Three Case Studies

Integration: Guidance for Reproductive, Maternal, Newborn, and Child Health Context

JSI Research & Training Institute, Inc.

May 2014

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Acronyms

Nigeria Case

3PL	third party logistics service provider
APIN+	AIDS Prevention Initiative in Nigeria
ART	antiretroviral therapy
ARV	antiretroviral
CCCRN	The Center for Clinical Care and Research Nigeria
CCFN	Catholic Caritas Foundation of Nigeria
CDC	Centers for Disease Control and Prevention
CHAI	Clinton Health Access Initiative
CHAN	Christian Health Association of Nigeria
CIHP	Centre for Integrated Health Programme
CRS	Catholic Relief Services
FCMS	Federal Central Medical Stores
FHI	Family Health International
FMOH	Federal Ministry of Health
GFATM	Global Fund to Fight HIV/AIDS, Tuberculosis and Malaria
GHAIN	The Global HIV/AIDS Initiative Nigeria
GON	Government of Nigeria
ICAP	International Center for AIDS Care and Treatment Programs
IDA	International Dispensary Association Foundation
IHVN	Institute of Human Virology Nigeria
IP	implementing partner
HTC	HIV/AIDS Testing and Counseling
JSI	John Snow, Inc.
LMS	Leadership, Management and Sustainability
LMIS	logistics management information system
NACA	National Agency for the Control of AIDS
NICAB	Nigeria Indigenous Capacity Building
PEPFAR	President's Emergency Plan for AIDS Relief
PFSCM	Partnership for Supply Chain Management
PMTCT	preventing mother-to-child transmission
PFD	Partners for Development
PPP	public-private partnership
PSM	procurement and supply management
RS	Regional Secretariat (for GFATM)
RTK	rapid test kit
SCMS	Supply Chain Management System
SIDHAS	Strengthening Integrated Delivery of HIV/AIDS Services
SMOH	State Ministry of Health
TWG	technical working group
UPS	United Parcel Service

USAID	U.S. Agency for International Development
USDOD	U.S. Department of Defence
USG	U.S. Government
VPP	Voluntary Pooled Procurement
WH	warehouse
WRP	The Walter Reed Program

Sudan Case

ART	antiretroviral therapy
CMS	Central Medical Store
DRF	drug revolving fund
FMOH	Federal Ministry of Health
GFATM (GF)	Global Fund to Fight HIV/AIDS, Tuberculosis and Malaria
HF	health facility
HIV	human immunodeficiency virus
LMIS	logistics management information system
LLITNs	long lasting insecticide-treated nets
MOH	Ministry of Health
PSM	procurement and supply management
RDTs	rapid diagnostic tests
SOP	standard operating procedure
TB	tuberculosis
UNDP	United Nations Development Programme
UNICEF	United Nations Children's Fun
UNFPA	United Nations Population Fund
WHO	World Health Organization

Tanzania Case

ARV	antiretroviral
CTCs	counseling and testing centres
EPI	Expanded Programme on Immunization
FBO	faith-based organization
FP	family planning
HCs	health centers
ILS	Integrated Logistics System
JICA	Japan International Cooperation Agency
JSI	John Snow, Inc.
LSAT	Logistics System Assessment Tool
MOH	Ministry of Health
MOHSW	Ministry of Health and Social Welfare
MSD	Medical Stores Department
NGO	nongovernmental organization
PSU	Pharmaceutical and Supplies Unit
RMNCH	reproductive, maternal, newborn, and child health
SDP	service delivery point
SOP	standard operating procedure
TOT	training-of-trainers

Introduction

This case study is part of an activity under the Every Woman Every Child Initiative and the UN Commission on Life-Saving Commodities for Women and Children (UN Commission) Recommendation 6 – Supply and Awareness. Through this activity, we will collect examples of supply chain integration efforts and develop a paper that outlines important considerations, providing pathfinder countries with practical guidance for ensuring appropriate, efficient, and effective management of the supply chain for the 13 UN Commission priority life-saving commodities in an integrated context. We will help country partners identify potential opportunities to build resource-efficient supply chains, which account for supply, demand, and handling considerations of products as well as facility operating conditions.

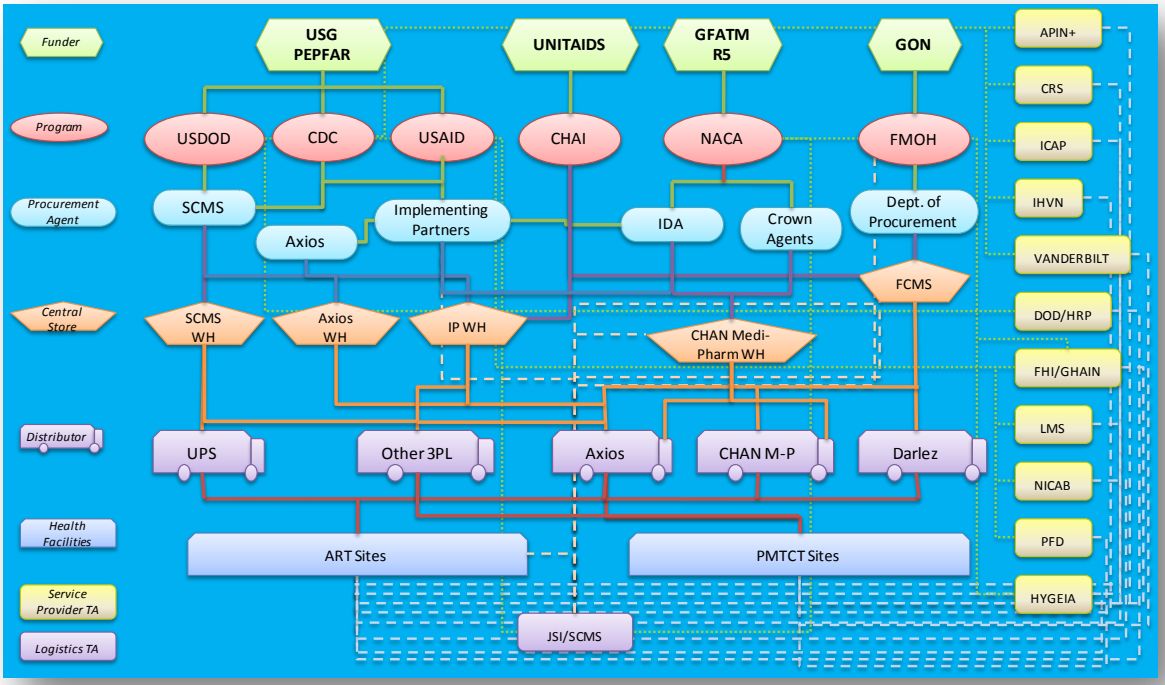
Nigeria: HIV and AIDS Supply Chain Unification Project (2012–Present)

Prior Network Structure and Impetus for Change

For the commodities involved, how were they managed, procured, stored, and distributed prior to the integration efforts? What specific or general situations provided the incentive to make major system changes?

