMU restructuring, or job creation at district public health offices.

- **Societal capacity building** denotes a broad range of activities whose goal is to capacitate central governments to improve their supply chains. These might be policy interventions, advocacy at the central level, or leadership workshops open to government officials. As such, these interventions might be organizational or focused on individuals, but they expand beyond supply chain activities and into other areas of health programming and national policy setting.

- Note that **HR for supply chain management (SCM)** is shorthand for all interventions aimed at a systematic approach to improving any part of the human impact on SCM, whether it is focused on HR, organizational development or societal capacity building.

- **Workforce** refers to the entire network of workers who are implicated in health SCM. This includes nurses, administrators, logisticians and pharmacists who fulfill supply chain and logistics duties at service delivery points.

Acronyms

OD	organizational development
SCM	supply chain management
SOP	standard operating procedure
ToC	theory of change

2. Introduction

Over the lifetime of the U.S. Agency for International Development (USAID)|DELIVER project, systematic investments in supply chain management (SCM) have matured as the development community at large has begun to better understand the relationship between supply chain workforces and system performance. This work falls under the purview of DELIVER's Task Order 4 (TO4), whose objective is to "*increase the availability of essential health supplies in public and private services through strengthened supply chains and supportive environments for commodity security*."

Because this growth in thinking and investing has occurred organically, it has been largely reactive and creative. As TO4 ends, USAID has deemed it timely to more systematically assess the logic and level of success that its collective investments in HR for SCM have had in regard to overall supply chain performance. In doing so, the Agency and community at large will be able to not only understand successes and areas for improvement from its portfolio to date but also to design future interventions based on an evidence base and deliberative systematic thinking.

This report is the result of cumulative analysis that presents the basis for developing that systematic thinking about human resources (HR) for SCM. While many lessons about HR for SCM interventions have been drawn over the course of DELIVER, they have been largely reactive to local situations and needs. Nevertheless, patterns emerged in these interventions, and this report was developed to fill the gap in knowledge around what those patterns were and *how* they have successfully contributed to the performance of a supply chain. The documentation of these lessons and the underlying systematic thinking of previous interventions not only preserves knowledge but also advocates for the continued implementation and growth of activities in this growing area. Practically speaking, this report's purpose to two-fold: a) to act as a guide for developing the next iteration of HR for supply chain investment by USAID; and b) to act as a framework that supports a business case that drills down into the return on investment for this activity area.

First, this report aims to pin down a theory of change (TOC) for HR for SCM that has driven interventions under TO4. It then uses this TOC as a basis for determining: a) how one would go about designing evaluable indicators for HR for SCM interventions; and b) the degree to which USAID can perform a retrospective evaluation of TO4. Because key performance indicators at the outset of TO4's development do not comprehensively capture the nature of its work in HR, organizational development, and capacity development, this report does not provide a judgment of how well the DELIVER Project has performed but rather lays the groundwork for determining if and how such a performance evaluation might be conducted.

This report has two main purposes:

1. To present a TOC, including preconditions and critical assumptions, which supports and justifies TO4's interventions around HR for SCM, capacity building, and organizational strengthening.

2. To make recommendations on the feasibility and potential evaluation of the DELIVER TO4 portfolio of investments in HR for SCM, and to propose indicators and study questions that will allow connections to be drawn between HR for SCM interventions and overall supply chain performance, within the framework of the proposed TOC.

Results from this assignment are expected to contribute to the design of an evaluation methodology for the USAID's HR for SCM work, and to contribute to developing measurable and evaluable interventions for USAID's future investments in HR for SCM. In addition, this report represents the first step toward making a business case which will enable HR for SCM stakeholders to quantify the return on investment of this activity.

2.1. Background

The USAID|DELIVER Project involved over 30 years of technical assistance programming funded by USAID and implemented by John Snow, Inc. Its goal was to strengthen the public health supply chain systems of developing countries to ensure that health commodities, particularly for family planning and malaria, were available for patients. TO4 began on September 30, 2010, and is aimed at improving "essential health commodity supply chains by strengthening logistics management information systems, streamlining distribution systems, identifying financial resources for procurement and supply chain operation, and enhancing forecasting and procurement planning" (USAID|DELIVER, 2012b).

The work of TO4 in HR for SCM built on capacity development initiatives of Task Order 1 (TO1), funded from 2006 to 2012. While other task orders are specifically designed to address health programs (TO2 was dedicated to avian influenza, TO6 covered emerging pandemic threats, and TOs 3 and 7 were for malaria supply chains), the approach of TOs 1 and 4 incorporated a broad definition of systems strengthening. As such, the project worked across other USAID programming in systems strengthening and capacity development, such as its HIV/AIDS supply chain system counterpart, Supply Chain Management Systems (SCMS), the HR for health flagship projects, Capacity and Capacity Plus, as well as Systems for Improved Access to Pharmaceuticals and Services (SIAPS).

2.2. DELIVER's HR System Assessment

HR is a key performance driver within supply chains. Therefore, the effective management of a supply chain demands excellence in managing its HR. By proactively managing plans, polices, and procedures associated with people, an organization can expand operations that sustain supply chain performance (USAID|DELIVER, 2013).

Figure 1: DELIVER's "Impact of HR on supply chain performance"

The *Capacity Plus* framework, set out in Figure 2 below and used by DELIVER in its Assessment Tool, has been used to determine the level of maturity of HR systems, policies, and procedures that impact SCM through five building blocks. The HR for health building blocks are as follows:

- **Building Block 1 – Powerful constituencies**: Constituencies, or stakeholders, are needed who provide technical leadership and advocacy in the field of SCM, as well as HR management.
- **Building Block 2 – Optimized policies and plans**: There need to be policies, plans, and associated SOPs that support HR capacity development and management, including financing and HR information systems (HRISs).
- **Building Block 3 – Develop workforce**: Initiatives need to be put in place that focus on identifying and building a robust workforce, including recruiting, competency modeling and development, and pre-service and in-service education.
- **Building Block 4 – Increase workforce effectiveness or performance management**: Initiatives need to be carried out that identify and enhance workforce performance, including retention, supervision, mentoring and coaching, and task shifting.
- **Building Block 5 – Professionalization of SCM**: A process needs to be carried out to make or establish supply chain roles as a profession, or the set of responsibilities or competencies of such professionals.

These building blocks, published in the 2013 USAID|DELIVER Human Resource Capacity Development in Public Health Supply Chain Management Assessment Guide and Tool, help to identify a proactive way forward for assessing and strengthening a country's public health supply chain HR system, which is deemed to be an important entity, but they do not directly tie the benefits of high performance within these areas to improved commodity availability. It is helpful to understand how USAID imagines an ideal HR system, but ***the link between individual interventions, this ideal system, and supply chain system performance is at the heart of this investigation.***

Figure 2: CapacityPlus framework adapted by USAID|DELIVER Project

2.3. Methods

In a general sense, the concept of a "theory of change" is based on the principle that a program's success is linked to a broader theory of how and why that program should work to achieve a defined goal (Weiss, 1972, 1995). This approach requires evaluators to draw out and test assumptions built into social programs, revealing how well assumed links between program inputs (levers of change) and outcomes hold up in practice to produce results (Weiss, 1995, p. 67). A TOC describes sequenced events that are expected to lead to a specific impact, and are "often presented in diagrammatic form with an accompanying narrative summary" (James, 2011). "Events" can be broadly conceived here as energy or financial expenditures in a system.

Traditionally, thinking around TOCs has fallen into two complementary approaches, seeing TOCs as: a) a practical tool to map activities to their influences; and/or b) a means to reflect on implicit underlying worldviews and philosophies and thus make explicit assumptions about levers for change (Vogel, 2012). These two approaches should be combined to maximize both applicability to an evaluation and reliability of results. TOCs have been used in designing, managing, assessing, and scaling up interventions (Mayne and Johnson, 2015).

Given the range of potential applications and the complex nature of drawing boundaries around events and beneficiaries, it is easy to imagine how a mapping practice might become messy. In fact, there is no consensus regarding what should be included in the representation of a TOC (Mayne, 2015). For a wide audience, visualizations must balance the need for readability and quick consumption with the true degree of complexity within the project.

Mayne (2015) refers to results as "outputs, outcomes, and impacts, where impacts are the final outcomes affecting well-being." In his discussion of TOCs, "intervention" signifies "specific activities undertaken to make a positive difference in outcomes and impacts of interests," inclusive of "policies, programs, and projects" (p. 121). The current report follows this nomenclature.

Often, a TOC is aimed at the beneficiaries of interventions. This project focuses on a conceptual beneficiary – that is, public health supply chain systems – rather than target workers or patients within the system. As such, DELIVER TO4 is examined from the perspective of overall supply chain improvement, whose overarching objective is commodity availability at the service delivery point. Implicit beneficiaries of an improved supply chain are a) patients, whose health improves via access to commodities, and b) citizens, whose livelihoods improve through meeting development goals. For the sake of this project, the links between supply chain and higher level development outcomes will not be explored.

The Centre for Theory of Change (theoryofchange.org) describes the process of mapping programmatic activities and goals as first identifying desired long-term goals and tracing backwards to identify the outcomes and their requisite causal relationships to interventions. This report will follow this order, presenting the long-term goal(s), then using expertise from the field of HR for SCM to explain the linkages of individual outcomes and interventions that are depicted on the diagrammatic model.

2.3.1. Data Collection and Analysis

This report draws primarily on two sources: a) notes from key informant interviews conducted in spring 2015 (see Appendix A for a list of the key informants interviewed), and b) a desk review of literature from the project and supported by literature from related USAID projects (see Appendix B for a list of the documents reviewed).

This data was systematically reviewed using a realist evaluation approach to program analysis. Systematic reviews involve reading and coding literature around a single research question and then collecting emergent themes that answer the question.

In the light of the increasing popularity of Cochrane Reviews in the 1990s, Pawson and Tilley (1997) developed a "realistic evaluation" that considers the fact that "through the workings of entire systems of social relationships that any changes in behaviors, events and social conditions are effected" (p. 4). As such, a realist review moves beyond a standard literature review by articulating when an intervention worked, for whom, and

under what circumstances (Pawson, Greenhalgh, Harvey and Walshe, 2005, p. 21). Realist reviews write levers of change into policy decisions (Pawson, 2002). Approaching a programmatic review from a realist perspective involves understanding and accounting for the messiness of contextual factors that might impact the outcomes of a project.

In the first iteration of this review, 654 documents, both public and private, were collected around USAID's investments in HR for SCM. 540 were excluded based on their title or after a brief review of their content. This left 114 documents in the final analysis.

Emergent themes were then categorized around the interrelated research questions:

1. How did USAID supply chain projects define problems in discussions about human performance in SCM?
2. What solutions did USAID supply chain projects suggest and/or implement?
3. What did USAID supply chain projects define as a success in HR for SCM?

Once a set of common themes emerged and reached saturation, such that there were no new themes, a coding set was established and applied to both interview notes and remaining documents until there was enough evidence to support a TOC between levers of change and outcomes/impacts (improvements in respect of problems, and successes).

Furthermore, this realist review aligns with a TOC approach to evaluation, as the context written into a realist evaluation translates into major preconditions or critical assumptions in a TOC. In this case, context considerations included where an intervention took place, when it occurred, and under what mechanism or project it was funded. Because this report primarily aims to analyze the DELIVER Project, documents related to that project were reviewed first, with other documentation and informant interviews filling in to support or problematize (if there were conflicting views) claims from the broader HR for health and SCM communities.

2.3.2. Methodological Limitations

The original interview questionnaire was developed to answer a different research question: What is a TOC for improving *HR systems* for public health supply chain systems? As such, the open-ended interviews did not produce responses that matched the aims of the current report. In addition, full transcripts from these interviews were not available. Time constraints prohibited a second set of interviews being conducted at the time of this study. Nevertheless, the detailed notes that were available were combed using the new coding scheme to the extent possible. Because of the nature of the questions asked, as well as stakeholders' own positionality, some participants produced responses that were more aligned to the current study. This is not to say that their opinion is to be privileged.

In addition, an ideal realist evaluation of the literature would a) provide more detailed explanation, and b) distinguish between information from private and public sources. Unfortunately, one can only evaluate texts based on the content contained within them. Thus, the answers were not always answered and certainly not packaged in way that

matched this study's research question. That is, many reports or success stories did not include reference to the Project's links between why a particular intervention was approached and whether it was sufficiently successful. Additionally, investing in HR is generally long-term, so it would not be feasible for regular reports to include longitudinal results. Lastly, this study aims to present potential evaluation metrics. Such metrics were not previously integrated into the design of the project, and, consequently, there is limited information on the impact that interventions have had on supply chain system improvements. Nevertheless, links that were noted in the literature were also noted in a coding spreadsheet, and findings across the data set were analyzed to infer links between levels of cause and effect.

3. Findings

A working framework for a TOC model or visualization for any project includes inputs, immediate outcomes, intermediary and long-term impacts, and decision-makers and influencers that link to an overarching objective (Vogel, 2012). In this case, the impact, or overarching objective, is the shared goal of the global health supply chain community: quality commodities are consistently available at service delivery points.

The following levers for change, which might also be identified as "inputs," emerged from the data:

- **Leadership;**
- **Collaboration and Coordination;**
- **Organization Optimization;**
- **Education and Competency; and**
- **Performance Management.**

These cascade up to concrete outcomes and eventually to impacts and the overarching objective. Similarly, they link downwards to specific interventions in the form of activities, policies, and investments. Outcomes link these levers of change to the overarching objective, and they will be discussed in the remainder of the report. A critical difference between a TOC and a log frame or other traditional evaluation framework is the outward consideration of assumptions and preconditions, which became major components of linkages between the outcome and impact levels but were also elements of other links. These will be discussed in the narrative section of this report.

In order to analyze in depth the contextualization of the TOC for HR and, more generally, SCM, existing tools developed by DELIVER are used to give coherence and consistency to the findings: the HR for Health Building Blocks and the Supply Chain Attributes for High Performance. These are used as a reference framework to further analyze the findings.

However, it must be noted that HR only, or SCM only, cannot solve all the issues connected to a lack of availability of medicines and medical items at the point of distribution

to the final beneficiaries. This is the reason why the existing tools and methodology must be grounded in a more comprehensive approach – i.e. the TOC. The TOC makes it possible to consider all the relevant factors simultaneously.

3.1. DELIVER's Supply Chain System Priorities

In the literature, interventions were not always tied linearly to specific problems and were often presumably implicit. USAID | DELIVER endeavored to improve several kinds of issues within both HR and supply chain systems through its investments HR projects. The boundaries between the two are blurry, and there is frequent overlap between HR and supply chain interventions. For the purpose of this report, the two areas are conceptualized as separate but interdependent systems.

DELIVER's Attributes of a High-Performing Supply Chain

Adopting lessons from the commercial sector, USAID | DELIVER has developed a list of six attributes of a high-performing supply chain in its supply chain integration framework. These support the systems strengthening arm of DELIVER's portfolio, and they link directly to the problems tackled over the course of the project's HR interventions:

- Clarity of roles and responsibilities—supporting the development of central LMUs.
- Agility—supporting the development of efficient, effective commodity procurement mechanisms.
- Streamlined processes—implementing cost-effective, secure efforts to distribute priority commodities.
- Visibility of information—establishing electronic logistics data reporting systems.
- Trust and collaboration—supporting the environment for local and international collaboration around public health logistics through the International Association of Public Health Logisticians (IAPHL).
- Alignment of objectives—researching performance-based incentive efforts for SCM.

At the same time, DELIVER has identified the following areas of SCM as priorities:

- product selection
- supply planning
- forecasting
- financing
- procurement
- quality assurance
- warehousing and distribution
- inventory management

- storage
- logistics management information systems (LMISs)
- waste management and disposal
- risk management

While HR interventions improved elements across these areas, as no supply chain activity is ultimately possible without human capacity, the areas that HR for SCM interventions targeted most directly were **forecasting and supply planning, procurement, inventory management, LMIS,** and **risk management.**

To determine how this ideal HR system matches the inputs that emerged during the development of a TOC, each building block is analyzed according to USAID literature and feedback from the key informants.

Building Block 1 – Powerful Constituencies

DELIVER states that "*constituencies, or stakeholders, are needed who provide technical leadership and advocacy in the field of SCM, as well as human resource management."* Its assessment tool goes on to include an HR champion for SCM, a commodity security group, the participation of SCM personnel, and SCM as a ministry of health priority as key components of this building block.

In the project's work, problems that fell under this building block were a lack of coordination between stakeholders, and leadership issues. In some contexts, advocacy played a key role and was often driven by leaders, in the form of supply chain champions. It follows that interventions aimed at technical leadership and at advocacy, as well as coordinating those efforts within the government, were meant to lead to powerful constituencies.

Lack of Coordination

A lack of coordination between different government departments and levels of governance has seen the manifestation of different systems of reporting, as was the case in Pakistan. Different systems of reporting at the district and sub-district levels made it difficult to analyze the supply situation across departments, and adversely affected planning, procurement and resource mobilization, with the ultimate negative consequence being that the ministries' ability to provide family planning services to the Pakistani population was impeded (USAID, 2012a).

Until just a few years ago Ethiopia's health system was trying to cope with an inadequate supply of affordable, quality essential medicines, poor storage conditions, and weak stock management, caused by a complete lack of unity within the healthcare supply chain (USAID, 2014). In some developing countries a series of individual supply chain systems have developed: for some time, Ghana managed and distributed health commodities through the operation of four vertical supply chains, a system that was judged by the Ministry of Health to be ineffective (USAID, 2007c). Similarly, in Ethiopia, in the absence of a strong, unified health supply chain the different health programs in operation in the country established their own logistics systems in an effort to improve the flow of supplies (USAID, 2014). While these individual programs were a short-term fix, gaps persisted (ibid.).

Leadership

Leadership was addressed from the perspectives of advocacy for policy and a technical perspective. Typically, technical leaders were deemed to be "supply chain champions."

The literature defines a supply chain champion as "a person or group that monitored the problem at hand and pushed for a resolution (USAID and DELIVER, 2013a, p. 2). These champions were cited as creative and proactive players in various processes, and, as such, they are able to move past problems and identify quick solutions to them.