For HIV and AIDS commodities, including antiretrovirals (ARVs), co-trimoxazole, test kits, and laboratory supplies, numerous implementing partners operated distinct warehouse and distribution systems. More than 12 President's Emergency Plan for AIDS Relief (PEPFAR) implementing partners, one Global Fund to Fight HIV and AIDS, Tuberculosis and Malaria (GFATM) principal recipient, and one Government of Nigeria (GON) counterpart accessed different central level stocks and transported commodities to service delivery points (SDPs) and testing sites across the country, sometimes using overlapping routes and without sharing of stock status information among them. The wiring diagram in figure 1 depicts the fragmentation and duplication among the supply chains for partners providing HIV and AIDS services in 2010, all of which predominantly supported similar commodities destined for similar facilities.

Figure 1. Pre-integration Supply Chain Structure for HIV/AIDS Commodities in Nigeria as of 2010 (Adedoyin 2013)



Under this arrangement, commodities reached health facilities using storage and distribution resources as determined by the funding of the commodities and the service provision implementing partner responsible for the particular health facility (listed on the right side of figure 1). In the case of PEPFAR implementing partners, many of them managed independent storage resources in Abuja (the capital city) or at other locations in the country. The implementing partners would independently bear responsibility for moving commodities between the central and subnational storage sites, and from there would deliver them to the health facilities they supported using a mix of both owned and outsourced vehicles or would require those facilities to pick up the commodities. Additionally, the implementing partners held the responsibility for determining order quantities using collected logistics management information system (LMIS) data.

Numerous supply chain performance deficiencies affected the HIV and AIDS warehousing and distribution systems as of 2010. The central medical stores warehouse in Oshodi was not adequate for storage and management of ARV commodities and did not have sufficient equipment and infrastructure. The service provision programs suffered relatively high facility-level stockout rates (above 25 percent) at the same time that products were available in-country at national warehouses. Additionally, the programs experienced significant expiries (more than 70 tons destroyed in 2011) in the midst of stockouts in neighboring facilities and high operating costs (above 15 percent of commodity value) (Adedoyin 2013). At the supply chain process level, there was a lack of standardized logistics data collection mechanisms among partners, poor collaboration among donors, and inadequate leadership

from the GON. Related to these problems, GFATM placed a condition precedent on the GON and transitioned their commodities to a parallel distribution system as shown in figure 1. Ultimately, these challenges affected program performance—GON and PEPFAR HIV and AIDS programs were not achieving client treatment targets. Additionally, the fragmented system raised questions about the feasibility of eventual GON ownership.

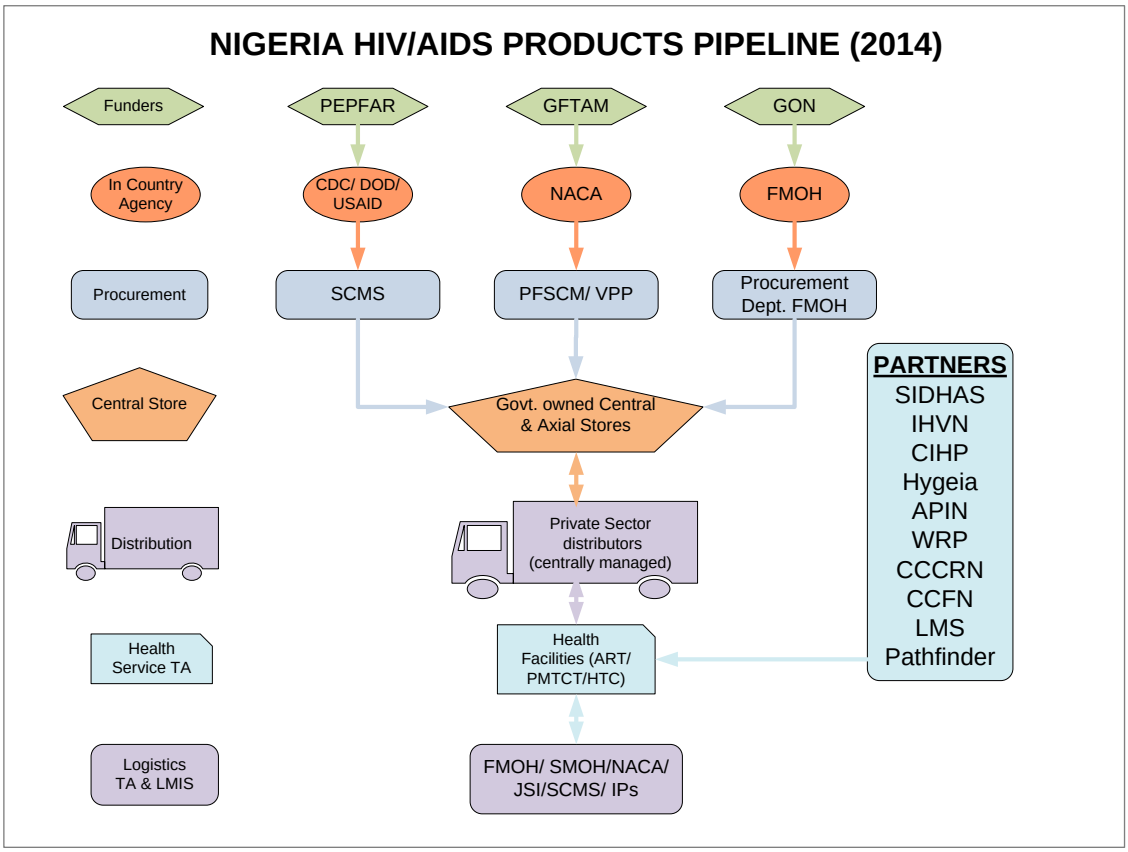
Intended Solution

What was the goal that country stakeholders were moving toward and what did they want to achieve through integration of distribution systems?