Champions gather and interpret information and either act or request others to act to solve problems. They use creativity to solve procurement bottlenecks, and they encourage a decision-making environment by taking responsibility for the betterment of the entire system and by empowering their colleagues.

Supply chain champions included civil society groups and stakeholders in the procurement process. These champions gathered and interpreted information and, sometimes, referred it to others who might be in a better position to act. They also monitored funding and supply status and engaged in advocacy, often showing initiative and creativity.

Examples of the abundance of capacity building measures attached to the health supply chain in a single country can be seen in Pakistan, where DELIVER's measures include technical assistance to provincial and regional governments on procurement and logistics, a three-credit hour-long course at the Health Services Academy, leading to a qualification in SCM, and the establishment of a pool of logistics champions in the public health sector through the involvement of master trainers, based within government, from across the country (USAID, 2013c).

In another example, the Botswana Ministry of Health created a specific "condom coordinator" job. This person was granted the authority to make procurement decisions and to establish systems for data collection, leading to an improved decision-making environment and preventing procurement problems as they arose, and before they could get caught up in long bureaucratic processes (Akhlaghi et al., 2013).

In India, initial technical assistance involved advocacy activities with senior-level officials. There, the primary driver that recognized the need for an effective logistics system was the Ministry of Health, which approved a separate LMU and staff allocation for the newly created cell (USAID DELIVER, 2007f). Similarly, People that Deliver found that involving the HR Directorate in Mozambique, consisting of both technical staff and leadership, was critical for facilitating workforce plan approval (Pilz, Nhaducue and Gasuguru, 2014).

In other cases, data was used to build convincing an evidence base and to jumpstart civil society advocacy efforts, which cascaded up to leadership to take action (USAID DELIVER 2007a, 2007b, 2013b, 2013h).

Insights from Key Informants

The majority of interview participants made mention of supply chain problems related to leadership and how supply chain issues could be overcome with a competent leader. One message was that leadership should consist of people with the competencies to be heard and respected, particularly given that strategies are difficult to implement without a champion in a country. These leaders need to be aware of how the entire supply chain functions, rather than simply taking responsibility for a small fragment. Furthermore, informants stated that ministries of health are not investing in supply chain performance improvement because they perceive the role of central medical store staff too simplistically—seeing such staff as a group of people that focus on immediate and local logistics, as opposed to whole supply chain systems. Not only do leadership-specific issues need to be addressed, workers need to have the motivation and means to raise issues with leaders. One way of doing this has been demonstrated in the Dominican Republic: to problem solve by bringing people together so that they know each other well enough to foster proactive communication.

Concerns related to the training of leaders were also flagged, both in terms of a lack of training for leaders (since the focus tends to be on ordinary supply chain workers) and also in terms of the type of training leaders receive. Supply chain leaders at the highest level have not generally been the targets of DELIVER's training efforts. Further emphasis should be placed on identifying the "right" leaders in the first place, and giving them the right tools and providing them with the necessary knowledge. Where good leaders are found in the central medical store, they have figured out how to be self-sustaining on their own; the clever ones are creating their own strategies and going to ministers regularly to tell them how issues should be handled. Leaders need to be trained in leadership skills, not just technical knowledge. Matters of leadership need to be worked on at each level of the supply chain: e.g. so that the person in the warehouse feel empowered to take leadership within their sector of the warehouse. Furthermore, while it is possible to improve a person's leadership skills through short-term interventions, those skills cannot replace ongoing external mentorship and support to reinforce the connection between learned skills and sustained and consistent implementation of these skills.

(Brown, Eomba, Frankel, Pilz, Yadav)

Summary

Well positioned constituencies, or stakeholders, who provide technical leadership and advocacy in the field of SCM, as well as HR management, are needed.

According to Building Block 1 – Powerful Constituencies, there is a strong need for both *political and technical* champions to lead and advocate for SCM and HR.

Insights from DELIVER initiatives suggest that a lack of coordination among different levels of the supply chain still persist. Also, the vertical nature of health programs hinders collaboration. Key informants highlighted the absence of a political champion in many contexts, although they suggested that facilitating a gathering of logistics and supply chain stakeholders can help collaboration, despite the very fragmented lines of responsibility.

In terms of leadership, good examples in terms of defining technical leadership can be found in Botswana and Pakistan. However, interviewees suggested that developing technical leadership and the capacity for champions within health supply chains is not yet a common practice. Moreover, for various reasons political (rather than technical) leaders did not often attend DELIVER trainings on SCM, which resulted in fragmented knowledge and understanding of supply chain functions and workforce.

Building Block 2 – Optimized Policies and Plans

Organizational Structure

The way in which an organization is structured, which includes coordination between different departments, levels or bodies, management practices, access to technology for the purpose of monitoring and forecasting, and training capacity, among others, is crucial for successful supply chain operations, meaning that when several of these factors are not working well, or are not in place at all, issues or problems will arise. Whilst it would not be possible to detail all the problems caused by an organization not having the appropriate structures in place in every aspect of its work, DELIVER's activities highlighted a number of such problems.

Insights from Key Informants

Key informants mentioned issues regarding coordination between donors and national governments. There were concerns about dependency on DELIVER's presence in functioning systems. While this shows that the project has done exceptionally well at developing relationships that work, it also demonstrates a felt need for the development community to continue thinking through the critical yet complex subject of coordinated exit plans. Informants suggested working with government staff when possible, but also considered the challenge of negotiating that work in contexts with high government turnover or other challenges. A lack of coordination between donors themselves was also raised as a problem, particularly if they are to act as a force that is strong enough to pressure the government to make necessary changes. In one country, for instance, corruption was cited as a big problem in the government system, leading to frequent procurement delays and the absence of a backup plan. Informants suggested a need for donor coordination committees that meet weekly. However, this still needs to translate into implementation. Furthermore, there continues to be a lack of coordination between countries on how best to train supply chain workers to do their job effectively. Countries may choose different approaches to ensuring that workers have the necessary competencies and that these lead to successful supply chains: e.g. putting

a universal curriculum in place for every health worker, or developing separate targeted curricula to respond to the needs of different cadres.

(Ifafore, Schafer)

Data Competency and Use

Good data is imperative for successful health supply chains, both in terms of monitoring stock levels and in terms of meeting numerous needs. There has been a distinct focus on the generation of good data within many of DELIVER's projects, with an emphasis on accuracy, cooperation and training, and in the majority of cases what starts off as a system of monitoring and technology based in one facility or one national context is quickly shown to be effective enough to be extended further (e.g. USAID, 2013a; 2014).

In Ethiopia in 2009, the USAID | DELIVER project introduced a computerized inventory management system for health facilities, the Health Commodity Management Information System (HCMIS), which is now employed by over 400 health facilities to manage supplies (USAID, 2014). In addition, the software is constantly being developed and enhanced, and further systems of technology are being developed and introduced in order to strengthen other areas, e.g. with the web-based Pharmaceutical Logistics Information Tracking System (PLITS), which allows managers to quantify the amount of resupply needed (ibid.).

In another project focused on West and Central Africa, the Procurement Planning and Monitoring Report (PPMR) and the Coordinated Assistance for Reproductive Health Supplies (CARhs) group were combined to provide information on stock levels and shipments for contraceptives, which was then reviewed and analyzed by the CARhs group to respond to supply issues (USAID, 2013a). This was extended to 13 countries in the region due to its effectiveness (ibid.).

Technology has been implemented in a number of DELIVER projects as a means of offering a reliable, accurate, widely accessible tool for monitoring and recording various types of data. In particular, a computerized LMIS now exists in several national contexts, enabling health facilities and warehouses to accurately track and communicate stock levels along the supply chain, thereby reducing stock-out situations (USAID, 2012a). In Pakistan, the digital LMIS was adjusted so as to fit local stakeholder structures and the devolution of health programs to provincial governments, which occurred in 2011 (USAID, 2012b), making it more effective – as opposed to imposing a general system that is implemented regardless of the national context.

Another adaptation of the a computerized LMIS has been seen in both Zambia and Tanzania, where discussions regarding a new piece of electronic LMIS (eLMIS) software commenced between the two countries (The Health Logistics Press, 2013). One advantage of this technology is that it is open source, meaning it is available to the public and permits future adjustments to be made (ibid.). Certain types of technology that are rolled out in just one or two national contexts can be used as platforms for similar

ministries of health and non-governmental organizations (NGOs) managing health supply chains in other developing countries (The Health Logistics Press, 2013). Thus, more health systems will eventually come to benefit from better knowledge of consumption and stock levels, which are generally understood or assumed to be more efficient than decentralized or manual approaches to data collection and recording.

Training in data collection and analysis methods is crucial to success, however. In Ethiopia, technical staff supported the implementation of technology in all hubs and warehouses (USAID, 2014). Indeed, in West and Central Africa, in-country technical assistance on how to report using PPMR data was provided by DELIVER to a number of early adopter countries (USAID, 2013a). In addition, remote support to all 13 countries continues to be provided to ensure the continued timely submission of data, as well as in-person technical assistance to certain countries (ibid.). It is not simply a case of introducing new methods of data collection: the ongoing success of such methods depends on long-term support.

Insights from Key Informants

One important consideration about date use is the limits of information access. DELIVER has access to lots of data but governments often have significant restrictions in place regarding who can access what data. As such, the "sunshine principle," in which biases and conflicts of interested are made public, needs to be facilitated.

SOPs are critical so that people know how they should and should not be doing things, but also that it is important that people move beyond SOP guiding principles and learn from how others carry out certain tasks. There should also be standards in place when carrying out training, for people to think about where they will go next.

(Yadav).

Summary

*According to **Building Block 2 – Optimized Policies and Plans**, policies, plans and SOPs can support HR capacity and development.*

In terms of organizational structure, respondents suggested that there has been an over-reliance on immediate operational effectiveness can draw attention away from the importance of an exit strategy. This makes it possible for local governments not to take the appropriate responsibility for the supply chain processes and often can translate into inadequate HR practices. Also, donors' funding lines tend to support specific categories of

beneficiaries or health issues rather than the country as a whole, limiting the deployment of resources so as to constitute a solid organizational structure.

According to DELIVER literature it appears that the implementation of eLMISs has been successful in several countries: Ethiopia, Pakistan, Zambia and Tanzania. Data sensitivity and government willing to openly share supply chain performance information continues to be an issue of concern.

In the DELIVER literature analyzed, no mention is made of standard operating procedures (SOPs) and only one key informant referred to these as a necessity. It is likely that health supply chains have not reached the level of sophistication that SOPs require, hence the limited interest. It is advisable to develop SOPs in the future to guarantee the accountability and visibility of processes.

Although improvements in data availability might fit under Building Block 2: Optimized policies and plans, they were often referred to as tools or outcomes of performance management interventions. As such, discussion of data often falls under **Building Block 4 – Increase Workforce Effectiveness**.

Building Block 3 – Develop Workforce

DELIVER states that: "*Initiatives need to be put in place that focus on identifying and building a robust workforce, including recruiting, competency modelling and development, and pre-service and in-service education.*"

Competency

A significant issue that negatively impacts supply chain performance is the fact that health service delivery workers are often not trained in supply chain basics, such as calculating how long their supplies will last, which results in medicines not being available, and thus the health of the population suffering (USAID, 2010). Another commonly documented challenge is disorganized storage space for health commodities and poor shelving conditions (USAID, 2011). Furthermore, for supply chains to be effective they must be underpinned by accurate and timely data related to demand, inventory and pipeline information, which tends to be lacking (USAID, 2013b). In the absence of logistics data, supply chains are more likely to face problems (including stock-outs) which cause the system to be unresponsive to health facility requirements and patient needs, as was seen in Malawi (ibid.).

People are crucial to the way in which systems and organizations operate: if the necessary mechanisms are not in place to ensure that workers have the appropriate competencies, capacities, and incentives, problems will be experienced with workers at all levels. In Malawi, since there are not enough trained workers with supply chain responsibilities at facility, district, and central levels, health workers are overburdened, and supervision tends to be inadequate (ibid.). As such, operations lack any form of structure and work will never be up to the appropriate standards.

Workforce Turnover

A number of key informants agreed that the matter of retaining competent supply chain workers was a huge problem and the issue of high levels of staff turnover can be recognized at all levels. One significant problem is that no one wants to be sent to work in remote areas and workers try to find ways to stay in particular districts.

Furthermore, it is very difficult to establish policies or mechanisms to retain staff in ministries of health due to the bureaucratic nature of highly political structures. Another issue that was raised was the need to overcome the opinion held by medical personnel that they are the only professionals in the building.

Training

Training is a key aspect of all of DELIVER's projects when it comes to health systems strengthening and making supply chain improvements. In many cases, a standard curriculum for training workers has been developed, thereby contributing to maintaining consistent teaching even after DELIVER is no longer operating within a national context (e.g. The Health Logistics Press, 2013; USAID, 2014). Alongside what is taught in textbooks and presentations, there has also been a realization in some cases that on-the-job training and the use of supportive supervision methods is crucial to making the system work (The Health Logistics Press, 2013). Added to this, in Ethiopia, in order to reinforce training, staff were sent on supervision visits to other facilities, and standard reference materials, including SOPs and standardized reporting forms, were distributed to staff for personal development purposes (USAID, 2014).

Another approach to training which has proved successful in at least two national contexts in which DELIVER has been operating is that of targeting students before they leave education (USAID 2010; 2013c). In Ethiopia, to create more sustainable training, a pre-service training program has been implemented, enabling colleges to teach logistics to students in health professions such as nursing and midwifery (USAID, 2010). The first students entered the public health system in 2010, equipped with the skills to calculate how long stocks will last and how to control and address stock-outs – meaning that these graduates will inevitably have an impact on patient service, and, thus, the general health of the people of Ethiopia (ibid.). In Pakistan, an internship program has been developed which allows young people to complete a four-month tenure with the USAID | DELIVER Project where they will receive on-the-job training and motivational encouragement to pursue further studies in the field of SCM (USAID, 2013c).

The training of trainers (TOT) is a further method that is adopted in a number of cases. TOT allows training to be given to a greater number of health professionals that project-delivered IST alone, exponentially expanding the potential of this competency building opportunity. In Ethiopia, through TOT, 200 technical staff from Pharmaceutical Fund and Supply Agency (PFSA), Regional Health Bureaus, and other logistics partners learned how to deliver Integrated Pharmaceutical Logistics System (IPLS) training. To date, nearly 10,000 health professionals, from all nine regions and two city administrations, have been

trained by PFSA and its partners (USAID, 2014). Another aspect of training which has been deemed highly successful, particularly when it comes to promoting program sustainability, is training a small number of people in high-level positions, since this helps to promote country ownership and program continuation at all levels (USAID, 2007c). In Ghana, DELIVER trained six central-level members of staff in the Supply Chain Logistics for Commodity Security course. As a result, crucial knowledge transfer and improved capacity has been achieved (ibid.).

A number of interviewees referred to a lack of available training for people working in supply chain at all levels, and this is particularly down to funding issues. Ministries of health refuse to pay for their staff to take a course in supply chain offered by regional institutions for supply chains. This is the case with PRISMA in Peru; unless a donor pays for someone from the Ministry of Health to take a course, they will not be trained as the government doesn't tend to fund this type of training.

Sometimes the problem is not about a lack of available training, but rather relates to where the training is targeted and how it is carried out. USAID and other organizations have been pumping a great deal of money into training people for SCM but questions progress is actually seen in terms of improved on-the-job behaviors. This is may be due to organizations focusing on training people who are already in their own workforce and fail to consider how they can develop the system and put the right policies in place in order to keep those on board who already have the right skills.

Furthermore, at higher levels of the supply chain it is not enough that knowledge gaps are filled simply through training: rather it is necessary that workers work with a government counterpart so that they will pick up skills on the job and eventually become sufficiently competent.

Partnership with Local Institutions

Building logistics training into public health and population curricula at local schools and colleges "increase[s] the capacity of the supply chain work force indefinitely" (USAID and DELIVER, 2011a). Furthermore, partnering with a ministry of health to develop logistics pre-service training in public health education curricula was a sustainable system for creating reliable and competent employees on the job market (USAID and TO1, 2010). Limited contributions have been gathered on linkages with business schools.

Insights from Key Informants

Whilst the majority of interviewees stated that training was extremely important, many different opinions surfaced regarding how training should be conducted and who should be trained. Training should not be rushed by being conducted on the job: rather, it needs to be done more strategically.

Other interviewees felt it was crucial to improve training at an earlier stage of a supply chain workers' career: it was stated that developing postgraduate programs is crucial as it is at this stage of learning that information is more likely to be retained.

However, it was also stated that for workers to perform effectively it is not just about training, but also about flexibility and adaptability. Furthermore, workers need to be taught the skills of problem solving, which will be crucial to helping them determine what is best for their country. Training in management skills must also be prioritized: donors have focused a lot on training but when workers like clinicians move up to management level, they do not have the skills and knowledge for managing. This can then cause the system to slip.

Two participants raised the problem of what happens to training once the donor leaves a country. DELIVER has created a curriculum which gives governments the capacity to provide basic training.cv

(Emery, Eomba, Hasselberg, Ifafore, Jascowitz, Schafer, Yonzone.)

Summary

Although significant attention has been given to training and education, as emerged from the review of USAID initiatives and the feedback from informants, other levers can be used to improve the HR component within public health supply chains. The DELIVER literature clarifies how the lack of competencies among health workers on logistics issues prevents operations from being efficient and effective. There is certainly a debate around introducing logistics units that can coordinate and support the health workers at the level of the health facilities. However, basic training on logistics is still advisable for health workers, to avoid stock-outs and lost items.

In terms of retention, and in particular the very high turnover of workers, key informants indicated very clearly a number of issues: 1. unwillingness of workers to be located in rural areas; 2. turnover related to political changes; and 3. substantial underestimation of logistics and supply chains as a fundamental contributor to beneficiaries' well-being by health workers, and by doctors in particular.

Training has attracted a significant amount of funding over the years. According to the DELIVER literature, successful examples of training include the development of standard curricula and supervision practices, which allowed the learning to remain in the country when DELIVER was no longer operating in the national context. It is certainly the case that training should not be deployed in isolation and should be matched by other initiatives: e.g. supervision. Other positive examples of training discussed in the literature relate to: 1. targeting students before they complete their courses; 2. TOT to increase the number of health professionals reached; and 3. dedicated training for people located at central level. The remarks from key informants were less positive: firstly, many

interviewees recognized that there is paucity of training on SCM and logistics by supply chain professionals. Secondly, informants indicated that ministries are not necessarily willing to fund training on the topic, hence the opportunity to access such training relies on donors funding it.

In more general terms, training appears to be ineffective when supply chain systems are not invested in. This makes clear that training alone is unable to fix the operational issues.

However, it is sensible to work with local institutions to include logistics and SCM in health curricula, together with managerial skills, starting from postgraduate level. Despite the good examples provided by the DELIVER literature, however, this does not appear to be a common practice as yet, given the key informants' responses.

Building Block 4 – Increase workforce effectiveness or performance management

Performance Management

Conceptually, supervision and performance monitoring occur at two levels: of policy in the form of advocacy, innovation, and problem solving (champion), and in routine practices like monitoring of stock and scheduled supervisory visits. As such, performance management initiatives have endeavored to implement systems and regularly scheduled site visits.

Insights from Key Informants

Three participants stressed the importance of having good monitoring mechanisms in place within an organization so that problems can be quickly identified and thus addressed. These evaluation mechanisms need to be in place at the very start of a process, alongside program implementation and design work. In terms of how monitoring should take place, weekly or even monthly meetings with staff are useful for setting certain goals and discussing why targets were not met. Furthermore, data such as mHealth and other supervision tools are useful for performance monitoring.

(Frankel, Magner & Mayo).

Accountability

Although only two participants discussed matters of accountability, both clearly agreed that making governments more accountable would improve the way a supply chain system operates. Interviewees stressed that there needs to be a culture of accountability and performance management to drive governments to make data readily available to donors and the public, as a matter of standard business.

In Kenya, for example, one prominent academic used the media to highlight matters of accountability and slowly this became an important topic in election campaigns. In Botswana there has been success through the public accountability program, which was

set up in the 1980s when the government wanted to decentralize. Medex set up management systems which could model readiness, willingness and ability.

Local government appreciated the data created from the process of establishing these systems, as it allowed for self-reflection. If and when workers do a bad job, they need to know that there will be consequences, as well as constructive feedback to allow them to implement changes.

In financial terms, Namibia made a concerted effort to make sure that salary levels were acceptable and since these are ministry-led, they can be maintained. Salary incentives are also particularly important in encouraging workers to work in remote locations.

Another incentive can be the level of responsibility assigned to a manager: if everything that happens in a system needs a manager's approval, they are likely to want to do a good job and to remain in that position for the long-term.

Summary

As mentioned when commenting on Building Block 3, performance management are necessary to increase the effectiveness of training along the various levels of the supply chain.

The key respondents clarified how a culture of accountability is needed. Measuring outcomes and performance is paramount in order to make the workforce responsible for their contribution. Limited insights are provided in the DELIVER literature, although the themes are a proxy for successful health supply chains.

Building Block 5 – Professionalization of SCM

"A process needs to be carried out to make or establish supply chain roles as a profession, or to establish the set of responsibilities or competencies of such professionals."

Proactive Workforce Development

Several interviewees agreed that professionalizing the discipline through clear roles, coordination between stakeholders, and professional development opportunities should be done proactively. That is, various approaches to HR interventions can result in supply chain success but most of these links are observed only after concentrated attention.

Job roles need to be professionalized: job titles and descriptions of necessary skills are required. If this is done, if someone is not familiar with a role they can look at the job description and scopes of work (SOWs) and know whether they are legitimate and appropriate.

However, what is crucial when it comes to HR development is that instead of starting with the supply chain and eventually moving to focus on HR, thinking about HR should come first. Coordination is another way of achieving HR development. For example, Ethiopia has been working to build staffing – if an SCMS person attends training, a

government employee must also go with them to take part in the training. That way, if a donor pulls out, the government still has staff.

Another means of developing HR is: in Mozambique, the central medical store acts as a learning institution: they bring people in who are relatively junior and enthusiastic five to 10 years before they will move on to other opportunities, thereby creating a market with supply and demand of people who can do their job well before they decide to leave the supply chain cadre and pursue other careers. This could be done through partnerships with universities and internships.

Staffing Roles, Motivation, and Dynamics

Issues related to staff motivation were raised by several interviewees. Factors including pay scales, incentives and management issues affect staff morale: organizations need to figure out how they reward, encourage and motivate people to ensure they are reliable and effective in their work. Workers need job descriptions, clear expectations and financial as well as non-financial incentives, such as training.

In addition, jobs are often defined without clear specification of roles and task delineation. In the central medical store in Mozambique roughly 70% of workers are pharmacists. Whilst it makes sense that these workers understand the pharmaceutical properties of the supplies with which they are dealing, most people also need general supply chain expertise, which is not typically included in the curricula.

Even where guidelines for how workers should act have been developed, take-up has been slow in many countries and achieving coherence amongst the workforce is one of the biggest challenges. One participant discussed the issues related to the way SCM jobs are perceived, both by potential workers and also by ministries of health. The supply chain element is often seen as a separate entity from the ministry of health and the disciplines involved in carrying out SCM are not viewed as serious positions. As such, the workers involved in supply chain tend to be treated as second-class citizens. The challenge lies in getting the ministry of health to take SCM seriously, and to integrate it as a functional arm within the ministry of health. If this is not done, supply chain workers are seen only as people who "deliver stuff". This then creates problems with regard to how SCM jobs are perceived and who then applies for them: organizations and health facilities struggle to get well-educated people. To avoid this situation, the leader of the supply chain should be sitting at an influential level within the government system.

Another HR issue highlighted by two participants was that of the distinct lack of female workers in the male-dominated supply chain. Finally, it was stated that it is important to have a really competent set of leaders running the HR department.

Summary

Proactive workforce development: key respondents clarified how a defined description of supply chain roles is still lacking. Responsibilities are blurred and the workforce are not aware of these responsibilities. This also causes an underestimation of how supply chain

workers can positively contribute to the availability of medical products. Clear roles and responsibilities are necessary to raise the profiles of supply chain professionals.

This building block, the professionalization of the workforce, requires a deeper understanding and implementation as problems on the ground are clearly visible, such as the effects on the efficiency and effectiveness of health supply chains.

Key HR Problems Identified in Interviews:

Monitoring/Supervision

- Reporting accuracy (Nepal)
- No reporting system for monitoring stock-outs (Mozambique)

Coordination

- Lack of coordinated strategy for exit of external assistance (general)
  - Suggested solution: work with government—assumption is that high-level governments are willing and motivated to take action
- Lack of coordination between donors
  - Rationale: when there is corruption at the central level, donors divide and focus on communities, families (Nepal)
  - Suggested solution: donor coordination committees meet weekly/regularly
  - Assumption: meeting will lead to implementation, donors will carry out agreed upon actions (Nepal)
  - Lack of coordination between countries on training approaches

Supply Chain Problems

- No timely procurement, frequent stock-outs (Nepal)
  - Reason: people do not see the importance of data about where stocks are, SDP product availability (LAC)
- Poor functioning due to lack of understanding around which system is best—parallel, integrated, etc. (In Guatemala and Paraguay, completely vertical systems have not been able to integrate, leading to poor performance)
- "Less visible challenges" than public stock-outs not addressed by civil society (Sierra Leone)

SOPs/Job Descriptions (JDs)

- Inability to move beyond guiding principles in SOPs and learn from others (general)
- Lack of clear pathway between training, and career ladder jumping (general)
- Lack of JDs with clear expectations and financial/non-financial incentives (general)

- Jobs not defined by specific roles (e.g. 70% of supply chain workers in Mozambique are pharmacists and do not have general supply chain expertise)
- Uptake of defined roles has not occurred (many countries)

Staffing

- Retention
  - High staff turnover (general)
  - Lack of motivation to go to remote areas (Nepal)
  - Political red tape in ministries of health (LAC)
- Staff morale
  - Companies have not figured out how to reward, encourage, motivate people to be effective and reliable in their work (general).

Other

- Perception of supply chain work as "beneath" service delivery (general)

3.2. Problems Identified in the Data

Although DELIVER's roadmap for effective SCM is comprehensive and detailed, several issues were detected in the literature and interviews.

Coordination and Collaboration

The ability to coordinate and collaborate with other individuals, institutions, donors and levels of governance is a key element of successful supply chain operations (USAID, 2007a). Supply chains and health systems involve a number of different players, and through the work of DELIVER it has become abundantly clear that means of collaboration need to be established, be it through external assistance, training or new systems of technology. Where this was successfully facilitated and achieved, operations became far more orderly and health outcomes improved (USAID, 2007b).

Insights from Key Informants

The majority of interviewees were in agreement that a solution to many supply chain issues is to see better coordination amongst donors, between national governments and institutions, and also between donors and governments. This coordination is necessary in functions such as graduate retention, where university bodies, SCM representatives and people from other ministries should meet regularly to discuss the problems. Governments and donors both have a role to play in ensuring that efforts are more coordinated. Rather than a consultant coming in and trying to put together a strategy, there needs to be support for a national strategy, one which is driven by the government and developed with partners in the country. Similarly, governments need to establish a donor coordination mechanism prior to

engagement, and they need to work with the planning commission to put together a business plan for donor support. Local governments and the press can also play an important role and it is essential to work with them. For example, DELIVER held a workshop with the press because what they were publishing was doing more harm than good – in this way DELIVER was able to explain what DELIVER was doing and why, rather than the press just hearing things and reporting it. At a smaller level, coordination and cooperation between leaders of supply chains/central medical stores are also useful. One successful measure would be for heads of supply chains/central medical stores to be part of a network in which they can get together with each other and with others with certain types of knowledge to ask who has experienced success in getting ministers to make changes, and how they achieved this. For example, the problem in Tanzania is that they do not know how to manage working capital flows, which means they do not receive money, or make payments, on time. DELIVER is not an expert in this, but airlines etc. are.

Organizational Structure

The way in which an organization is structured, which includes coordination between different departments, levels or bodies, management practices, access to technology for the purpose of monitoring and forecasting, and training capacity, among others, is crucial to successful supply chain operations, meaning that when several of these factors are not working well, or are not in place at all, issues will arise. Whilst it is not possible to detail all the problems caused by an organization not having the appropriate structures in place in every aspect of its work, DELIVER's highlighted a number of problems.

A lack of coordination between different government departments and levels of governance has seen the manifestation of different systems of reporting, as was the case in Pakistan. Different systems of reporting at the district and sub-district levels made it difficult to analyze the supply situation across departments, and adversely affected planning, procurement and resource mobilization, with the ultimate negative consequence being that the ministries' ability to provide family planning services to the Pakistani population was impeded (USAID, 2012a).

Similarly, in Malawi, a lack of appropriate technology systems in place within organizations led to district and national levels of operations being distinctly unaligned (USAID, 2013b). Existing technology options – Supply Chain Manager (SCMgr) software and the National Stock Status Database (NSSD) – are no longer fit for their original purpose and have failed to keep up with changing supply chain needs, meaning they should be replaced with integrated eLMIS (ibid.).

Furthermore, the way in which different levels of an organization are used to operating can have knock-on negative impacts if they are not up to the necessary standards. For example, in Malawi, lower level health facilities fail to prioritize when making lists of

commodities needed, and hospitals do not have appropriate inventory control parameters in place (USAID, 2013b).

People are crucial to the way in which systems and organizations operate: if the necessary training mechanisms are not in place, problems with workers at all levels will be experienced. In Malawi, since there are not enough trained workers with supply chain responsibilities at facility, district and central levels, health workers are overburdened, and supervision tends to be inadequate (ibid.). As such, operations lack any form of structure and work will never be up to the appropriate standards.

Insights from Key Informants

The two interviewees who discussed the importance of organizational development spoke about the need to think about the long term, and also about the many different aspects of an organization that need to be focused on. With regard to the former, rather than thinking about the present situation, a five-year workforce plan should be developed, as was seen in Mozambique. Thus, thinking needs to be less operational and more strategic. That way, the whole system is considered and the overall staff structure required to build up the workforce can be put in place. Expanding on this,some of the many different aspects of an organization's operations that require development are: workforce development; performance management and retention; professionalization of HR; data management; external body oversight; internal organizational ethos; and engaging stakeholders.

Data Issues

To date, the health supply chain community has placed great emphasis on data collection, reliability, and use. Because this is a key focus throughout supply chain activity, it is unsurprising that it has played such a big role in the literature, which tended to report on training workers on technology or on the capacity of data to aid in performance management. While this cross-cutting area might fit more directly into other categories, the attention paid to it as a subject in its own right warrants a separate category.

For instance, in Malawi, the PPMR and Health Technical Support Service produced the stakeholders' report in July 2011, but it failed to include any data from the central medical store or the regional medical stores. As such, it was extremely difficult to determine which areas needed attention (USAID, July 2011). In addition, reporting rates from districts were low, despite reminders being sent online that timely reports were crucial, resulting in the necessity to readjust consumption to determine estimated demand (ibid.). In December 2011 reporting and monitoring was still an issue: only 19 of 32 sites that were expected to report did so, with the most commonly given reason for this being the USB Internet connectors not working properly (USAID, December 2011).

Meanwhile, the Botswana National Supply Chain Assessment called attention to "a lack of proper data and data management at all levels of the supply chain" (p. 4) as a result of insufficient numbers in the LMU, the lack of on-time monthly data reports, and inventory management issues at the district level and below (Badubi et al., 2013).

Summary

Despite the advancements in SCM, to date there are indications that there has not been a comprehensive approach to its development. SCM alone cannot remedy all the inefficiencies and the issues around availability at the beneficiary level. It must be noted, though, that an end-to-end vision of the supply chain would certainly increase the efficiency and the effectiveness of the operations.

3.3. Lessons Learned: How DELIVER Addressed HR for SCM

Retrospectively, the DELIVER project did, in various instances, declare its approach to HR for SCM matters, both in terms of technical assistance response and systems strengthening approaches. It also looked at how HR interventions could effect change both on the internal HR for SCM system as well as the broader supply chain system functionality.

In Ghana, DELIVER has assisted particularly in the area of HIV/AIDS, providing support in forecasting, procurement planning, and pipeline monitoring to the country's national program, whilst also establishing an LMIS for HIV/AIDS testing kits and antiretrovirals (ARVs) (USAID, 2007c).

Supporting countries through establishing long-term sustainability is very much dependent on the national context, and where DELIVER has accounted for this fact success has been witnessed. In India, DELIVER sought to support the priorities of the government, and took notice of its vast wealth of resources through providing technical assistance focusing on using these local resources in order to develop local capacity (USAID, 2007b). As a result of this process the government were cooperative and local people received the necessary training to ensure the system could continue to function without external support. In Mozambique health supply chain operations are based largely around the CMAM and the Ministry of Health, so that it was effective to focus on strengthening the country's public sector forecasting, procurement, storage and distribution processes within these bodies (USAID, 2007a).

Only one participant discussed the matter of receiving external assistance in relation to tasks but their view on this subject was undecided: they believe it is demonstrable that external assistance is sometimes beneficial, and sometimes not. According to Maeve Magner, many countries have hit the middle-income barrier, but since they do not have the support of either a scale-up program, or the financial or people resources of their own, they cannot scale up those efforts. In such a case, external assistance is necessary and is clearly lacking. Rwanda is now standing on its own two feet in terms of owning the system and the outside support is at a level which is in line with the country's plan. As

such, external assistance is beneficial, but only when it is kept at a certain level. Meanwhile, Sudan has figured out how to make the system work and has been able to think progressively because it is independent. Thus, in this case external assistance is not necessary and would be detrimental to the overall stability of the system. Sudan is not a USAID country and the example is mentioned by of contrast to the insights described above.

When it comes to achieving long-term solutions to health supply chain problems, general supply chain improvements, as well as general capacity building efforts, are crucial to sustainability: if problems in the supply chain are not addressed, and the capacity of the systems and individual workers are not strengthened, lasting success will not be achieved.

Clearly, one measure for achieving long-term sustainability is not enough, and focusing on training workers is necessary if the technologies and changes implemented are to operate correctly and sustainably.

4. TOC Model

The TOC model (Figure 3) maps out a retrospective justification of the logic underlying DELIVER's investments in HR for SCM.