As part of the effort to address these issues, the U.S. Government (USG) signed a partnership framework with the GON in 2010 with the commitment to strengthen warehouse and distribution networks (including the central store in Oshodi and some stores at the state level) within the PEPFAR program to be subsequently transitioned to the GON by 2015 (Adedoyin 2013). The associated implementation plan stimulated an HIV supply chain–wide integration process that was initially planned for only the PEPFAR programs.

The GON and donors sought to ultimately improve health services and meet patient needs for ART, preventing mother-to-child transmission (PMTCT), and testing services through uninterrupted product availability at service delivery points. The objectives of HIV supply chain unification (as the effort became known) included reduced stockouts, reduced waste, and lowered operating costs through a centralized supply chain with greater collaboration among partners. Partners also sought GON leadership and system ownership by the end of the undertaking. Figure 2 depicts the intended long-term national pipeline for HIV commodities (although, initially, the HIV supply chain unification efforts only incorporated the PEPFAR program commodities). In this arrangement, a central stock of commodities supports deliveries to five *axial stores* (subnational stores located in state capitals). Each of these stores as well as the central stock will support direct delivery to health facilities using private third-party logistics service providers.

Figure 2. End Vision for HIV and AIDS Supply Chain Unification Efforts (Adedoyin 2013)



In the future, opportunities will be sought to extend this integration to other commodity groups where appropriate. This could include commodities that are also dispensed or consumed at ART facilities (e.g., maternal and reproductive health commodities at PMTCT sites).

Initially, this unified supply chain was planned to showcase what could be done to improve storage and distribution in Nigeria with the view to have the GON learn from this and potentially take it over. In parallel, the U.S. Agency for International Development (USAID) worked with the Federal Ministry of Health (FMOH) to improve the central storage and distribution infrastructure, potentially under a public-private partnership (PPP) comprised of a build–operate–transfer model with heavy reliance on private sector execution and strengthening. In principle, this system would be easier to manage and relatively inexpensive to operate.

In February 2013, the unification project expanded to include the GFATM products within a supply chain now led by a multiparty project management team including the GON, USG/PEPFAR, and GFATM/the National Agency for the Control of AIDS (NACA). The plan was also to supply commodities (ARVs, co-trimoxazole, and HIV rapid test kits) to facilities offering HIV services using available stocks in-country irrespective of the funding source for the commodity. These stocks, coming from all donors, will be managed in a virtually pooled inventory coordinated by the Supply Chain Management System (SCMS) as the secretariat.

In the longer term, this approach is expected to contribute to greater national visibility into consumption and stock status (through a standardized LMIS) and greater country ownership through empowerment of the GON supply chain leadership and stimulation of the private sector health products distribution market. However, on this last issue, partner objectives have shifted during the unification process from a *build to operate* approach to a *joint venture* approach regarding the unified HIV and AIDS supply chain, meaning that public sector resources will be leveraged to a greater degree in later phases.

Approach to Design and Implementation

Who was involved, how was the effort managed, and what specific implementation activities took place?

Informal discussions among partners began in 2011, followed by a procurement and supply management (PSM) technical working group (TWG) meeting in November 2011 to approve a roll-out approach.

Implementation included a USG-approved, SCMS-operated unification inception plan in 2012 with a focus on harmonizing the supply chains across all PEPFAR implementing partners within a three- to five-year period. The approach aimed to ultimately merge with the GON supply chain by 2015. A separate unification plan came into effect in 2013 and aimed to unify the entire national HIV and AIDS supply chain (including GFATM components) using public sector warehouses under SCMS and GON operation.

Implementation of the integrated warehousing and distribution took place in a phased approach across the country. States have been grouped into contiguous phases, starting with a Phase 1, which began in July 2012, for a set of five states in the South-South zone of the country after the SCMS Abuja office established the required contracts for storage and distribution covering both the central to zonal shipments and health facility deliveries there. In total, this approach was projected to support around 1,000 facilities across the country in 2012 and is projected to cover over 5,000 sites by the end of 2014. The implementation plan is, as of December 2013, in Phase 3, covering 25 states and over 2,600 facilities (Haushlohner 2013).

The South-South zone was chosen as the location of Phase 1 because stakeholders believed it offered a relatively quick and easy opportunity to build initial success; the region was seen as relatively secure and local stakeholders were already making progress in supply chain strengthening through refurbishment of the State Central Medical Store in Calabar.

Given the number of stakeholders involved in this process, an inclusive and collaborative approach is being used for implementation. Initial sensitization efforts occurred in early 2012, including a core stakeholder group meeting and a pre-pilot stakeholder meeting. Stakeholder meetings also occurred during the first roll-out phases. Lessons learned in the implementation of the first phase were shared with stakeholders in December 2012 after six months of implementation to support further roll-out (Hauslohner 2013). Updates are provided to the multi-stakeholder group managing the project at monthly national HIV and AIDS PSM TWG meetings. It is expected that lessons learned in the phased

implementation will be deployed in phased completion of the unification plans in 2014, with a national stakeholders debrief in the second quarter of 2014.

The inventory control parameters were harmonized in 2011 in line with the national system design for the HIV and AIDS program to ensure that all partners and facilities use the same inventory control procedures for both product resupplies to health facilities and data.

During the scale-up process, *lessons learned* have been documented, disseminated among partners, and applied.

Outcomes

What were the results of the integration efforts in the short- and long-term?

The implementation approach successfully managed the gradual integration of central stock management, information management and visibility, and the unified storage and distribution system for the HIV and AIDS commodities.

Although the entire effort has not yet concluded, results have already been documented for Phase 1 facilities using reported data complemented by data quality assessments. Stockouts at the facility level have dropped from 15 percent at ART sites to below 10 percent, and the lead time for facility orders has dropped from one month to less than two weeks, thus supporting increased patient access to ARVs and testing services. For both the ARV and rapid test kit (RTK) reporting forms, reporting rates moved from 59 percent and 40 percent to 88 percent and 92 percent, respectively, within the first three delivery cycles of Phase 1 (Supply Chain Management System (SCMS) 2013). In addition, the project has stimulated the engagement of subnational government stakeholders at the state level through information sharing and the institution of TWG sessions to provide updates on the project progress, to seek guidance, and to collaborate. This has further provided a forum to encourage state-level groups to drive information sharing among different public health programs in the public sector. Increased information visibility has supported the retrieval and redistribution of excess and short-dated commodities among supported facilities.