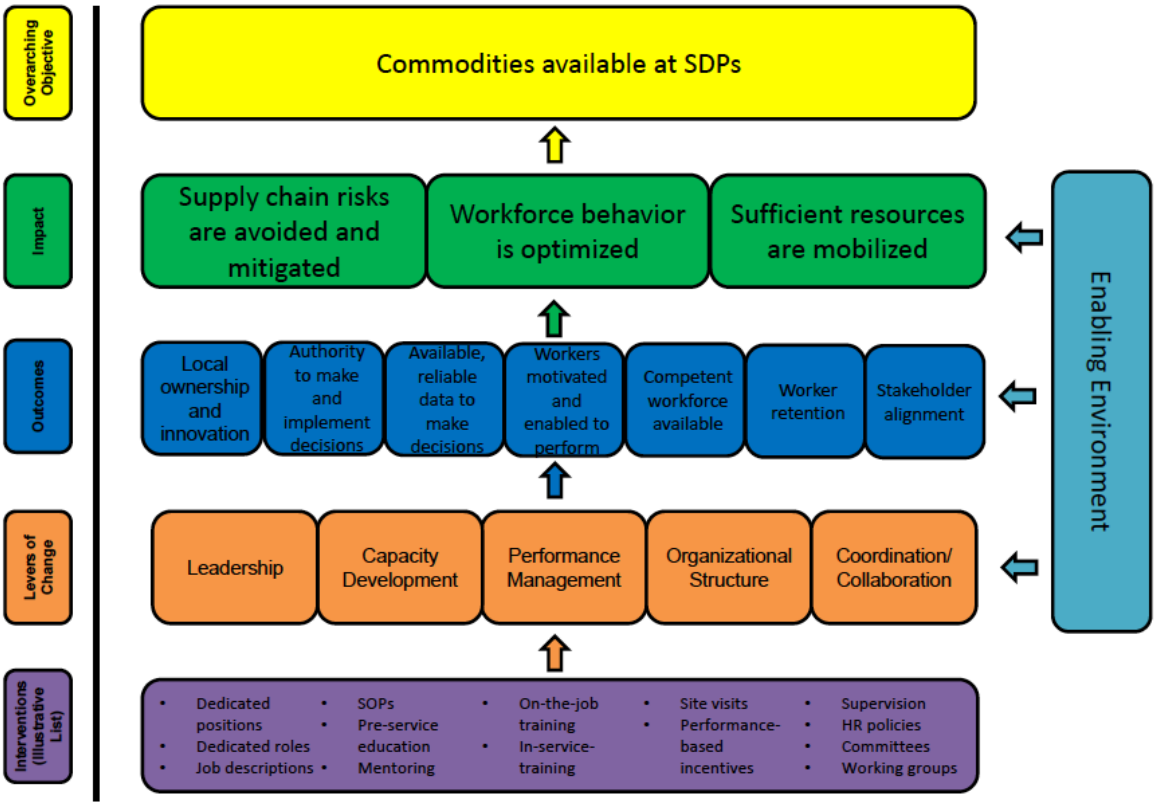

Figure 3: Working TOC Model

Although the arrows point upwards and the model may be read from bottom to top, it is feasible, and even recommended, to trace impacts backwards down to the levers of change and interventions. The meaning of the color scheme adopted in this figure is as follows:

Purple boxes refer to interventions, or specific activities or policies that are implemented. These are tangible actions that are often funded by outside donors, but might be co-founded or fully funded by ministries in partner countries.

Orange boxes are organizational levers of change. These levers of change are the most critical foundations of the TOC. A functional HR system relies on all six of these areas. Multiple interventions may lead to improvements in these areas, and improvements in these areas may set off multiple chains of positive outcomes and impacts, but these areas are the core of HR for SCM investments. Investments that contribute to these boxes set off a cascade of outcomes.

Blue boxes are direct outcomes of successes achieved by influencing the levers of change. These are often necessary short-term steps that are concrete. Together, these outcomes lead to an enabling environment in which supply chain workers can perform. It is important to note that a combination of outcomes is required to achieve any given

impact; this is a non-linear path. This issue is one of the key reasons why evaluability of the types of interventions referenced is such a nuanced and complex challenge. When vetting and further validating this model, it would be useful to examine whether there are additional key outcomes that should be incorporated into this framework.

Green boxes indicate impacts of the previous chains. These impacts are results and impact based. In considering how to measure these impacts in future models, it may be useful to link specific impacts to accepted KPIs. The impacts listed are not comprehensive, but rather the key impacts that seem to hold the most significance in the theory of change cascade as it is currently understood.

The **yellow box** is the overarching objective of the project. In this case, the overarching objective is having high quality commodities available at SDPs in appropriate quantities to meet need. There will be numerous pathways to get to this overarching objective and myriad other impacts that contribute to the overarching objective that are not depicted in this specific TOC framework.

4.1. Levers for Change

Levers for change, , are similar to DELIVER's building blocks, but rather than leading to a capacitated HR for SCM system, they lead to a better functioning supply chain system. Levers that emerged in the literature are shown below and mapped against the building blocks presented in DELIVER's assessment tool (see Figure 4).

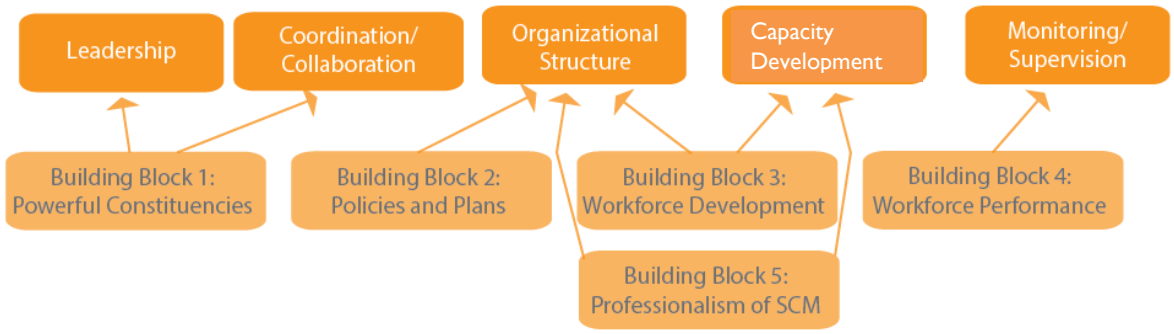

Figure 4: Levers of Change Mapped to DELIVER Building Blocks

1. Leadership (aligns with Building Block 1: Powerful constituencies, and leads to advocacy and decision-making)
2. Coordination and collaboration (aligns with Building Block 1: Powerful constituencies, and leads to stakeholder alignment)
3. Organizational structure (aligns with Building Block 2: Policies and plans, because it leads to SOPs and role definition)
4. Capacity Development (aligns with Building Block 3: Workforce development, because it leads to data and competency and is influenced by interventions like training and curricula; and with Building Block 5: Professionalization, because it is influenced by degree programs)

5. Performance Managementsupervision (aligns with Building Block 4: Workforce effectiveness, because it leads to accountability and retention and is influenced by supervision and mentoring; and with Building Block 5: Professionalization because it is proactive and leads to stability)

4.1.1. Leadership

Leadership led to innovation, authority, and advocacy.

When leadership was a major investment, direct impacts were mostly individual focused but had broad impacts on the system. When leaders were entrusted with positions of authority, they were able to act quickly and develop local solutions.

This is the most reactive and unsustainable lever, from an outside perspective, but it is especially vital in unexpected situations, particularly in the face of a crisis or even in routine changes to the system, such as the introduction of new products, unexpected policy changes, or emergent opportunities.

The leadership lever of change encompassed both political and technical leaders—those who could advocate for supply chain funding, and for attention to be given to the supply chain, as an important factor, as well as those who could take authority to make sound technical decisions for the benefit of all stakeholders. While in some cases leaders were individuals, in others they were collectives.

In a review of case studies around procurement bottlenecks, the need for a supply chain champion was highlighted. Most cases studies identified contraceptive committees as champions, while one case study identified a specific position, such as a project manager, and others identified local civil society or midwife groups, as important actors for championing supply chain efforts (USAID and DELIVER, 2013a).

Other publications pointed out the benefits of leadership in advocacy for supply chain investments and improvements. For instance, in Bangladesh, DELIVER used advocacy by national and local media to build demand for contraceptive security (USAID and DELIVER, 2007a). In this case, the project implied that leadership among members of the media would advocate for additional financial resources.

Assumptions: For a leader to effect positive change in these areas, she must have the support of cross-functional ministries such as finance and general administration. For instance, an innovative leader cannot be elected to a special position (e.g. condom coordinator) if the ministry of finance refuses to pay for the position. Additionally, this role presumes a democratic political system.

4.1.2. Collaboration and Coordination

Collaboration and coordination of efforts between various stakeholders led to their alignment, saving resources.

Coordination of efforts between the project and host governments, other donor partners, and other countries, was a key component of many interventions. The idea was

that by having workforces determine roles and expectations, they were more likely to be held accountable and to eliminate duplication of efforts.

Collaboration, on the other hand, was aimed at encouraging participation among personnel in the supply chain workforce.

Interventions included:

- Regional workshops
- Technical working group meetings
- Regional training institutes
- Strategic planning workshops
- Participatory activities (like assessments and market segmentation analyses)

4.1.3. Organizational Structure

Coherent organizational structures were often discussed in concert with data availability and financial means. Underlying these connections was an implicit theory that strong organizations lead to the ability to leverage other outcomes and move towards impacts. For instance, a strong leader operating in a weak or loosely defined organization without clear channels of communication and authorization would struggle to practice necessary authority and effect change.

By co-developing the organizations responsible for SCM while developing individuals' capacity, supply chain workers were able to enter strong workforces with some sense of stability. It was also implied or, in some instances, stated outright that creating a new structure, like an LMU, would increase the financial resources for SCM from the central government.

Interventions included:

- Creation of a regional health commodity security task force
- Establishing LMUs
- Establishing coordinated bodies
- Central-level division of labor between forecasting and supply planning and procurement
- Job creation

Preconditions: For organizational development interventions to produce key change within a traditional public health setting, they need to occur in a supportive government environment. Highly bureaucratic government systems will delay or halt the process of approving organizational restructuring, job creation, and budget implications for either. In these cases, a precondition would be that governments either privatize their supply chain activity or find ways to gain autonomy as an independent structure managing its own resources. There also need to be mechanisms in place to retain workers placed within an organization. This can be positively influenced by advocacy interventions that fall under the "capacity development" lever for change.

Assumptions: In order for these interventions to lead to positive change it is assumed that there is a competent and educated workforce to enter into new positions or to fill roles within an LMU.

4.1.4. Capacity Development

Efforts in providing or improving education were aimed at quality data and competent workforces. Most activities were either resource-driven (as in job aids and CDs) or classroom-driven (as in training). Over the course of DELIVER's investments in education, best practices evolved from routine logistics training to more sophisticated university partnerships and pre-service curricula development. While education has received a high volume of activity throughout the course of DELIVER, those interventions which were in the form of short-term training programs have not adequately proven a link to sustained improved supply chain performance.

Interventions included:

- Job aids
- In-service training, usually between one and five days in length, and themed
- Curriculum development or review for pre-service training

Education and data: The project aimed to demonstrate this link frequently, asserting that a curriculum that focused on data led to improved quality and fewer errors in reporting.

Assumptions: In order for education to produce higher quality data it is assumed that a) workforces are available and retained, and b) data systems are user-centered and intuitive. Trained individuals during this time period were generally enthusiastic about learning new technologies associated with data collection. It was imperative that logisticians were able to access means to input data into a reliable system, whether that was electronic or paper-based. Reliability signifies that there were consistently people available to collect that data and that the resources for recording data were consistently accessible when needed. Furthermore, educating people who cannot enter the supply chain system in a reliable long-term position will not improve the system. In fact, investments in education within a system that does not have established positions and appropriate funding for educated logisticians is wasted.

4.1.5. Performance Management

Performance Management, namely supervision, motivation, and performance monitoring initiatives, led to data use and retained workforces.

Monitoring activities were usually centered on developing tools and methods for data collection and routine data use. This lever focused on developing a workforce that felt valued.

Supervision was generally the link between leaders and retention. It was also relational in the sense that site visits encouraged connections between levels of the supply chain

workforce. Tied into this area, especially in recent years, was mentorship, connecting this lever of change very closely to leadership.

Interventions included:

- Tools like eLMISs, SMS information or inventory systems
- Site visits to hospitals and other SDPs
- Mentorship of personnel at various levels of the supply chain

Preconditions: For supervisory site visits to lead to retention, the supervisor must be sincere and reliable, and must follow-up on agreed upon action items. That is, the visit must be mutually beneficial and a means of opening communication, rather than just an opportunity for wrist-slapping.

5. Overarching objective: Commodity Availability

The availability of necessary medicines, both in terms of quality and quantity, is a key sign of a successful health supply chain given that meeting the health needs of the population drives the entire system from start to finish. This availability is at the heart of USAID's investments in procurement and supply chain system strengthening projects, and it is influenced by a myriad of complex, networked factors.

5.1.1. Additional/Alternative Goals

It is important to note that the consistent overarching objective underlying DELIVER's interventions was commodity availability at the service delivery point. This is a critical link to improving the sector, and it is the main subject of this report. Nevertheless, other goals did emerge in the findings that take supply chain improvement one step beyond availability to both health outcomes and to country ownership of the supply chain system, which touches on a number of other factors from across the development landscape. We expand on these findings here with the understanding that fully connecting commodity availability to health outcomes or to system sustainability would require an additional, and different, literature review and analysis.

Improved Health Outcome

This study takes for granted that an improved supply chain system impacts the overall health of communities and constituents. Of course, there are external factors that can prevent health improvements even where the highest functioning supply chains are in place. For instance, a patient that rejects modern pharmaceuticals altogether will not benefit from drug availability. There may be other cultural or practical reasons why a high-performing supply chain does not improve the health of its customers. In those cases, this study will not be beneficial, as a major critical assumption is that improving commodity availability will improve the public's health. This philosophy was present in the literature, where, at times, HR for SCM interventions were written about in the context of health outcomes.

As more medicines become available, the likelihood of stock-outs is reduced, and a greater number of people can be treated. Both HIV/AIDS treatment and the availability of contraceptives are key examples of cases where improvements have been witnessed. While contraceptive security is not a direct health outcome, it is key to decreasing unintended pregnancies and to healthy choice in timing and spacing of births.

In Ethiopia in 2006, stock-out rates for contraceptives were 58% for injectables, 30% for pills and 60% for implants. This can be compared to results from a national survey conducted by UNFPA in 2012, which found that the availability of modern contraceptives at health facilities was over 97% (USAID, 2014). In Ghana, the use of modern contraceptive methods increased to 19% in 2003, compared with 13% in 2003 (USAID, 2007c). In terms of HIV/AIDS drug availability, in Ethiopia in less than a decade, the country's contraceptive prevalence rate has nearly doubled, from 15% in 2005, to 29% in 2011 (USAID, 2014). Almost 300,000 HIV-positive people who need ARV drugs are currently being treated, compared to 24,400 in 2006, before the implementation of IPLS (ibid.).

At the community level, ensuring access to contraceptives has had a profound impact on the health of individual women, as well as on the economic and social well-being of their families (USAID, 2012b). In providing reproductive health commodities worth $52 million to the Government of Pakistan, USAID aimed to prevent an estimated 3.2 million unintended pregnancies, more than 81,000 infant deaths, and almost 3,300 maternal deaths between the years 2010 and 2011 (ibid.). Health improvements can not only be witnessed at the community level or when it comes to certain health issues, but also when it comes to most health outcomes. In 2013, Ethiopia achieved Millennium Development Goal (MDG) 4 by reducing under-five child mortality by two-thirds from 1990 to 2012 (USAID, 2014).

Insights from Key Informants

Commodity availability

Only one participant discussed commodity availability. In one country with high central level corruption and government official turnover, signs that it was appropriate for DELIVER to graduate from a country were reduced stock-outs and increased commodity security, to name but a few. However, it was pointed out that there needs to be a plan in place to ensure commodity availability continues or else stores will fall apart because of external factors that negatively affect Ministry motivation.

Coordination

If all the necessary bodies and organizations are working together, a country will likely experience a great deal of success. An example isEthiopia, where DELIVER country directors built a relationship with the Ministry of Health – there was a

great deal of communication between the two so that they could fully grasp the lay of the land. Furthermore, a lot of money was spent on training staff at all levels and in coordinated organizations and they worked in tandem, with representatives from each being present at training at all times.

Demonstrates independence

The ability of a country to demonstrate that it can operate independently is a clear sign of success, particularly in terms of how it starts to articulate its goals and benchmarks and subsequently sets aside resources to achieve these goals.

Saving for financial benefit

It is a clear sign of success when countries and donors are able to get more for their money. Money can be saved when a country's procurement capacity increases; that way, they can obtain commodities from multiple sources, rather than just the local market, which will likely be far more expensive.

Better leadership

An emphasis was placed on the importance of building leadership skills and capacity within supply chains. When governments chose to hire managers because they can see individuals in front of them with the right qualifications, rather than hiring because of nepotism or political affiliation, leadership was said to be distinctly better.

(Jascowitz, Kasonde, Mayo, Quesada, Rilling)

Country Ownership/Sustainability

The given long-term goal which this report works back from in its analysis is commodity availability at service delivery points. The extended rationale of this goal is that commodity security leads to improved patient and community health outcomes, contributing to achievement of the United Nation's MDGs, including reduced prevalence of HIV/AIDS, malaria, and other diseases (MDG 6), improved maternal health (MDG 5), and reduced child mortality (MDG 4). These development goals address basic human rights and endeavor to improve developing countries' abilities to grow their economies and improve the quality of life of their citizens. However, exploring the implicit assumptions that link commodity security and development is outside the scope of this project.

Nevertheless, in this process, country context was identified as a central factor in ensuring the long-term success of particular HR for SCM interventions was sustained. This theme of sustainability emerged frequently, and it might be a central factor in decision-making within a country's context.

As such, outcomes generally occur within one of three levels of supply chain system development, as described in the table below:

Table 1: Supply Chain Development Levels from the ToC

Level 1 – Basic Supply Chain

- Supply chain operates at rudimentary (ad hoc) level, with key supply chain functional areas not fully operational or adequately staffed
- HR assessment required and no HR strengthening strategy in place

Level 2 – Functional Supply Chain

- Supply chain fully operational and adequately staffed across all functional areas of the system
- Decisions regarding HR/SCM informed by evidence
- HR strategy developed and implemented

Level 3 – Advanced Supply Chain

- Supply chain fully functional and incorporates all HR strengthening elements from Level 2
- Financial resources for operating the supply chain are increasingly derived from national sources
- Increased country ownership as national leadership manages HR for SCM, identifying problems and developing strategies for resolving problems (including identification of technical assistance/financial resource needs)
- HR strategies accommodate potential organizational changes stemming from health sector reform

These levels are not rigid and they exist on a continuum. Nevertheless, a critical assumption is that achieving all outcomes at Level 1 will help advance a supply chain to a functional level, signifying that interventions should grow to Level 2 interventions. This does not factor in those levers of supply chain success that are outside of this closed loop, such as total market approach considerations or corruption at the central level.

Level 1

In the basic supply chain system (Level 1), HR strategic components operate at rudimentary (ad hoc) levels, with key supply chain functional areas not fully operational or adequately staffed. Level 1 has no formal HR strengthening strategy as such, but instead it attempts to organize an assessment of HR staffing levels and needed

competencies. Level I is also typified by fragmented approaches, multiple parallel systems, and poor donor coordination (every agency doing its own thing).

Level 2

The functional supply chain system (Level 2) is fully operational and adequately staffed across all levels of the system. An HR strategy has been developed and implemented once systems reach Level 2. In addition, there is more effective coordination and collaboration among stakeholders, who aim to address problems jointly rather than relying on stand-alone (silo) approaches.

Level 3

The advanced supply chain system (Level 3) is also fully functional and incorporates all HR strengthening elements from Level 2. It is distinguished from Level 2 by having greater country ownership (leadership) in place, more national resources allocated to support day-to-day operations, little dependence on external funding and technical assistance, and greater sustainability in identifying HR problems and developing strategies to rectify them. It should be noted that sustainability in supply chain operations is an overarching objective for all three development levels. However, country ownership and sustainability become achievable priorities for Level 3.

Most supply chain systems in the developing world are operating at either Level 1 or Level 2 (or some amalgam of the two). Most evaluations of HR strategies therefore focus on how supply chain systems are moving from basic to functional levels of performance. In other words, what are the dynamic pathways between Levels 1 and 2 that countries can consider in attempting to move into the realm of a functional supply chain? And how can a focus on HR most effectively help guide this transitional process?

6. Evaluability

The aim of this project has been to help USAID better understand the degree to which it can feasibly measure its past investments in HR for SCM under DELIVER TO4, and to provide an appropriate methodology for monitoring this type of activity either retrospectivey (as in the case of DELIVER) or prospectively (for USAID's future investments in this area).

A traditional performance evaluation of HR for SCM inputs/levers of change that isolates programming and HR factors from the contextual and social networks in which they exist would be disingenuous. Thus, any evaluation of the HR for SCM program area would have to admit its shortcomings and acknowledge factors outside of key interventions as playing a potential role in improving commodity availability. It would also have to only report on indicators that were baselined, which can attempt to draw correlations between levels of levers of change, outcomes, and impacts, but ultimately measure performance in singular program areas. That is, horizontal links are difficult to measure accurately. At this point, it is not possible to provide a definitive evaluation, and it's unclear if this will become more possible in the future, given the complexity of human

behavior. Nevertheless, there are ways to anecdotally draw connections and collect evidence that makes a strong case for continued investment in the area. In this section, the central levers of change are discussed in terms of their evaluability and the key metrics that would support a case for investment.

6.1. Evaluation Readiness

An evaluability assessment examines the readiness of a program to be evaluated (Kaufman-Levy and Poulin, 2003). As a program evolves in response to observed need, it goes through a natural period of ontological development to determine what the problem is and what the intervention should be. The growth of the program area of HR for SCM in DELIVER's programming, and the resources like People that Deliver and IAPHL that it supported and helped to develop, demonstrate that the area is just emerging form a period of growing pains and coalescing into a single phenomenon within global health supply chain programming. In other words, we do not feel that it would be feasible to evaluate DELIVER TO4 retrospectively based on the data available. Moreover, the nature of HR, which is entangled with other contextual factors, makes it difficult to definitively separate HR from other SCM interventions.

According to the Overseas Development Institute, an evaluability assessment should examine the following three areas:

1. "Adequacy of intervention design for what it is trying to achieve.
2. Conduciveness of the institutional context to support an appropriate evaluation.
3. Availability and quality of information to be used in the evaluation." (Peersman, Guijt, and Pasanen, 2015, p. 5).

These three areas are boiled down to plausibility, utility, and feasibility, and are discussed below.

6.1.1. Plausibility

This area of an evaluation assessment looks at which parts of an intervention can be assessed at which points in time. It focuses on the intervention design. In this case, the Project Performance Monitoring Plan (PMP) serves as the best baseline, but it does not adequately capture the connections that would result in change. One useful tool for getting at some of the questions is the LSAT, which includes sections on "organization and staffing" and on "organizational support for logistics systems," which both provide scores and could be matched up with LMIS scores. Their potential will be described, per lever of change, in the next section. So, in terms of plausibility, the project was not designed with an expectation that it would reach intended impacts that extended to supply chain optimization. Ideally, it would have been designed around an articulated ToC (Peersman, Guijt, and Pasanen, 2015, p. 9). However, this report, including the ToC, is only now articulating the lessons learned from the field, as those lessons are just now stabilizing in the field globally and coalescing into a comprehensible narrative.

In this study, the success of links between HR levers of change and supply chain outcomes was alluded to, but the focus on DELIVER's interventions in the area was to improve HR system stability, particularly evidenced by the HR Assessment Tool, which focuses on HR systems rather than supply chain systems. Thus, the project's performance in a given country might demonstrate the degree to which the HR system is functioning within a logistics system, but there is a gap between HR system improvement and supply chain system improvement. Thus, it is not plausible to measure this retrospectively.

In the future, we recommend that all interventions, and documentation and/or assessment of them, clearly articulate their goals for improving the supply chain. This should include a rationale that links the suggested intervention with the intended impact and indicators to be collected that verify the pathway.

6.1.2. Utility

The degree to which a retrospective evaluation would be useful and used to understand the performance of DELIVER is questionable. The beneficiaries of a project evaluation are often the project staff themselves, as well as the funders who can benefit from reflection on the project's direction during the length of that project. In this case, though, DELIVER is already closing down, and evaluating TO4's performance based on a *new* ToC, one that was not articulated at the time of activity design and intervention implementation, would be of no major use to project stakeholders.

However, there are two main ways in which benefits might be obtained from developing an evaluation tool, based on a new ToC, moving forward:

1. For a business case that demonstrates the value proposition of investing in HR for SCM
2. For planning future HR for SCM interventions

As the public health supply chain community elevates HR as a programming area, it is very useful to quantify its return on investment in order to justify continued expenses and understand which activities have the largest impact. Mapping out these interventions should serve as a foundation for understanding the benefit of them. It is expected that such a business case will validate past expenditures, but a reflexive evaluation might help investors understand where they perhaps over or under-spent in the past, and it can be an invaluable tool for translating this complex work into a language that funders value. In fact, that advocacy work supports the theories underlying DELIVER's interventions in HR for SCM, which argue that tools and figures, particularly when tied to funds, can lead to action among high-level stakeholders. A strong business case for HR for SCM would perform such advocacy work among international development partners like governments and non-profit organizations.

In terms of planning future interventions, a central evaluation tool based on the knowledge of the field and vetted by various partners from the HR for health and supply

chain communities, would be very useful. Such a tool could align stakeholders around the same stated goals and provide a baseline for the next generation of HR for SCM programming. Focusing on overarching objectives and considering the metrics needed to improve commodity availability through human and organizational capacity development would also provide insight into implementing partner success, and might more closely pinpoint areas for improvement, allowing funding and activity managers' efforts to be narrowly focused on areas that could make the most impact for beneficiaries.

Ultimately, the lessons learned in DELIVER's lifetime provide a framework for developing evaluation metrics for future projects. In this section, we outline key metrics that would support a case for investing in HR for SCM based on the ToC underlying DELIVER's investments in this area.

6.1.3. Feasibility

The ToC presented in this report relies on some significant critical assumptions and preconditions that demonstrate the nature of HR and organizational development levers of change to be inextricably linked with local political, historical, and social contexts as well as individual behavior. As such, causal links between each level are difficult to definitively boil down to valid assessment opportunities.

Nevertheless, it is possible to identify which linkages in the ToC are least understood and which are most autonomous. In other words, it might be more feasible to assess some program areas, like education/capacity building initiatives, at this point, compared to others, like organizational structure, which is more entangled in other contextual factors and limitations outside of the system. Such an analysis of the trends, based on the maturity level of the supply chain for each lever of change can help determine whether supply chain systems that are high-performing in a particular area are producing the outcomes and subsequent impacts linked to that area. Using a case study approach to assess and collect patterns around these links would be a very feasible and useful task.

6.2. Monitoring the Program: Next Steps

Following objectives related to the ToC, USAID asks for clarity around the following four objectives related to program evaluability:

1. Based on this ToC, propose a list of indicators or metrics that might help to draw a clear relationship between project outcomes and impact.
2. What is CSL's ability – using the available resources, documentation and data – to conduct an effective retrospective evaluation of these TO4 activities using the proposed ToC and indicators? What are the recommended evaluation questions and methodologies for distinguishing between less successful and more successful interventions for TO4 and other HR for SCM projects and activities?
3. What are the recommended evaluation questions and methodologies for distinguishing between less successful and more successful interventions for TO4 and other HR for SCM projects and activities?
4. How can the above framework (ToC and proposed metrics) be applied in the design of future HR for SCM initiatives so that they are feasibly and reasonably evaluable?

Although this report determined that an evaluation of TO4 would not match the main criteria of plausibility, utility, and feasibility for a performance evaluation, we consider how the ToC could help USAID monitor impact in this area. Note that data for most indicators would need to be collected qualitatively, and it is recommended that these data points be wrapped into interview questionnaires with existent assessments such as the National Supply Chain Assessment (NSCA) tool.

Monitoring Each Lever of Change – Indicators and Metrics

An assessment for of HR4SCM should focus on how well it is achieving overarching objectives, and trace those back to interventions. For each of the major levers of change of the ToC we indicate what metrics could draw a connection to desired supply chain outcomes. Key indicators in the TO4 PMP are very much aligned to the supply chain performance areas that HR capacity building efforts endeavored to improved, but they do not capture interventions aimed specifically at HR or capacity building. In some cases, data is being collected to draw these connections together in a convincing way, but others would require matching qualitative findings, through new tools, to existing data. Each lever of change is explained in terms of its evaluability, based on current metrics and recommended changes or additions to those. Evaluating the maturity of the supply chain for each of these levers of changeprovides a snapshot of overall intervention performance level, but in order to be able to validate the ToC (and provide useful data), each intervention would also need to be linked to the levers of change through indicators.

The discussion of each HR lever of change includes key areas that determine maturity within each area. At the end of this section, the indicators from all ToC lever of change are combined into a single table (see Table 2).

6.2.1. Leadership

Areas of maturity:

a. Degree to which supply chain is a ministry priority – definition of a supply chain strategy?

b. Presence and authority of individual political supply chain champion

c. Presence and authority of individual technical supply chain champion

d. Defined budget for supply chain at ministry of health level

Leadership and advocacy for health supply chains are paramount, as, traditionally, logistics and supply chains have represented a support service and not a core activity. Both political and technical leadership are needed to increase medicine availability, reduce stock-outs and waste, and improve the service provided to beneficiaries.

The following questions represent a list of possible indicators and metrics that can be derived.

- Is there a political health supply chain leader?
- Is there a technical health supply chain leader? What are his/her responsibilities and objectives?
- Is there a budget for health supply chain?
- Is there a health supply chain strategy at ministry of health level?
- What is the evidence of advocacy for supply chain issues at central level?
- What is the evidence that supply chain activities are a high priority for the ministry of health?
- Is funding for supply chain activities (e.g. training) a part of the ministry of health budget?
- Have any supply chain assessments been initiated by the ministry of health?
- What is the level of government funding for supply chain-specific leadership positions at ministry of health level?

Examples of high-level indicators that can be used to monitor leadership and advocacy:

Key Supply Chain Stakeholder	***Supply chain actions to monitor***
Example: ***- Minister of Health on Advocacy***	***- Member of SCM working group*** ***- Fully funded commodity budget line item*** ***- Funded the construction of two new regional warehouses***
Example: ***- Supply Chain Unit Director***	***- Approved supportive supervision training for all manager-level supply chain employees*** ***- Approved hiring of three warehouse managers***
Example: ***Minister of Health on HR-Related Decisions***	***Allocates annual budget to capacity building activities for central supply chain managers***

Source USAID, DELIVER HRCD – PHSCM

6.2.2. Capacity Development

Areas of maturity:

a. Presence of a competency matrix and link to available training

b. Permanent budget line item for HR development for supply chain personnel at the national and local level

c. In-service capacity development: considers training, workshops, and other educational opportunities that are provided for supply chain personnel at all levels

d. Pre-service education: the degree to which there are university programs that provide health supply chain curricula, including as logistics components of pharmacy and service delivery degree programs and as specializations.

The development of a competency matrix is paramount in order to define educational needs for health cadres and supply chain professionals in public health supply chains. In fact, for training and educational activities in general to be effective and to bring about change in behaviors there should be a clear link to existing and lacking capabilities. Ad hoc access to supply chain-related training is not adequate for providing health and logistics professionals with the required knowledge and learning.

It is obvious then that training must be integrated into a wider definition of capacity development and education, including both pre-service education, and in-service capacity development. In order to impact the individual competencies, access to education should be strictly and clearly linked to competencies, with funds available in a permanent budget line for HR development for supply chain personnel at both national and local level.

The following questions represent a list of possible indicators and metrics.

• Is training linked to required competencies?
• Is there a permanent budget line item for HR development for supply chain personnel at the national and local level?
• What are the sources of funding for these activities?
• What is the level of coordination of funding received from partners for supply chain personnel strengthening activities at the national and local level?
• What in-service training opportunities are available for supply chain personnel currently employed?
• Is there a training program in SCM for current employees?

Some indicators that can be derived are:

% staff accessing training / completing training

% staff with pre-service qualifications

6.2.3. Performance Management

Areas of maturity:

a. Policies for performance management
b. Data reliance and use
c. Supportive supervision activities

In a scaffolded approach, supportive supervision and overall performance monitoring could be evaluated in the short term, but longitudinal data collection and analysis would be much more reliable. On the one hand, it would be quiet easy to evaluate the supportive structures for this area. That is, one could ask about the existence and design of evaluation metrics. Similarly, an evaluation could ask about policies around supervision activities, like site visits. If these cohere with the accepted standard (e.g. "% of health workers who have received supportive supervision in last six months', Fort, Pacqué-Margolis, Ng, Kauffman, and Nicholson, 2015, p. 13) then they could be traced to see whether they were regularly implemented. Similarly, one could check the pulse of supply chain personnel to evaluate the degree to which supervision is perceived as motivational and to which it has improved commodity availability. Longitudinally, these analyses of the supervision environment would have to be aligned to findings around both worker retention and quality data availability.

6.2.4. Organizational Structure

Areas of maturity

a. Central-level organization: presence of LMU or similar authority at the central level of a supply chain
b. Professionalization of the supply chain: the degree to which staffing, job descriptions and roles are sufficient in quantity and budget and appropriate for the context. This is the area in which both budget and recruitment are most accounted for.

Much of the literature declared the aim of developing logistics units as supporting data analysis. As data availability improves, there needs to be a means of operationalizing its utility. A major response to this is the creation of LMUs with staff trained in data management. In theory, these units should use data to monitor stock levels, anticipate problems, and make routine evidence-based decisions to improve efficiency, cut costs, and, ultimately, improve overall stock management.

However, as organizational units, there are numbers of relational and financial factors that could impede the reliability of the link between organizational development levers of change and commodity security outcomes. At the most basic level, this element could be evaluated based on the following metrics:

- Number of units and sub-units at the central, regional, and district levels dedicated to logistics management
- Frequency of meetings and number of core responsibilities met per unit

Correlated alongside:

- Data reliability inputs—frequency of collection, quality of data

6.2.5. Coordination/Collaboration

Areas of maturity:

a. Between supply chain stakeholders: the degree to which partners are aligned and in regular communication, e.g. through a commodity security group
b. Between/with government stakeholders: the level of coordination at the ministry level, including between ministries, as relevant and necessary for supply chain activity, such as creating positions and paying employees (ministry of finance and/or administration), aligning procurement decisions, developing educational pathways (ministry of education)

If coordinating bodies like Commodity or Contraceptive Security committees are to align stakeholders and advocate for an enabling environment, financial means, and contextualized SOPs, then an evaluation of the impact of these levers of change would follow. That is, one could trace the size and regular meetings of organized bodies and measure the degree to which a country has an enabling environment for supply chain development, budget lines with sufficient funds dedicated to supply chain activities, and SOPs both in place and followed.

DELIVER's interventions with coordination and collaboration among ministries and stakeholders have mostly centered on creating groups to either make regular, routine decisions, or to respond to specific needs (e.g. a week of meetings to discuss new eLMIS between a Ministry of Health and partners, Heath Logistics Press 2013).

Table 2: List of HR for SCM Indicators Developed from ToC

Lever of Change	Indicator	Formula/ Data Collection
Leadership	In areas where there are few procurement bottlenecks (low lead time for awarding contracts, high rate of on-time/full delivery), is there a public health supply chain leader with a dedicated position and high degree of authority? Ratio of unit prices paid through an emergency procurement vs. competitive bidding process over percentage of dedicated leaders per procurement unit (low to high indicates success in leadership)	Degree of authority relates to ability to act on decisions and would need to be determined through triangulating qualitative information: surveys of co-workers, interview with leader, review of policies
Capacity Development	In a country with high service delivery point-level reporting rates and an LMIS that routinely reports stock status from the SDP level, how many in-country staff are trained? (DELIVER PMP indicator)	Need to focus on time for each activity here to determine number of trained staff needed per activity

	Competency per supply chain area by percent trained: Warehouse accident rate per number of warehouse staff trained Put-away time per number of storage location staff trained Units moved per person-hour Inventory accuracy rate	
Monitoring/ Supervision	In a country with high-order entry accuracy and low stock wastage due to expiration or damage, are there supervision guidelines and tools for routine supervision of commodity logistics management functions? (DELIVER PMP indicator) Where there are guidelines and tools, are there routine site visits? Are supervisors trained?	
Organizational Structure	In a country with a high percentage of procured products registered in-country, is there an established procurement unit/body responsible for the procurement of health commodities (DELIVER TO4 PMP indicator)	The focus should, again, be on the task, which should have an established SOP: procurement, forecasting and supply planning, etc.
Coordination/ Collaboration	Commitment to Established Procurement Plan Positive financial Indicators (e.g. % average international reference price paid) per positive CS committee metric	Are all stakeholders committed to carrying out an established procurement plan by product? (Y/N) -procurement plan, interviews, policy documents, meeting minutes from procurement unit or committee including all donors procuring or financing procurement

7. Conclusion and Recommendations

Because the area of HR for SCM in global health has progressed rapidly in the past decade, it is reasonable that it will continue to grow and change as new interventions are attempted and as contexts change. It's possible that quickly emerging markets in some developing countries will have a major impact in how we view the role of public health supply chains, for instance. Or, it might be that supply chain workers are impacted by the automation of certain tasks. The context of international development is dynamic and unpredictable, therefore, this ToC should be viewed as a living tool, and it should be revisited as contexts change and new knowledge emerges. This report should be seen as the first step in an iterative process.