These performance outcomes have been achieved despite a rapidly expanding pool of recipient facilities through the scale-up of PMTCT services and through the tripling of testing targets in 2013.

In retrospect, having an agreed upon implementation plan among the GON, PEPFAR, and GFATM supported HIV programs would have been ideal before the commencement of the program, although this may have delayed the initiation of the project.

The stimulation of a competitive private-sector health commodity distribution market for health is also a significant outcome of this integration process. It has further consolidated and enhanced the capacity of these companies to competitively bid on health commodities distribution contracts. These companies have successfully bid and won contracts for distribution of products for other health programs like malaria and family planning.

Photos: Contracted and public-sector staff prepare the last mile deliveries to health facilities from the Oshodi medical stores.

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Tanzania: Implementation of the Integrated Logistics System (ILS) (2002–2010)

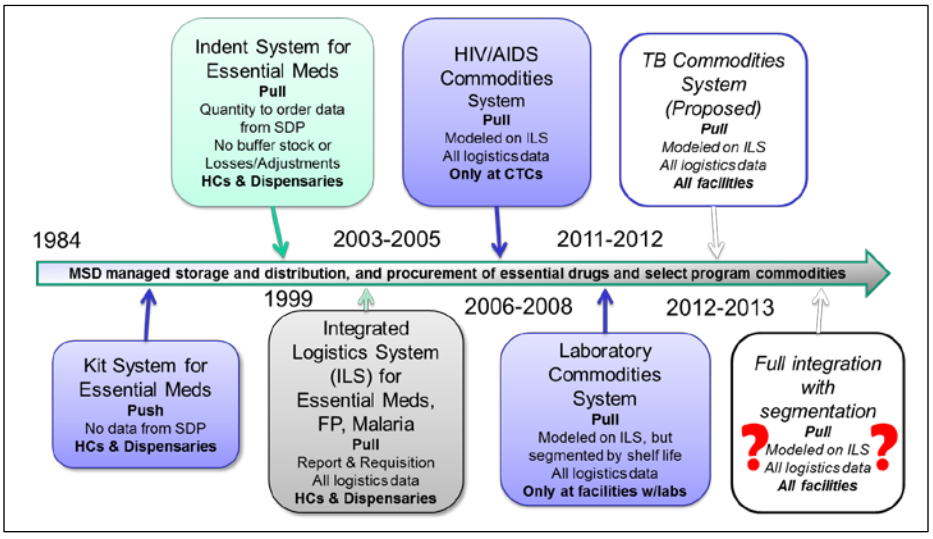
Introduction

The following is an overview of the public health system of the late 1990s for the 13 reproductive, maternal, newborn and child health (RMNCH) commodities in question, outlining how they were procured, stored, and distributed at that time. This case study also documents the process undertaken to merge previously vertical distribution systems and the outcomes of that process.

Prior Network Structure and Impetus for Change

In the 1990s, Tanzania's Pharmaceutical and Supplies Unit (PSU) (a public sector policy and oversight entity within the Ministry of Health and Social Welfare [MOHSW]) ran the country's public essential medicines' supply chain as a centralized kit system in which the PSU would determine the resupply quantities for all facilities. At the time, the vertical health programs and external donor-supported projects operated independent supply chains in the country. Their use of the public supply chain network (medical stores department [MSD], central and zonal stores, and regional stores) to support health facility commodity needs varied. Distinctly separate forecasting, procurement, and information systems existed for the different programs including the Essential Drugs Programme, Family Planning Programme, Sexually Transmitted Infection Programme, National Malaria Control Programme, and many others; although, in some cases, these programs shared some storage and distribution resources.

Figure 3. Timeline of Major Supply Chain Introductions, Tanzania (Wright 2012).



In the late 1990s, the PSU began to transition the country's essential medicines logistics system from a kit system to an *indent* system, whereby facilities determined their own demand and placed orders accordingly (See Figure 1). In effect, this moved the responsibility for determining health facility resupply quantities from PSU at the central level to district-level staff and from nationally standardized kit quantities using demographic indicators toward the creation of facility orders based on demand and budget availability (USAID | DELIVER PROJECT 2011a).

This transition of responsibility was not only driven by decentralization and health sector reform efforts within the MOHSW, but also by the desire to improve the effectiveness of medicine purchases given the challenges created by standardized kits (Amenyah et al. 2005).

The 1996/1999 health sector reform action plan called for consolidation of vertical logistics functions under the MSD in order to improve overall system efficiency. Additionally, although the indent system was an improvement over the kit system, a MOHSW assessment of the indent system conducted at the same time identified procurement bottlenecks, a lack of data for operational and strategic decisionmaking, non-adherence to inventory control procedures, delivery delays, waste, product expiry, and stockouts (USAID | DELIVER PROJECT 2011a).

Also, in 2002, the Ministry of Health (MOH) requested assistance from the USAID | DELIVER PROJECT to development forecast and logistics management tools requested by the Japan International Cooperation Agency (JICA) to increase visibility around the distribution of donated commodities. The programmatic overlap of these donated commodities with the existing essential medicine and family planning programs encouraged incorporation of these commodities into a broader integrated system (Amenyah et al. 2005).

Intended Solution and Approach to Implementation

What was the goal that country stakeholders were moving toward and what did they want to achieve through integration of distribution systems?

Responding to the drivers of operations consolidation and a desired transition to the demand-based features of the *indent* system, stakeholders sought the development of a responsive, highly functioning logistics system that consolidated order fulfillment responsibility for nearly all health programs under the MSD. The new system, known as an integrated logistics system (ILS), would extend the improvements brought by the indent system to essential medicine (routine reporting, ordering, and distribution based on demand) to a broader set of commodities in a way that would streamline management and supervision requirements for the supply chain. Although the ILS was intended to support all drugs and medical supplies within the public health system, stakeholders also recognized that in order to account for varied handling and shelf life considerations, not all commodities could be managed using the same inventory control and distribution procedures, meaning that the use of subsystems within the ILS was possible (Amenyah et al. 2005).