In the near-term, a vetting of this ToC would be beneficial to its reliability. As the model has been developed through a review of existing artifacts, namely interview notes and literature, it is missing primary confirmation of its accuracy. Before fully operationalizing lessons from this report, the expert community should achieve consensus on the theory. The following questions should be asked to determine the validity of this study:

A. Is the separation of each lever of change justified, or should horizontal connections between areas be further drawn out (e.g. need leadership in order to provide supportive supervision, need stakeholder collaboration and coordination in order to properly design curriculum and to monitor all progress)?
B. Are there country examples that show unequal distribution of energy into specific areas that are successful? That is, what outliers demonstrate that stakeholders should be more focused on one area than others?
C. What challenges are there in collecting the data outlined here?
D. Have we captured full realm of kinds of outcomes these interventions have had? Do they lead us to the main goals of the project?
E. Is there other language that the ToC should use to get to optimal supply chain outcomes and/or impacts?
F. Are the levers correctly identified? Are there any gaps?
G. Are the pathways between levels clear? What are the underlying assumptions that one would endeavor to measure to validate these pathways? Do the pathways need to be mapped out from invidivual "box" to individual "box" in the framework or is there sufficient evidence to support that each level naturally cascades as shown?
H. What evidence exists or can be generated to demonstrate the degree to which influencing the individuals levers of change impacts the overarching objective?
I. Are there other KPIs that would better capture the impacts of these interventions?
J. Are there other confounding factors that should be captured?

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Appendix A: List of key informants interviewed

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Appendix C: Summary of key informant interviews

Problems

Monitoring or supervision

According to participants, efforts have been made to improve the process of monitoring various aspects of the supply chain (SC). Despite this, problems with implementation and accuracy persist. According to Yonzone, the Logistics Management Information System (LMIS) system was started by DELIVER in 1994 and product availability is increasing in the center. Yet, even though rates of reporting are high, accuracy – which is almost entirely dependant on workforce behaviors and adherence to SOPs – remains an issue. Kevin Pilz gives an example of this in relation to monitoring measures put in place in Mozambique. When the Minister heard about frequent stock-outs, he decided that every facility in the country should report weekly stock-outs of 10 tracer medicines, but there was no system in place for this. As a result there is a lot of confusion about what the problem is and what the best course of action is to meet it, which means problems are rarely solved in an effective way.

Organizational structure (lack of coordination)

A handful of interview subjects laid particular emphasis on coordination issues between donors and national governments. According to Yadav, there is a strong dependency on DELIVER's planning in many countries. While this is a measure of project success, it also demonstrates a need for a coordinated exit plan, which is the most critical and complex stage of the project.

A lack of coordination between donors themselves was also raised as a problem, particularly if they are to act as a force strong enough to pressure the government to make necessary changes. In Nepal, government corruption is a big problem and there is no back-up plan if procurement is delayed. Donors usually can't spend the budget because they want to do things to benefit individuals or families rather than the country as a whole. There should be weekly donor coordination committees, but this still needs to be implemented (Yonzone).

There also continues to be a lack of coordination between countries on how best to train supply chain workers to do their job effectively. As Schafer and Ifafore point out, countries may choose a different approach to ensuring that workers have the necessary competencies and these lead to successful SCs; e.g. there is a difference between putting a curriculum in place for every health worker versus separate cadres.

The Supply Chain problem

According to a number of interviewees, supply chain systems are still not working well enough. This has a negative effect on timely procurement, and stock-outs are continually occurring (Yonzone). A number of factors have been blamed; huge stock-outs and overstocks happen when people don't see the importance of having data available on where stocks are, or where service delivery points are in terms of product availability (Nora Quesada). In addition, there is confusion over which areas would be best to invest in. USAID support projects have evolved from 'how do we best train/prepare people to do work?' to 'what are the best ways of preparing workers to

sustain a system and maintain it?'. Even though DELIVER has created indicators, implementation tools, and assessment tools, trained staff to fill in stock cards, designed supply chain systems optimization, set RTIs, and built networks to get staff, skills and tools, they can still not give a clear indication of where money should be focused (Kevin Pilz). Countries with weak supply chains, furthermore, continue to have vertical programs, vertical supply chain functions, completely vertical supply chain functions, and are unable to integrate the SC. This may be compounded by donor interests – as, in the face of a weak or failing national supply chain, donors may chose to run their commodity donation and distribution programs in parallel to existing government systems.(Nora Quesada).

Nevertheless, one interviewee highlighted that we should not only be concerned with the obvious problems in a supply chain such as stock-outs, which get a great deal of publicity in a country, but also with the less visible challenges. Civil society could play a role in generating noise around the less visible problems, creating publicity and therefore accountability, as has been the case in Sierra Leone (Musonda Kasonde).

Standard Operating Procedures (SOPs)

Only one participant made any significant comment on issues related to standards of practice: there must be standards of practice in place so that people know how they should or should not be doing things. But it is important that people move beyond SOP guiding principles and learn from how others carry out certain tasks. There should also be standards in place when training staff, to allow people to think about where they will go next (Yadav).

Staff turnover

A number of participants agreed that retaining competent supply chain workers was a huge problem, and the issue of high levels of staff turnover can be recognized at all levels (Schafer; Yonzone;Quesada). One significant problem is that no one wants to work in remote areas, and staff therefore try to find ways to stay in the district (Yonzone). It is also very difficult to establish policies or mechanisms to retain staff in MOHs due to them being highly political (Quesada). Another issue is how to overcome the opinion held by medical personnel that they are the only professionals in the building (Emery).

Staffing needs/HR issues

Issues relating to staff motivation were raised by several interviewees. Factors including pay scales, incentives and management issues affect staff morale; companies need to figure out how they reward, encourage and motivate people to ensure they are reliable and effective in their work (Jascowitz; Yazone). Workers need job descriptions, clear expectations and financial as well as non-financial incentives such as training (Jascowitz; Yadav).

Jobs are, moreover, often defined without specific roles. In Mozambique, in the Central Medical Store (CMS), roughly 70% of workers are pharmacists. While it makes sense for them to understand the pharmaceutical properties of the supplies they handle, most people also need general supply chain expertise, which isn't typically included in the curriculum (Pilz). Even where

guidelines for how workers should act have been developed, take-up has been slow in many countries and achieving coherence among the workforce is one of the biggest challenges (Kasonde).

One participant discussed the issues relating to the way supply chain management (SCM) jobs are perceived, both by potential workers and by Ministries of Health. The supply chain element is often seen as a separate entity from the Ministry of Health (MOH) and the disciplines involved in SCM are not viewed as serious positions. As such, the workers involved in supply chain tend to be treated as second-class citizens. Where the challenge lies is getting the MOH to take SCM seriously and to integrate it as a functional arm within the MOH, because otherwise these workers are viewed as nothing more than people who deliver things. Organizations and health facilities thus struggle to recruit well-educated people to SCM jobs (McCafferty).

Another HR issue highlighted by two participants was the distinct lack of female workers in a male-dominated supply chain (Jascowitz; Eomba). Finally, the importance of having a really competent set of leaders running the HR department needs to be recognized (McCafferty).

Lack of available training

A number of interviewees referred to the lack of available training for people working in supply chain at all levels, and this is particularly down to funding issues. According to Quesada, MOHs will never pay for their staff to take a course in supply chain offered by regional institutions for supply chains. This is the case with PRISMA in Peru: unless a donor pays for someone from a MOH to take a course, they will not be trained as the Minister will never invest.

Sometimes the problem is not always about a lack of available training, but also relates to where the training is targeted and how it is carried out. As Pilz states, USAID and other organizations have been pumping a great deal of money into training people for SCM but little progress has actually been seen in terms of skills. This is down to the fact that organizations focus on training people who are in the system, and thus fail to consider how they can put the right policies in place to keep those on board who already have the right skills. At higher levels of the SC, furthermore, it is not enough to fill knowledge gaps through training. Employees must rather work with a government counterpart so that they will pick up skills on the job and eventually become competent (Yadav).

Solutions

Access to information

Only one participant referred explicitly to the benefits of information access: Rilling stated that DELIVER has collected a lot of data, but governments have put a lot of restrictions in place over who can access it. As such, he suggests that the 'sunshine principle' be facilitated.

Champion or leader?

The majority of interview participants mentioned supply chain problems relating to leadership, and how these could be overcome with a competent leader. For one thing, leadership should consist of people with the competencies to be heard and respected, particularly as strategies are

difficult to implement without a champion in a country. These leaders need to be aware of how the entire supply chain functions, rather than simply taking responsibility for a small fragment of the system (Brown; Pilz). As Pilz further details, at the heart of the problem is the reality that MOHs are not buying in because the CMS is simply just a group of people focusing on logistics rather than SC.

Not only do leadership-specific issues need to be addressed, workers also need to have the motivation and means to raise issues with leaders, rather than remaining silent. One way of doing this has been demonstrated in the DR, which is to problem-solve by bringing people together so that they know each other well enough to talk to one other.

Concerns relating to the training of leaders were also flagged up by a handful of participants, both in terms of the lack of leadership training (since the focus tends to be on ordinary supply chain workers) and also in terms of the type of training leaders receive. YadavWhere good leaders are found in the CMS, they have figured out how to be self-sustaining; the clever ones create their own strategies and go to Ministers every week to tell them how issues should be handled. According to Eomba, leaders need to be trained in leadership skills, not just technical knowledge. She further states that matters of leadership need to be worked on at each level of the SC, e.g. so that the person in the warehouse feels like they are in charge.

Further, while it is easy to make people capable leaders in a short space of time, they will always need ongoing external mentorship and support: just because you train someone in leadership skills, does not mean they will continue being more efficient and successful (Frankel).

Coordination

The majority of interviewees agreed that a solution to many supply chain issues is to see better coordination among donors, between national governments and institutions, and between donors and governments. This coordination is necessary in functions such as graduate retention, and university bodies, SCM representatives and people from other ministries should meet regularly to discuss the problems (McCafferty). Pilz discusses how he created a coordinated working group (which included people from CMSs, people from the HR directorate and partners who were meeting on a weekly basis) to discuss and oversee the monitoring process. They went through it step-by-step and came up with an implementation plan, as well as establishing a unit for projects and strategy.

Governments and donors both have a role to play in ensuring that efforts are more coordinated. Rather than a consultant coming in to put together a plan, there needs to be support for a national strategy driven by the government and developed with partners in the country (Magner). Similarly, governments need to establish a donor coordination mechanism prior to engagement and work with the planning commission to put together a business plan for donor support.

Local governments and the press can also play an important role and it is essential to work with them. For example, DELIVER held a workshop with the press because what they were publishing was doing more harm than good. Through the medium of this workshop DELIVER was able to

explain what they were doing and why, rather than the press just reporting rumors about their activities (Yonzone).

At a smaller level, coordination and cooperation between leaders of SCs/CMSs is also useful. If heads of SCs/CMSs were part of a network in which they could get together with each other (and others with certain types of knowledge) to discuss how changes have been brought about at a ministerial level, it could be quite a successful measure. Tanzania is an example of a country that would benefit from this. Here they do not know how to manage working capital flows, which means they neither receive money nor make payments on time. DELIVER is not an expert in this, but airlines etc. are (Yadav).

External assistance in tasks

Only one participant discussed the matter of receiving external assistance in tasks, but their view was undecided. It was demonstrable that external assistance is not always beneficial. According to Magner, many countries have hit the middle-income barrier, but since they don't have either the support of a scale-up program, or financial or people resources of their own, they cannot scale those efforts up. In such a case, external assistance is necessary and is clearly lacking. Rwanda is now standing on its own two feet in terms of owning the system and the outside support is at a level which is in line with the country's plan. As such, external assistance is beneficial, but only when kept at a certain level. Sudan, meanwhile, has figured out how to make the system work and has been able to think progressively because of this independence. External assistance is therefore not necessary and would be detrimental to the overall stability of the system.

Long term planning

When thinking in the long term, the issue of system sustainability is crucial, and two participants made reference to this. Sustainability comes from having the correct HR policies, possessing quality data and having good funding strategies in place (Kasonde). SCM training also needs to be institutionalized, so that once a donor makes the decision to leave a country, training can be passed on within an organization between new and old managers (Jascowitz). That way, the system will not collapse once the donor leaves but continue operating effectively.

Monitoring

Three participants stressed the importance of having good monitoring mechanisms in place within an organization so that problems can be quickly identified and addressed (Magner). These evaluation mechanisms need to be in place at the very start of a process, alongside program implementation and design work (Mayo). In terms of how monitoring should take place, weekly or even monthly meetings with staff are useful for setting certain goals and discussing why targets were not met. Further, supervision tools such as mHealth are useful for performance monitoring (Frankel).

Organizational development

The two interviewees who discussed the importance of organizational development emphasized the need to think about the long term, and also touched on the many different aspects of an

organization that need to be focused on. With regard to the former, as Pilz states, rather than thinking about the now, a 5-year workforce plan should be developed (as was done in Mozambique). Thinking thus needs to be less operational and more strategic. That way, the whole system can be considered and the overall staff structure required to build up the workforce can be put in place. Expanding on the latter, Brown lists just some of the many different aspects of an organization's operations that require development: workforce development; performance management and retention; professionalization for HR; data management; external body oversight; internal organization ethos; and engaging stakeholders.

The private sector

It was widely agreed by interviewees that the private sector is very important to SC. Not only can the public sector learn from its ways of doing things, but its workers could also bring some useful skills to the table. For example, the private sector spends a great deal of time looking at worst case scenarios and identifying risks. Private SCs in particular are aware of how to look beyond the sources they usually use if products are not available (Ifafore).

Leveraging the private sector should be seen more as an opportunity for the overall system and country, rather than as a treat for trainees (Pilz). As Yadav suggests, the government could establish an alternative cadre of senior officials from the private sector who may want to work in the public sector for 3–5 years.

The public sector, however, doesn't always need private sector input to achieve success. In Malawi, SCM work has been very successful and is donor-supported using local warehousing partners (Hasselberg).

Training

While the majority of interviewees held that training was extremely important, many different opinions surfaced regarding how training should be conducted and who should be trained. According to Pilz, training shouldn't be rushed by being conducted on the job; it needs to be done more strategically. Other interviewees felt it was crucial to improve training at an earlier stage of a supply chain workers' career. Developing postgraduate programs are crucial as it is at this stage of learning that information is more likely to be retained (Hasselberg; Eomba).

For workers to perform effectively, however, flexibility and adaptability are just as important as training (Emery). Workers need to be taught problem solving skills, which will be crucial to help them determine what is best for their country (Schafer). Training in management skills must also be prioritized; donors have focused a lot on training, but when workers like clinicians move up to management level, they do not have the skills and knowledge for managing. This can lead to the system slipping (Jascowitz).

Two participants raised the problem of what happens to training once the donor leaves a country (Yonzone; Wanda Jascowitz). DELIVER has created a curriculum which gives governments the capacity to provide basic training (Yonzone).

Accountability

Although only two participants discussed matters of accountability, both clearly agreed that making governments more accountable would improve the way the system operates. There needs to be a culture of accountability and performance management to drive governments to make data readily available to donors and the public as a matter of business (Miles). In Kenya, for example, one prominent academic used the media to highlight matters of accountability and slowly it became an important topic in election campaigns (Yadav). In Botswana, there has been success through the public accountability program which was set up in the 1980s when the government wanted to decentralize. Medex set up management systems to model readiness, willingness and ability. Local government appreciated the data created by this process, as it allowed for self-reflection (Miles).

Incentives

Several participants recognized the importance of incentives, both financial and non-financial, in getting the best possible performance out of supply chain staff at all levels, and also for attracting people to SCM in the first place. If there is no reward for getting degrees in SCM, no one will want to do it (Ifafore). It is important for workers that their jobs are rewarded through recognition and appreciation. Equally, if workers do a bad job, they need to know that there will be consequences, as well as constructive feedback to allow them to implement changes (Jascowitz).

In financial terms, Namibia made a concerted effort to make sure that salary levels were acceptable and, since these are ministry-led, they can be maintained (Mayo). Salary incentives are also particularly important in encouraging workers to work in remote locations (Jascowitz). Another incentive can be the level of responsibility assigned to a manager: if everything that happens in a system needs their approval, they are likely to want to do a good job and remain in that position for the long term (Yadav).

HR development

Several interviewees agreed that HR development is crucial to supply chain success, although there are many different aspects of HR that need to be focused on. Job roles need to be professionalized; they need titles and descriptions of necessary skills (McCafferty; Hasselberg). If someone is not familiar with a role, they can thus look at the job descriptions and Statements of Work (SOWs) and know whether they are legitimate or not (McCafferty). What is crucial, however, when it comes to HR development is that instead of starting with the supply chain and eventually moving to focus on HR, thinking about HR should come first.

Coordination is another way to achieve HR development. For example, Ethiopia has been working to build staffing: if a SCMS person goes to training, a government employee must also go with them to take part in the training. That way, if a donor pulls out, the government still has staff (Mayo). Another means of developing HR is provided by Pilz. In Mozambique, the CMS acts as a learning institution; they bring people in who are relatively junior and enthusiastic 5–10 years before they would move on to other opportunities, thereby creating a market with supply and demand of people who can do their job well before they decide to leave. This could be done through partnerships with universities and internships.

Transparency

Greater transparency would mean less chance of corruption, as governments are more accountable to the people. This would see less money wasted that could be spent on medicines (Bornbusch). Corruption, however, remains a big problem, and morally good staff are few in numbers (Yonzone).

Indicators of success

Commodity availability

Only one participant discussed commodity availability. According to Yonzone, signs that it was appropriate for DELIVER to leave a country were reduced stock-outs and commodity availability, to name but a few. However, there needs to be a plan in place to ensure commodity availability continues, or else stores will fall apart because of lack of interest.