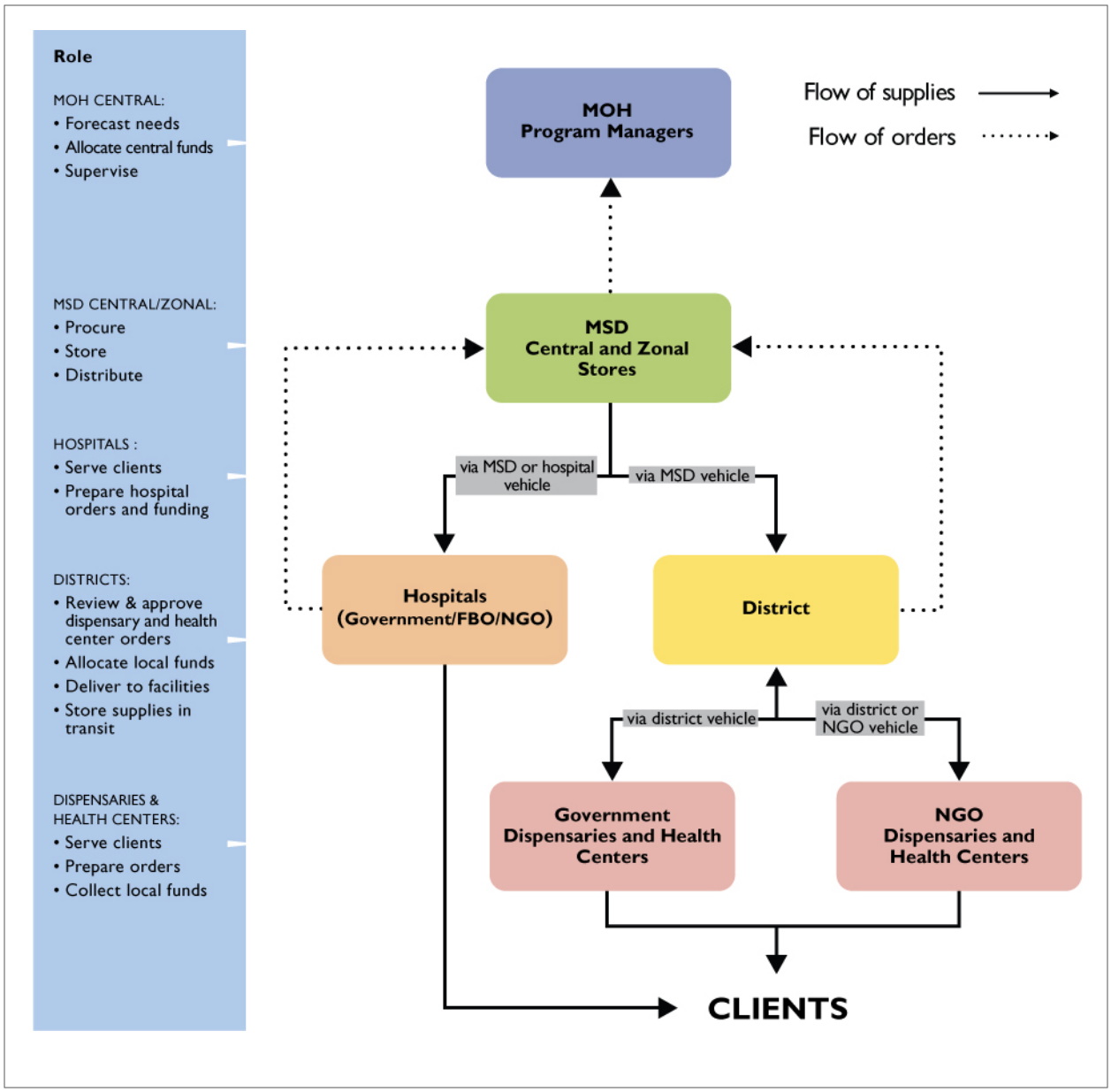
In 2002, partners began with a process mapping exercise to compare the strengths and weaknesses of the ordering and distribution processes of various vertical programs (i.e., how were data captured and reported, what data were included, how were orders filled and delivered). This process concluded with an agreement to pursue a combined comprehensive system in order to achieve logistics performance targets for the various commodity groups. Initially, however, the tuberculosis and leprosy program and the Expanded Programme on Immunization (EPI) would continue to function independently of the integrated system due to their relative high performance and degree of implementation (Amenyah et al. 2005).

The ILS would introduce a national, demand-based system for supplying facilities with nearly all of the public health system's commodities and would include other commodity groups as distinct subsets. This system would still include a variety of commodity and program-specific stakeholders for commodity financing and procurement (figure 4), but would predominantly rely on public sector resources for national storage, distribution, and information management.

From a functional perspective, procurement and forecasting would continue to occur on a program-by-program basis, but concurrently and with coordination by the PSU (Diallo 2006).

Almost all commodities would use the same storage and distribution network: Commodities would be stored and distributed from the MSD central and zonal stores. The MSD zonal stores would pack individual facility orders to be delivered to hospitals or district stores. Districts would act as a type of cross-dock by either delivering the pre-packed orders or by making them available for dispensaries and health centers to pick up (USAID | DELIVER PROJECT 2011b) (see figure 4).

Figure 4. Tanzania ILS Flow of Commodities and Information (USAID | DELIVER PROJECT 2011a)



Logistics reporting and order submission were also combined in the ILS. To support quarterly order fulfillment, facilities would complete a single requisition and resupply form for most commodities and provide it to the district pharmacist for review. After being passed to the MSD zonal stores, the forms would inform resupply quantities. Within each district, facilities were split into three groups in order to evenly spread the orders across each month within the quarter and to make efficient use of resources (Chimnani et al. 2010).

A collaborative system design workshop was held in late 2002 to identify the rules and parameters for inventory control, logistics reporting frequency, and order fulfillment. This workshop drew on the knowledge of staff from all levels of the health system and from various health programs to design logistics records and report forms as well as standard operating procedures (SOPs) to inform staff of

their new logistics roles (USAID | DELIVER PROJECT 2011a). In 2005, these forms and SOPs were reviewed and revised by stakeholders through a thorough and lengthy process, resulting in a final procedures manual. The manual includes annexes that articulate the various subsystems to the ILS intended to accommodate the logistics requirements of specific commodity categories including vaccines, HIV tests, tuberculosis drugs, and antiretroviral (ARV) drugs, while also demonstrating their overarching similarity to the ILS (Amenyah et al. 2005). For example, HIV/AIDS commodities are ordered using a separate form, which is reviewed and aggregated by the district pharmacist. Laboratory supplies are also ordered on a separate form and, due to their short shelf life, some are ordered on a monthly basis and some reagents are delivered directly to the laboratory by the manufacturer rather than passing through the main public storage system (Printz et al. 2013).