Coordination

If all the necessary bodies and organizations work together, a country will likely experience a great deal of success. Mayo offers the example of Ethiopia: country directors built a relationship with the MOH in which there was a great deal of communication between the two so that they could fully grasp the lay of the land. A lot of money was also spent on training staff at all levels and in both organizations, which worked in tandem, with representatives from each being present at training at all times.

Demonstrations of independence

According to Kasonde, the ability of a country to demonstrate that it can operate independently is a clear sign of success, particularly in terms of how it starts to articulate its goals and subsequently sets aside resources to achieve them.

Saving for financial benefit

It is a clear sign of success when countries and donors are able to get more for their money (Rilling; Quesada). Money can be saved when a country's procurement capacity increases; that way, they can get commodities from lots of different places, rather than just the local market which will likely be far more expensive (Quesada).

Better leadership

Stress has been placed on the importance of training, and thus improving, leadership within SC. When governments choose to hire managers because they can see individuals in front of them with the right qualifications, rather than hiring because of nepotism or political affiliation, then leadership is inevitably going to improve (Jascowitz).

Appendix D: Table of coded interventions from the literature

Document	Location	Date	Date range	Intervention	Keyword1	Notes		
Project Update for Task Order 1, February 2010	Bangladesh	Feb 2010	2010–2012	Transition Meeting with the Management Information System Director and the Logistics and Supply Director at the Directorate General Family Planning (DGFP)	Coordination			
Project Update for Task Order 1, February 2010	Bangladesh	Jan 2010	2010–2012	Four-member team from DELIVER Pakistan and three members from the home office country team visited Bangladesh field office a) for training/orientation on the working procedures of the office, b) to view two warehouses, and c) to discuss LMIS, inventory management, procurement, etc.	Coordination	Cross-country collaboration		
Project Update for Task Order 1, February 2010	Bangladesh	Jan 2010	2010–2012	Handover materials and closeout	TA			
Project Update for Task Order 1, February 2010	Dominican Republic	Feb 2010	2010–2012	Training workshops on logistics and contraceptive technology for 40+ health promoters, nurses, doctors, and community leaders	Education	Logistics training		
Project Update for Task Order 1, February 2010	Dominican Republic	Feb 2010	2010–2012	Assisted National Maternal and Child Health General Directorate to appoint new director for provincial hospital family planning (FP) program	OD	Job appointment		
Project Update for Task Order 1, February 2010	Dominican Republic	Feb 2010	2010–2012	Site visits to initiate community activities	Supervision	Site visits		
Project Update for Task Order 1, February 2010	Dominican Republic	Feb 2010	2010–2012	Met with contraceptive security (CS) committee members from MOH to discuss work plan and reinstate regular meetings	Coordination	CS committee		

Project Update for Task Order 1, February 2010	Dominican Republic	Feb 2010	2010–2012	Worked with MOH officials to strengthen links with local NGOs	Coordination	Local NGOs		
Project Update for Task Order 1, February 2010	Dominican Republic	Feb 2010	2010–2012	Monitoring visit to province directorate of health	Monitoring			
Project Update for Task Order 1, February 2010	Dominican Republic	Feb 2010	2010–2012	Participated in health cluster meeting about Haiti disaster	Coordination	Cluster		
Project Update for Task Order 1, February 2010	El Salvador	Feb 2010	2010–2012	Met with other IP about software and monitoring visit	Coordination		Also monitoring	
Project Update for Task Order 1, February 2010	El Salvador	Feb 2010	2010–2012	Organized EOP meeting with other IP and MOH	Coordination	Between partners, Ministry		
Project Update for Task Order 1, February 2010	Ethiopia	Feb 2010	2010–2012	Two-day workshop to discuss Reproductive Health Supplies Coalition activities	Coordination	NOT education		
Project Update for Task Order 1, February 2010	Ethiopia	Feb 2010	2010–2012	1-day advocacy meeting by FP Technical Working Group (TWG) with EDPs, multiple ministries, NGOs, professional associations, civil societies, and universities	Coordination	Between many stakeholders	Also advocacy	
Project Update for Task Order 1, February 2010	Ethiopia	Feb 2010	2010–2012	Creation of regional health commodity security task force	OD	"Member organizations include Oromia Regional Health Bureau, Pharmaceutical Fund and Supply Agency (PFSA), the USAID | DELIVER PROJECT, Supply Chain Management System (SCMS), United	Also coordination, advocacy	

						Nations Population Fund (UNFPA), Management Sciences for Health (MSH)/HCSP, MSH/SPS, ICAP, Integrated Family Health Program, Ipas and DKT"		
Project Update for Task Order 1, February 2010	Ethiopia	Feb 2010	2010–2012	Logistics officers continued supportive supervision	Supervision			
Project Update for Task Order 1, February 2010	Ethiopia	Feb 2010	2010–2012	6-day training of trainers (TOT) on paper-based LMIS (7 trainers, 39 trainees) followed by 3-day local training (170 staff from over 80 facilities trained)	Education		Also data/LMIS	
Project Update for Task Order 1, February 2010	Ethiopia	Feb 2010	2010–2012	Facilitative meetings with the Federal Ministry of Health, UNFPA, DKT and other reproductive health/FP partner organizations	Coordination			
Project Update for Task Order 1, February 2010	Ethiopia	Feb 2010	2010–2012	Project sent 8 DELIVER staff on Eastern and Southern African Management Institute (ESAMI) courses	Education			
Project Update for Task Order 1, February 2010	Ghana	Feb 2010	2010–2012	Meeting with Focus Regions Health Project	Coordination	Between other USAID projects		
Project Update for Task Order 1, February 2010	Ghana	Feb 2010	2010–2012	Supported Food and Nutrition TA II Project with commodity procurement information request	Collaboration			

Project Update for Task Order 1, February 2010	Liberia	Feb 2010	2010–2012	One-on-one discussions with UNFPA about reproductive product requirements	Collaboration			
Project Update for Task Order 1, February 2010	Liberia	Feb 2010	2010–2012	Supply chain TWG meeting with MOH to plan supervisions	Coordination	Between DELIVER and MOH		
Project Update for Task Order 1, February 2010	Liberia	Feb 2010	2010–2012	Presented to EDPs and MOH on reproductive health requirements for 2010 with information on contraceptive stock issue	Coordination			
Project Update for Task Order 1, February 2010	LAC Region	Feb 2010	2010–2012	Regional technical working meetings with candidates from MOH and SS Institutes	Collaboration	South-to-south	Also public-private alliance building	
Project Update for Task Order 1, February 2010	LAC Region	May 2010	2010–2012	Contraceptives Procurement Manual for MOH in Dominican Republic	Education	Tool/resource		
Project Update for Task Order 1, February 2010	LAC Region	Feb 2010	2010–2012	Meeting in Nicaragua with CS committee stakeholders to move market segmentation from theory to practice	Coordination	CS committee		
Project Update for Task Order 1, February 2010	Malawi	Feb 2010	2010–2012	Curriculum review for faith-based college of health sciences that produces paramedical staff	Education	Curricular		
Project Update for Task Order 1, February 2010	Mozambique	Feb 2010	2010–2012	Printing of SOP manuals	Education	Tool/resource	Also OD	Problem noted: slow pace of printing
Project Update for Task Order 1, February 2010	Mozambique	Feb 2010	2010–2012	Meeting with PSI to discuss approaching engagement in contraceptive distribution with MOH community health worker	Coordination	Between DELIVER and IP		
Project Update for Task Order 1, February 2010	Mozambique	Feb 2010	2010–2012	SOW for TA in contraceptive forecasting	TA			Problem noted: recent staff turnover AND need to train

								reproductive health commodity security (RHCS) in forecasting and supply planning for RH commodities
Project Update for Task Order 1, February 2010	Mozambique	Feb 2010	2010–2012	Condom TWG meetings chaired by Minister of Health about a) 2 national events and b) importance of coordination, communication, M&E of subgroups	Coordination	With MOH	TWG	
Project Update for Task Order 1, February 2010	Nepal	Feb 2010	2010–2012	Pull system training conducted and funded by Logistics Management Division (LMD) in 27 previously left out (N=36 and 85 staff in two districts)	Education	Training of health facility staff		
Project Update for Task Order 1, February 2010	Nepal	Feb 2010	2010–2012	Held orientation, distributed standard storage guidelines and revised ASL/EOP reports to 115 health facility staff	Education	Logistics orientation	Also SOP	
Project Update for Task Order 1, February 2010	Nepal	Feb 2010	2010–2012	Assisted LMD in distributing commodities	TA			
Project Update for Task Order 1, February 2010	Nepal	Feb 2010	2010–2012	One-day joint LMD/DELIVER national workshop on consensus forecast and quantification with attendance from MOH and EDPs	Education	Workshop	Also coordination	
Project Update for Task Order 1, February 2010	Nepal	Feb 2010	2010–2012	Two-day workshop to draw up procedural guidelines around district-level auctioning and disposal organized by LMD	Education	Workshop	Also coordination	
Project Update for Task Order 1, February 2010	Nepal	Feb 2010	2010–2012	Project staff attended Capacity Development Plan workshop	Coordination	Workshop		

Project Update for Task Order 1, February 2010	Nepal	Feb 2010	2010–2012	Finances and TA for logistics task force meeting to discuss quantification of lab and STI drugs with EDPs	Coordination	Task force		
Project Update for Task Order 1, February 2010	Nicaragua	Feb 2010	2010–2012	Finances and TA to MOH for new LMIS forms	Monitoring	Resources	Also TA	
Project Update for Task Order 1, February 2010	Nicaragua	Feb 2010	2010–2012	Supportive supervision visit to hospital	Supervision			
Project Update for Task Order 1, February 2010	Nicaragua	Feb 2010	2010–2012	Facilitated CS committee meeting and established two groups to finalize CS plan	Coordination	CS Committee	Also SOP	
Project Update for Task Order 1, February 2010	Nicaragua	Feb 2010	2010–2012	Developed medical supply storage management manual	Education	Job aid	Also resources	
Project Update for Task Order 1, February 2010	Nicaragua	Feb 2010	2010–2012	Reviewed pharmacy university syllabus for logistics content	Education	university syllabus		
Project Update for Task Order 1, February 2010	Nigeria	Feb 2010	2010–2012	Supportive supervision and on-the-job training by project field-based officers in two states	Supervision	Training	Also education	
Project Update for Task Order 1, February 2010	Nigeria	Feb 2010	2010–2012	Five-day Targeted States Health Improvement Project workshop for team building and work planning	Coordination	Just for Project staff		
Project Update for Task Order 1, February 2010	Pakistan	Feb 2010	2010–2012	Workshop on national contraceptive procurement manual with government officials	Education	Job aid	Also coordination	
Project Update for Task Order 1, February 2010	Paraguay	Feb 2010	2010–2012	Participated in CS committee meeting	Coordination	CS Committee		
Project Update for Task Order 1, February 2010	Paraguay	Feb 2010	2010–2012	Awarded regional FP officer with $ for zero stock-out	Leadership	Incentive: monetary award		
Project Update for Task Order 1, February 2010	Rwanda	Feb 2010	2010–2012	Project conducted 4-day quantification workshop for MOH, university	Coordination	Workshop	Also education	

				pharma department and EDPs				
Project Update for Task Order 1, February 2010	Rwanda	Feb 2010	2010–2012	Project preparing SOW for TOT on SCM for district pharmacists	Education	TOT		
Project Update for Task Order 1, February 2010	Tanzania	Feb 2010	2010–2012	1-day training/orientation in use of cell phones and mobile software for data collection with MOH, CDC and PMI. Project followed by four warehouse site visits	Education	Training	Reactive	Outcome: helped build sustainable model for use of cell phone to conduct end-use activity
Project Update for Task Order 1, February 2010	Tanzania	Feb 2010	2010–2012	Initial stage of large scale data collection exercise with store visit and Report and Requisition (R&R) collection exercise	Monitoring	End-use exercise		Outcome: data from R&R activity able to assist in design of subsequent brainstorming sessions
Project Update for Task Order 1, February 2010	Tanzania	Feb 2010	2010–2012	Project advocated to MOH to incorporate Depo into programs	Leadership	Advocacy		Challenge noted: recall on specific Depo batches so concern over effectiveness of drug
Project Update for Task Order 1, February 2010	Zambia	Feb 2010	2010–2012	Ongoing monitoring and evaluation visits	Monitoring	Site visits		
Project Update for Task Order 1, February 2010	Zambia	Feb 2010	2010–2012	Training on Antiretroviral (ARV) system and HIV test kit system	Education	Training		
Project Update for Task Order 1, February 2010	Zambia	Feb 2010	2010–2012	Preventing mother-to-child transmission roll-out training	Education	Training		
Project Update for Task Order 1, February 2010	Zambia	Feb 2010	2010–2012	Supportive supervision visits by Project and by deputy director	Supervision	Site visits		

Project Update for Task Order 1, February 2010	Zimbabwe	Feb 2010	2010–2012	Project helped MOH revise Delivery Team Topping Up trainer manual and participant workbook	Education	Job aid		Question: what revisions were made and why?
Project Update for Task Order 1, February 2010	Zimbabwe	Feb 2010	2010–2012	Project staff participated in monitoring, support, and supervision visits	Supervision	Site visits		Outcome: facility staff satisfied with system Outcome: learned of improvement of malaria commodity availability and receipt vouchers were filed at service delivery platforms (SDPs)
Project Update for Task Order 1, February 2010	Zimbabwe	Feb 2010	2010–2012	Project went to Zimbabwe Informed Push (ZIP) technical meeting	Coordination	Meeting		Outcome: NatPharm requested formal letter from Department of Public Security explaining role and transfer of area coordinators to assist with monitoring
Project Update for Task Order 1, February 2010	Zimbabwe	Feb 2010	2010–2012	Project participated in annual national quantification and supply planning exercises organized by MOH	Coordination	Meeting		Outcome: supply plans and forecasts generated
Project Update for Task Order 1, February 2010	Zimbabwe	Feb 2010	2010–2012	Project met with MOH stakeholders to solicit input on DELIVER and SCMS strategic plans	Coordination	Meeting		

Project Update for Task Order 1, February 2010	LAC Region	Mar 2010	2010–2012	RTI: PRISMA conducting Quant and Procurement Planning workshop in Lima	Coordination	Regional workshop	Also educatio n	
Project Update for Task Order 1, February 2010	E&S Africa Region	Mar 2010	2010–2012	RTI: ESAMI holding Overview of Logistics and Quantification and Procurement Planning workshop in Arusha	Coordination	Regional workshop	Also educatio n	
Project Update for Task Order 1, February 2010	W Africa Region	Mar 2010	2010–2012	Course with Bioforce (training materials translated and participants invited)	Education			
Project Update for Task Order 1, February 2010	Global	Feb 2010	2010–2012	IAPHL released new tool for members to connect	Coordination	Networki ng		
Project Update for Task Order 1, February 2010	Global	Feb 2010	2010–2012	Distance learning program disseminated 440 CDs	Education	CDs		
Project Update for Task Order 1, February 2010	E Africa	Feb 2010	2010–2012	Technical advisor went to Rwanda for 5-day lecturers' orientation to adapt curriculum of logistics management course for pharmacists at National University of Rwanda	Education	Curriculu m		
Project Update for Task Order 1, August 2008	Bangladesh	Aug 2008	2006–1009	1-day orientation workshop on procurement with MOH	Education	Training		
Project Update for Task Order 4, October 2011	Ethiopia	Oct 2011	2010–2012	FP TWG met to plan for international FP meeting in Dakar	Coordination	TWG, meeting		
Project Update for Task Order 4, October 2011	Ethiopia	Oct 2011	2010–2012	Monitoring visits to SDPs by region	Monitoring	Site visits		
Project Update for Task Order 4, October 2011	Ethiopia	Oct 2011	2010–2012	Project regional staff did site supervision at lower levels using LMIS	Supervision	Site visits		
Project Update for Task Order 4, October 2011	Ethiopia	Oct 2011	2010–2012	Project trained MOH 87 facility staff (pharmacy heads and storekeepers) on IPLS	Education	Training		

Project Update for Task Order 4, October 2011	Ethiopia	Oct 2011	2010–2012	PFSA logistics partners' meeting to discuss joint work plans and model health facilities	Coordination	Meeting		
Project Update for Task Order 4, October 2011	Ghana	Oct 2011	2010–2012	Project facilitated third meeting of logistics subcommittee of Inter-Agency Coordinating Committee for CS	Coordination	Meeting		
Project Update for Task Order 4, October 2011	Liberia	Oct 2011	2010–2012	Project organized training for pharmacy department at teaching hospital	Education	Training		
Project Update for Task Order 4, October 2011	Malawi	Oct 2011	2010–2012	Pilot training	Education	Training		Note: TOT and training for HSAs were cancelled; Outcome: disappointing levels of competency post-training
Project Update for Task Order 4, October 2011	Mozambique	Oct 2011	2010–2012	Condom TWG completed 3-day site visit to follow up on supervision plan	Supervision	Site visits		
Project Update for Task Order 4, October 2011	Nepal	Oct 2011	2010–2012	Project and LMD staff using logistics supervision checklist during technical support visits to districts	Supervision	Site visits		
Project Update for Task Order 4, October 2011	Nicaragua	Oct 2011	2010–2012	Project staff reviewed syllabus of specialty program for pharmacy students	Education	Curriculum review		
Project Update for Task Order 4, October 2011	Nicaragua	Oct 2011	2010–2012	Project staff visited major hospital to monitor ARV logistics	Supervision	Site visit		
Project Update for Task Order 4, October 2011	Nigeria	Oct 2011	2010–2012	Project conducted routine supervision visits to service providers	Supervision	Site visits		
Project Update for Task Order 4, October 2011	Nigeria	Oct 2011	2010–2012	Project conducted supportive supervision visits in two states and included on-the-job training	Supervision		Also education: training	