Principal stakeholders to the process included—

- MSD: The parastatal central medical store strengthened its capacity for order fulfillment, because, under ILS, they assumed greater responsibility for picking and packing individual service delivery point (SDP) orders.
- PSU: The PSU played a central design and oversight role and gradually increased its management capacity.
- Vertical health programs: Under the MOH, they retained forecasting and supply management responsibility for their respective commodities.
- Commodity and system strengthening donors, as well as implementing partners.

Stakeholders selected pilot regions that could support transition to the ILS in the short term and were close enough to receive central-level supervision within a day's drive. Regional and district-level staff in the pilot zones were engaged to secure their support of the pilot transition to the ILS.

Over 1,000 facility staff in the two pilot regions were trained in their inventory control and reporting roles within the ILS using a training-of-trainers (TOT) roll-out approach during 2005, with management and financial support through John Snow, Inc. (JSI)/ USAID | DELIVER PROJECT. Once the trainings had taken place, facilities began placing orders through the ILS.

Following the initial pilot test, the ILS was gradually expanded to other regions over several years through a TOT approach. During that time, the ILS underwent several evaluation and strengthening efforts in order to identify and improve the system design, which included the need for additional clarity on roles and responsibilities for staff (USAID | DELIVER PROJECT 2011a).

The process from initial design to full national implementation lasted several years (table 1) and required a sustained design, management, and evaluation effort from numerous central-level stakeholders, including a donor-funded implementing partner.

Table 1. Timeline for Implementation of Tanzania's Integrated Logistics System

2002	• Process mapping exercise for ordering and distribution of various vertical programs • Formed a logistics task force to guide the ILS development process • System design workshop
Late 2003	• Stock status and logistics performance baseline of pre-ILS systems
2004	• Logistics System Assessment Tool conducted in each of three candidate pilot regions • Dodoma and Iringa selected as pilot regions
2005	• ILS pilot • ILS pilot evaluation • Expansion of ILS to other zones
2007	• ILS comparative study
2008	• ILS revitalization
2009	• Final zones transition to ILS
2010	• ILS strengthening/brainstorming workshop

Outcomes

What were the results of the integration efforts in the short and longer terms?

The initial 2005 pilot evaluation found that Tanzania's health workers preferred the ILS to previous vertical systems and the kits in terms of the ordering approach, and largely expressed confidence in their ability to properly order commodities through the system. Also during the pilot, stockout rates were equal to or below previous rates for some of the previously vertical programs; compared to the 2003 baseline, the percentage of facilities out of stock on the day of the survey visit went from 15 percent to 7 percent for essential medicines and from 13 percent to 8 percent for HIV test kits. However, the evaluation did find some performance limitations in the completion and submission of required forms, and central-level stockouts of priority commodities (commodities selected to be preprinted on ILS forms) appeared to cause low stock levels nationwide. In the case of family planning commodities, stockout rates went from 9 percent to 22 percent of facilities due to nationwide shortages. Based on these findings, the evaluation recommended a number of improvements for the ILS during further rollout (Amenyah et al. 2005). These included increased nongovernmental organization

(NGO) participation, improved monitoring and evaluation, and further inclusion of the tuberculosis and EPI programs.

A 2007 study compared product availability in ILS and non-ILS (indent system) regions. Specifically, the two initial pilot regions for the ILS were compared to two regions using the indent system, which were selected for having similar total population, population density, and contraceptive prevalence rates. The study found similar percentages of facilities stocked out of tracer essential drugs during the previous six months (42 percent for indent and 40 percent for ILS), but noticeably lower percentages of facilities stocked out of family planning products (32 percent for indent and 15 percent for ILS). This study showed at least some point-in-time performance benefit of the ILS and the trainings and strengthening activities that accompanied it, whereas differences in national availability between programs still impacted relative facility-level availability.

A 2010 evaluation analyzed product availability and adherence to ILS reporting and ordering processes at the district and zonal levels. There were no significant differences between zones overall, but the study did identify specific high-performing and low-performing districts in order to recommend that supervisors target the low performers while drawing on the experiences of better performing districts (Chimnani et al. 2010).

The ILS has been complemented by additional system strengthening efforts during its implementation, such as the mobile logistics surveillance system ILS Gateway. Also, the system has adopted a direct delivery system in which MSD zonal stores deliver facility orders straight to the receiving facilities without being delivered first to the district level. At the same time, the volume of commodities handled by the MSD has increased significantly since 2000, which puts a strain on existing resources.

Hindsight

How might the process be different if it were repeated today? Are there any particular *lessons learned*?

The Tanzania experience generated several globally applicable lessons:

- The major, system-wide changes inherent in this degree of commodity supply chain integration require that staff and stakeholders have incentives to adopt the new system over the old ones. In this instance, the anticipated performance improvements and cost savings drove commitment and effort from all stakeholders over time; regional and district staff were committed to making the new system work because they saw that their facilities could achieve higher commodity availability while reducing the logistics burden on clinical staff.
- The efforts in Tanzania also benefited from having a champion driving progress (the PSU), which maintained progress throughout the process, and a source of technical expertise (the USAID | DELIVER PROJECT), which is a mediator between local stakeholders.
- Integration efforts should include an in-depth assessment of individual systems and a gradual transition with routine monitoring and refinement throughout the process
- Integration efforts should start with the easiest elements and should use existing systems to the greatest degree possible. Distribution was seen as the easiest function to integrate, and PSU

began by adding family planning to the existing distribution for essential medicines, rather than creating an entirely new mechanism. Other vertical systems can be added as performance of the integrated system is demonstrated and seen as adding value.

- Continuous improvement is an essential feature of successful systems implementation, with routine monitoring of performance and assessment of performance inhibitors, periodic system adjustments based on those assessments, and continuous engagement of supply chain operators and stakeholders to ensure acceptance to system changes.
- Change management and local ownership is essential. Districts in which the health management team was strongly committed to commodity availability achieved high levels of performance compared with districts in which the health management team was less engaged and committed (USAID | DELIVER PROJECT and Supply Chain Management Systems (SCMS) 2012).

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Sudan: Case Study on Commodity Integration

1. *Prior structure: For the commodities in question, how were they managed, procured, stored, and distributed prior to the integration efforts?*

Sudan operates several different major public health services, including a drug revolving fund (DRF), which supports facilities through nine subnational stores, a free medicines program for emergency medicines required within the first day or hospital visit and a national insurance fund for drugs. The Global Fund to Fight HIV/AIDS, Tuberculosis and Malaria (GFATM), the United Nations Children's Fund (UNICEF), and the United Nations Population Fund (UNFPA) also provide health commodities through vertical programs. The Central Medical Store (CMS) is responsible for the procurement, storage, and distribution of the DRF and the Free Medicines program, the procurement of drugs for the national insurance fund, and the storage and distribution of the GFATM and UNICEF products (vaccines) to the state level.

This case study focuses not only on efforts to consolidate, strengthen, and institutionalize supply chain management of the GFATM commodities, but also on developments in other national supply chains.

Prior to 2011, supply chain management activities related to GFATM commodities fell under the management of the procurement and supply management (PSM) unit of the General Directorate of Pharmacy. This unit coordinated with relevant central-level health program staff and also utilized state-level PSM coordinators to manage and strengthen supply chain operations at that level of the health system (Kasujja and Muwonge 2012).

Central level storage occurred at GFATM stores for most HIV and AIDS, tuberculosis, and malaria products, while other related commodities passed through central UNICEF, UNFPA, or other programmatic stores. From the central level, commodities passed through both push and pull systems: in the case of malaria commodities, moving through a four-tiered system including GFATM state stores and locality stores, and for AIDS and tuberculosis commodities, moving through a three-tiered system that did not include locality stores. Bed nets and contraceptives were distributed through parallel infrastructure. All of this distribution occurred largely in parallel to the CMS and essential medicines distribution system (Kasujja and Muwonge 2012).

2. *Impetus for change: What specific or general situations provided the incentive to make major system changes?*

As of 2011, the Federal Ministry of Health (FMOH) was undergoing a general reform toward the improved use of limited resources for operations and process strengthening. In line with this, reducing redundancy was a goal of the FMOH, particularly as there were existing entities capable of managing integrated systems (i.e., the CMS) (Mohamed 2013).

A ministerial council decree was passed on the integration of the public health supply chain. In October and November 2011, a baseline assessment was conducted by Axios, CMS, and PSM coordinators looking at the current systems and performance of national supply chains for AIDS, tuberculosis, and

malaria commodities. This assessment found that the current supply chain systems for these commodities—

- did not have clearly defined organizational structures for activity management and supply chain management roles were unclear
- determined state level requirements at the central level, and had facility level staff determine their order quantities
- had large number of emergency orders
- had parallel structures that caused inefficiency and waste.

(Kasujja and Muwonge 2012)

These particular findings, along with an existing ministerial council decree on integration of the public health supply chain, encouraged partners to pursue a strategy that made better use of existing infrastructure and capacity.

3. *Intended solution: What was the goal that country stakeholders were moving toward and what did they want to achieve through integration of distribution systems?*

Partners sought to respond to the general trend within the FMOH and the findings of the supply chain design baseline assessment by instituting a newly designed supply chain system for these commodities, which includes the transfer of national supply chain oversight to the CMS and the integration of storage and distribution activities into the main public system.

Specific recommendations for the state supply chain goal included a clarification of central level management responsibilities and relationships; a transition to a pull system across the supply chain; the integration and rationalization of the distribution of GFATM commodities, bed nets, test kits, and condoms; and the gradual transition of state storage and distribution responsibility from GFATM state stores to DRF stores on a state-by-state basis (Kasujja and Muwonge 2012).

In terms of the national storage and distribution system, the 2011 supply chain design process recommended a transition as demonstrated in figure 5 to figure 6. Fundamentally, this would involve a transition to a single four-tiered public sector storage and distribution network from the more varied current approach, which uses a mix of public and parallel resources. Antiretroviral therapy (ART) commodities and rapid test kits would skip the locality level due to their high value and shorter shelf life. Orders from one level to the next would be requisition based.

Figure 5. Current Distribution System (2011) (Kasujja and Mwongwe 2012).