Project Update for Task Order 4, October 2011	Pakistan	Oct 2011	2010–2012	Project held three-day workshop on procurement in public sector environment; government approved procurement manual used at workshop	Education	Workshop		Outcome: coordination of government officials and education
Project Update for Task Order 4, October 2011	Tanzania	Oct 2011	2010–2012	Project held strategic planning workshop with SCMS then shared results with MOH	Coordination			
Project Update for Task Order 4, October 2011	Tanzania	Oct 2011	2010–2012	Orientation training for quarterly end-use verification to collect data and provide supervision for approximately 320 facilities	Education	Training	Also supervision	
Project Update for Task Order 4, October 2011	Zambia	Oct 2011	2010–2012	"Training as needed to build capacity for personnel that support logistics systems", e.g. training on ARV system in one province and Emerging Markets Liquid Investment Portfolio (EMLIP) in another	Education	Training		Note: reactive
Project Update for Task Order 4, October 2011	Zimbabwe	Oct 2011	2010–2012	Project training advisor with two MOH staff co-facilitated medicines management TOT for five regions; trained 19 staff members	Education	TOT		
Project Update for Task Order 4, October 2011	South Africa	Oct 2011	2010–2012	Project met with RTT S Buys Training Academy to discuss potential partnership	Education			
Project Update for Task Order 4, October 2011	Global	Oct 2011	2010–2012	IAPHL: 72 discussion contributions around EpiSurveyor tool for mobile data collection	Coordination			
DELIVER & USAID (2013a) Addressing Procurement Bottlenecks: A Review of Procurement Bottlenecks in Public Sector	Global	Aug 2013	2013–2015	Identifying champions in context	Leadership	CS committee, local civil society org, midwives group,	Also monitoring	(suggested) Champions gather, interpret info and refer to others to act (as

Medicine Supply Chains and Practical Approaches Taken to Resolve Them. Retrieved from http://deliver.jsi.com/dlvr_content/resources/allpubs/policypapers/AddrProcBottl.pdf						project manager		necessary); champions monitor funding and stock status; advocate
Badubi, O., Brown, T., Mapiki, S., Ogbuabo, M., Pace, J., Phoi, P., Shioso, A. (2013) Botswana National Supply Chain Assessment Results, (September)	Botswana	Sep 2013	2013–2015	Supplier relations management program	Monitoring		Also data	Supplier relations management program leads to availability of reports, which in turn leads to proactive management of stock and penalty enforcement
DELIVER & USAID (2013a) Addressing Procurement Bottlenecks: A Review of Procurement Bottlenecks in Public Sector Medicine Supply Chains and Practical Approaches Taken to Resolve Them. Retrieved from http://deliver.jsi.com/dlvr_content/resources/allpubs/policypapers/AddrProcBottl.pdf	Asia	Sep 2013	2013–2015	Donor-sponsored training on quality assurance and international standards	Education	Training on quality and procurement standards		
DELIVER & USAID (2013a) Addressing Procurement Bottlenecks: A Review of Procurement Bottlenecks in Public Sector	East Africa	Sep 2013	2013–2015	Shifting all forecasting and supply planning activities to a strengthened central medical supplies management unit (away from core procurement functions)	OD			

Medicine Supply Chains and Practical Approaches Taken to Resolve Them. Retrieved from http://deliver.jsi.com/dlvr_content/resources/allpubs/policypapers/AddrProcBottl.pdf								
DELIVER & USAID (2014a) A Participatory Approach: Using Evidence to Support a Total Market Approach to Family Planning. Retrieved from http://deliver.jsi.com/dlvr_content/resources/allpubs/guidelines/MarkAnalyFPServ.pdf	Global	Apr 2014	2013–2015	Guide to participatory market analysis workshop	Collaboration		Also education: job kit	
USAID DELIVER (2009a) After Receiving USAID | DELIVER PROJECT Logistics Training, Access to Health Products Improves in Nepal. Retrieved from http://deliver.jsi.com/dlvr_content/resources/allpubs/logisticsbriefs/NP_LogTrainImp.pdf	Nepal	Jul 2009	2006–2009	DELIVER partnered with Ministry of Health and Population for community logistics and web-based logistics management to implement pull system	Education			
USAID DELIVER (2007a) Bangladesh: Final Country Report. Arlington, VA. Retrieved from http://deliver.jsi.com/dlvr_content/resources/allpubs/countryreports/BD_FinaCounRepo.pdf	Bangladesh	Mar 2007	2006–2009	MOH supplies right quantity and quality of staff to manage tendering and contract management at CMS	OD			

Badubi, O., Brown, T., Mapiki, S., Ogbuabo, M., Pace, J., Phoi, P., Shioso, A. (2013) Botswana National Supply Chain Assessment Results, (September)	Botswana	Sep 2013	2013–2015	Establish LMU	OD			
USAID DELIVER (2007) India: Final Country Report. Arlington, VA: DELIVER	India	Mar 2007	2006–2009	Initial technical assistance involved advocacy activities with senior-level officials first to recognize the need for an effective logistics system was the Ministry, which approved a separate LMC and staff allocation for the newly created cell	Collaboration	Advocacy, central level	Also OD	
USAID DELIVER (2007a) Bangladesh: Final Country Report. Arlington, VA. Retrieved from http://deliver.jsi.com/dlvr_content/resources/allpubs/countryreports/BD_FinaCounRepo.pdf	Bangladesh	Mar 2007	2006–2009	DELIVER's interventions and strategies focused on developing national awareness of (and commitment to) CS, and institutionalizing and optimizing a logistics system that was developed under predecessor projects	Leadership	Advocacy	Also OD	
USAID DELIVER (2007a) Bangladesh: Final Country Report. Arlington, VA. Retrieved from http://deliver.jsi.com/dlvr_content/resources/allpubs/countryreports/BD_FinaCounRepo.pdf	Bangladesh	Mar 2007	2006–2009	DELIVER initially organized and ultimately institutionalized a Logistics Coordination Forum and the Forecasting Forum to support supply chain improvements that included improving HR competencies for defined positions	Collaboration	Forums		
USAID GHANA (2007) Ghana: Final Country Report, Arlington, VA: DELIVER	Ghana	Mar 2007	2006–2009	DELIVER established coordinating bodies that are reported to have successfully mobilized finances for procurement	OD	Coordinating bodies	Also collaboration	
USAID DELIVER (2007) Nicaragua: Final Country Report Executive	Nicaragua	Mar 2007	2006–2009	Nicaragua used a CS Committee to mobilize government funds to	Collaboration	CS committee	Also OD	

Summary. Arlington, VA: DELIVER				replace donor funds for procurement				
Pilz, K. Nhaducue, P., Gasuguru, D. (2014) Strategic Planning for Reform of Human Resources for the Supply Chain within Mozambique's Health System, Journal of Pharmaceutical Policy and Practice, 7, 1	Mozambique	Dec 2014	2013–2015	Involved HR Directorate led to approval of workforce plans	Coordination	National level		NOTE: PtD DOCUMENT
Pilz, K. Nhaducue, P., Gasuguru, D. (2014) Strategic Planning for Reform of Human Resources for the Supply Chain within Mozambique's Health System, Journal of Pharmaceutical Policy and Practice, 7, 1	Mozambique	Dec 2014	2013–2015	Quantitative data convinced skeptics of need for reform	Monitoring	Data		NOTE: PtD DOCUMENT
Pilz, K. Nhaducue, P., Gasuguru, D. (2014) Strategic Planning for Reform of Human Resources for the Supply Chain within Mozambique's Health System, Journal of Pharmaceutical Policy and Practice, 7, 1	Mozambique	Dec 2014	2013–2015	Participatory assessment led to consensual recommendations and saved time	Collaboration	Assessment		NOTE: PtD DOCUMENT
Printz, N., Amenyah, J., Serumaga, B., Van Wyk, D., USAID DELIVER and SCMS (2013) Tanzania: Strategic	Tanzania	Apr 2013	2013–2015	Coordination in supply chain master plan led to aligning various stakeholders	Collaboration			

Review of the National Supply Chain for Health Commodities. Arlington, VA: DELIVER								
USAID DELIVER. (2007a) Bangladesh: Final Country Report. Arlington, VA. Retrieved from http://deliver.jsi.com/dlvr_content/resources/allpubs/countryreports/BD_FinaCounRepo.pdf	Bangladesh	Mar 2007	2006–2009	DELIVER used advocacy by national and local media to build demand for contraceptive security	Leadership	Advocacy		
USAID DELIVER. (2007a) Bangladesh: Final Country Report. Arlington, VA. Retrieved from http://deliver.jsi.com/dlvr_content/resources/allpubs/countryreports/BD_FinaCounRepo.pdf	Bangladesh	Mar 2007	2006–2009	DELIVER conducted a market segmentation analysis that was presented at public sector, NGO and commercial sector workshops to build consensus for change	Collaboration			
USAID DELIVER (2013) Mozambique and Nigeria: Using Results from Supply Chain costing. Arlington, VA: DELIVER	Mozambique, Nigeria	Feb 2013	2013–2015	Optimization analyses to improve effective data use for decisions	Monitoring			
USAID GHANA (2007) Ghana: Final Country Report. Arlington, VA: DELIVER	Ghana	Mar 2007	2006–2009	Assessment to advocate for integration of vertical supply chains	Monitoring			
USAID DELIVER (2013) Task Order 4 Annual Report: October 2011–September 2012. Arlington, VA: DELIVER	Global	Mar 2013	2013–2015	Collaboration with private sector to develop donor strategies	Collaboration	With private sector		

USAID Health Policy Initiative (2007) Using Data and Information to Advance Contraceptive Security in Latin America and the Caribbean. Washington, DC: USAID	LAC Region	Sep 2007	2006–2009	LAC Advocacy workshop led Nicaragua to learn from Paraguay and El Salvador and procure UNFPA commodities	Collaboration	Workshop South-to-South	Also leadership	
USAID DELIVER (2014) Task Order 4 Annual Report: October 2012–September 2013. Arlington, VA: DELIVER	Global	Mar 2013	2013–2015	DELIVER created tools (SMS, web-based system, e-docs) to move data faster and improve visibility	Monitoring	Tool creation		
USAID DELIVER (2011) Task Order 4: Quality Assurance Surveillance Plan (QASP) & Performance Monitoring Plan (PMP). Arlington, VA: DELIVER	Global	ND	2010–2012	DELIVER created tools (SMS, web-based system, e-docs) to move data faster and improve visibility	Monitoring			
Levenger, M., Ongeri, B., Wolde, A., Kagoya, H.R. (2013) Namibia National Supply Chain Assessment: Capability and Performance. Submitted to the US Agency for International Development by the SCMS	Namibia	Sep 2013	2013–2015	DELIVER assessments led to strategic plans for SCM and CS	Monitoring			
USAID DELIVER (2007) Bangladesh: Final Country Report. Arlington, VA: DELIVER	Bangladesh	Mar 2007	2006–2009	DELIVER assessments led to strategic plans for SCM and CS	Monitoring			
USAID GHANA (2007) Ghana: Final Country Report.	Ghana	Mar 2007	2006–2009	DELIVER assessments led to strategic plans for SCM and CS	Monitoring			

Arlington, VA: DELIVER								
USAID DELIVER (2014) Optimizing Supply Chains for Improved Performance. Arlington, VA: DELIVER	Global	Jun 2014	2013–2015	DELIVER assessments led to strategic plans for SCM and CS	Monitoring			
USAID DELIVER (2014) Task Order 4 Annual Report: October 2012–September 2013. Arlington, VA: DELIVER	Global	Mar 2013	2013–2015	DELIVER assessments led to strategic plans for SCM and CS	Monitoring			
USAID DELIVER (2013) Task Order 4 Annual Report: October 2011–September 2012. Arlington, VA: DELIVER	Global	Mar 2013	2013–2015	DELIVER assessments led to strategic plans for SCM and CS	Monitoring			
Printz, N., Amenyah, J., Serumaga, B., Van Wyk, D., USAID DELIVER and SCMS (2013) Tanzania: Strategic Review of the National Supply Chain for Health Commodities. Arlington, VA: DELIVER	Tanzania	Apr 2013	2013–2015	DELIVER assessments led to strategic plans for SCM and CS	Monitoring			
USAID DELIVER (2007) India: Final Country Report. Arlington, VA: DELIVER	India	Mar 2007	2006–2009	DELIVER training materials or implementation	Education			
USAID DELIVER (2014) Logistics Outsourcing and Contract Management in Public Health Settings: Technical	Global	May 2014	2013–2015	DELIVER training materials or implementation	Education			

Brief. Arlington, VA: DELIVER								
USAID DELIVER (2012) Supply Chain Risk Management: Project Monitoring at the SMS Project. Arlington, VA: DELIVER	Global	Jun 2013	2010–2012	DELIVER training materials or implementation	Education			
USAID DELIVER (2011) Task Order 4: Quality Assurance Surveillance Plan (QASP) & PMP. Arlington, VA: DELIVER	Global	ND	2010–2012	DELIVER training materials or implementation	Education			
USAID DELIVER (2011) The Logistics Handbook: A Practical Guide for the Supply Chain Management of Health Commodities. 2nd ed. Arlington, VA: DELIVER	Global	ND	2010–2012	DELIVER training materials or implementation	Education			
USAID DELIVER (2014) Quantification of Health Commodities: A Guide to Forecasting and Supply Planning for Procurement. Arlington, VA: DELIVER	Global	Jun 2014	2013–2015	DELIVER training materials or implementation	Education			
USAID DELIVER (2013) Recruiting Supply Chain Professionals: A Ready Reference Guide for Findings and Selecting High Performers	Global	Oct 2013	2013–2015	DELIVER training materials	Education	Job aid		

Eichler, R., Alex E., Brian S., James R., Greg M., Mavere T. (2012) Options Guide: Performance-Based Incentives to Strengthen Public Health Supply Chains – Version 1. Bethesda, MD: Health Systems 20/20 project, Abt Associates Inc.	Global	Aug 2012	2010–2012	DELIVER produced guidelines and recommendations related to HR competency strengthening, recruitment and retention	OD			
Eomba, M., Roche G., Hasselberg, E. (2010) Initiating In-Country Pre-Service Training in Supply Chain Management for Health Commodities: Process Guide and Sample Curriculum Outline. Arlington, VA: DELIVER	Global	Jun 2010	2010–2012	DELIVER produced guidelines and recommendations related to HR competency strengthening, recruitment and retention	OD			
USAID DELIVER (2014) Task Order 4 Annual Report: October 2012–September 2013. Arlington, VA: DELIVER	Global	Mar 2013	2013–2015	DELIVER documented six countries where the International Procurement Planning and Monitoring Report (PPMR) was not maintained after DELIVER left	OD			
USAID (2010) Do nurses need to know how long medical supplies will last?	Global	Sep 2010	2010–2012	DELIVER provided targeted contraceptive security strengthening support to four focus countries: Burkina Faso, Mauritania, Niger, and Togo. Activities align with country-level plans and their Ouagadougou Partnership goals. Activities include conducting contraceptive security assessments, building country capacity in SCM, strengthening RHCS committees and their use of data for decision-making, and supporting efforts to	Coordination	CS assessments and RHCS committees		Problem noted: "Stockouts, however, are common in many developing countries, and often professionals are not trained in supply chain basics, such as calculating how long their supplies will

				increase investments in supply chain and contraceptives				last. But, if the needed medication or medical supplies are not available, the health of their patients will suffer"
USAID (2010) Do nurses need to know how long medical supplies will last?	Ethiopia	Sep 2010	2010–2012	Ethiopian Federal Ministry of Health collaborated with USAID | DELIVER to start a program of pre-service training in logistics, targeting young public health professionals while they were still in school	Education	PST	Also collaboration	
USAID (2010) Do nurses need to know how long medical supplies will last?	Ethiopia	Sep 2010	2010–2012	5-day orientation in logistics to lecturers and managers at the four health science colleges in the southern region	Education	5-day orientation		
USAID (2013) Early warning system for contraceptives in West and Central Africa improves supply availability	West and Central Africa Region	May 2015	2013–2015	PPMR and CARhs groups for EWS	Coordination		Also monitoring	Problem noted: a major challenge to addressing unmet needs and ensuring the success of FP programs in the region is ensuring a continuous supply of quality contraceptives and continuous monitoring of contraceptive stocks at the country level
The Health Logistics Press (2013) eLMIS development	Tanzania and Zambia	Oct 2012	2013–2015	MOH, USAID, SCMS had a week of discussions over eLMIS	Collaboration	Between countries		

discussions bring together Tanzanian and Zambian delegations								
USAID (2011) Ethiopia: Better storage of medicines means better care at Goba hospital	Ethiopia	Feb 2011	2010–2012	TA in storage and shelving	TA			
USAID (2014) Ethiopia: Collaboration builds sustainable healthcare SC, boosting health outcomes	Ethiopia	Mar 2014	2013–2015	In 2009, USAID|DELIVER introduced a computerized inventory management system for health facilities – the Health Commodity Management Information System (HCMIS) – which is now being used by more than 400 health facilities to manage their supplies	Monitoring	TA: IMS		Enables managers to quantify needs
USAID (2014) Ethiopia: Collaboration builds sustainable healthcare SC, boosting health outcomes	Ethiopia	Mar 2014	2013–2015	Co-developed standard training curriculum for new IPLS process. Through TOTs, 200 technical staff from PFSA, Regional Health Bureaus, and other logistics partners learned how to deliver IPLS training. To date, nearly 10,000 health professionals from all nine regions and two city administrations have been trained by PFSA and its partners	Education	Curriculum		
USAID (2014) Ethiopia: Collaboration builds sustainable healthcare SC, boosting health outcomes	Ethiopia	Mar 2014	2013–2015	To reinforce the training, field staff from both projects and government partners conducted joint supportive supervision visits to 1,200 facilities. The projects printed and distributed essential reference materials, including SOPs and standard recording and reporting forms	Supervision	Site visits	Also: job aids	

USAID (2013) Malawi: Assessment of the integrated logistics management information system	Malawi	Sep 2013	2013–2015	Training for health workers and supervisors has resulted in improved LMIS data collection and reporting	Education		Also monitoring	
Technical Assistance Record: TZM eLMIS development phase planning session/kick-off meeting	Zambia	Oct 2012	2010–2012	STTA (one week) for kick-off meeting to align stakeholders around new joint eLMIS with Tanzania	Coordination and Collaboration			