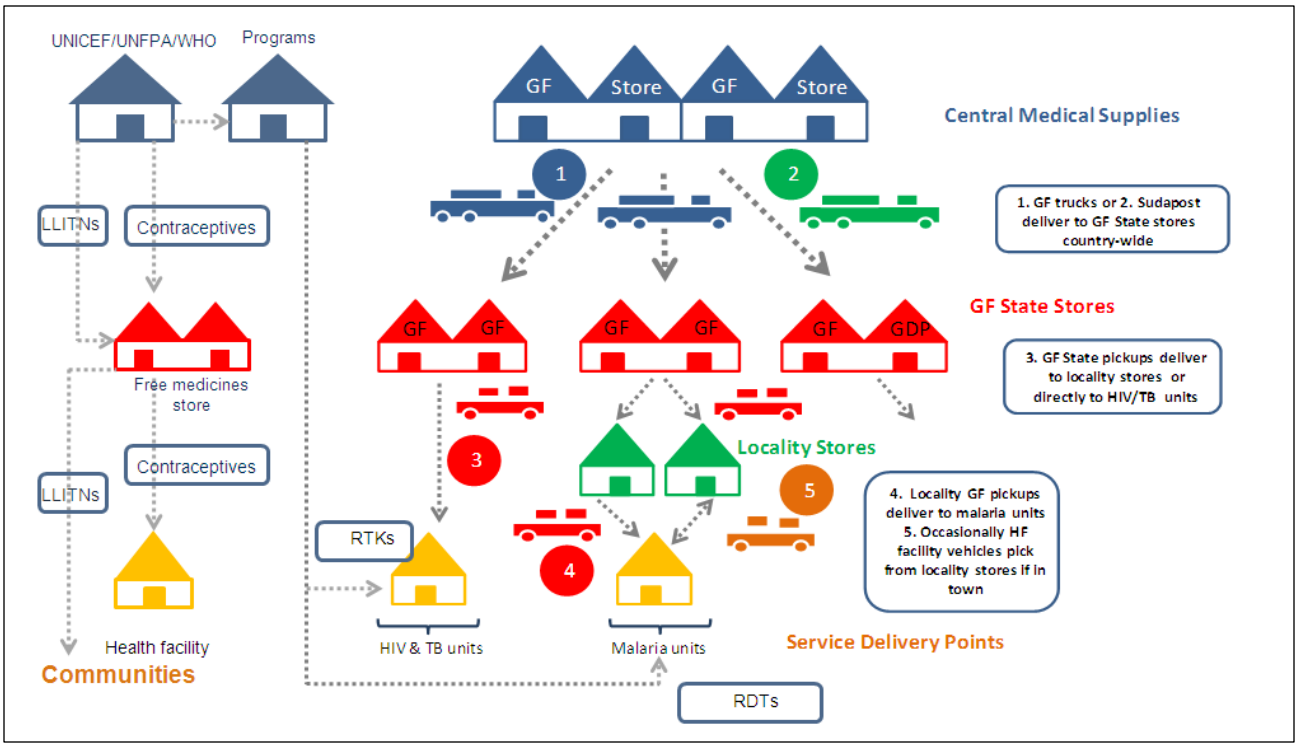
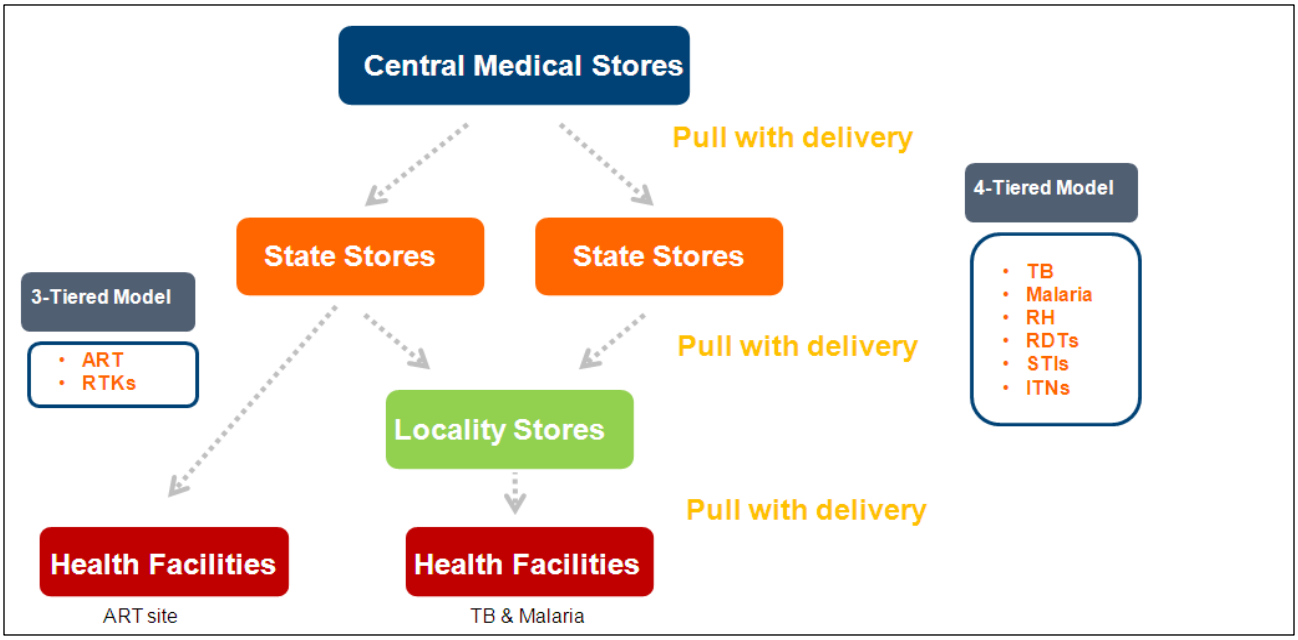


Figure 6. Proposed Distribution System (Kasujja and Mwongwe 2012).



(Kasujja and Muwonge 2012)

Ultimately, partners intended to achieve a better use of resources, better management and accountability, and higher supply chain performance.

4. *Approach to design and implementation: Who was involved, how was it managed, and what specific implementation activities took place?*

Overall, the supply chain strengthening process employed a predesign–design–implement approach. *Predesign* included the informative baseline assessment described previously.

Design took place through a national supply chain design workshop in January 2012. This workshop presented results of the baseline assessment and drew upon stakeholder knowledge in an inclusive, collaborative process. Stakeholders involved in the workshop and in the process generally included national health program managers, the Department of International Relations within the FMOH, the United Nations Development Programme (UNDP), UNFPA, UNICEF, CMS, and state Ministry of Health (MOH) staff, and drew upon technical facilitation from Axios advisors. This workshop proposed the supply chain design and associated implementation process.

The proposed implementation process included the development of standard operating procedures (SOPs) for the new system as well as tools for data capture, reporting and analysis, training manuals, and a roll-out training plan. Axios continued to provide technical assistance throughout this multi-year process. Proceeding from the national system design workshop, implementation activities were to include phased integration of DRF and GFATM state stores, cascade trainings on the integrated distribution system, and subsequent and ongoing support to the state, locality, and facility levels on implementation of this system. Proposed support included the recruitment of PSM coordinators and drivers and implementation of distribution indicators and cost tracking tools (Kasujja and Muwonge 2012).

Additionally, strengthening of human resource capacity has been a focus at the CMS, including a focus on providing targeted training and developing career tracks. Strengthening information systems that guide the sales and warehouse management processes has also been an aspect of overall capacity strengthening.

5. *Outcome: What were the results of the integration efforts in the short and longer term?*

To date, no formal evaluations have taken place for this strengthening effort. However, local partners have indicated that the availability of medicines and logistics data from the logistics management information system (LMIS) have notably increased and improved.

The availability of essential medicines has greatly improved during this time period, which was likely influenced by major funding and procurement forms. Starting in January 2011, adjustments were made to the tendering and procurement award process to account for quality and price, among other factors, and to bring the procurement process in line with national regulations. In the two years following this reform, the average availability of medicines at the CMS has increased from 45 percent to 93 percent between 2010 and 2012 (Mohamed et al. n.d.).

Regarding the national supply chains for HIV/AIDS, tuberculosis, and malaria commodities, it should be noted that several activities have taken place in this time period that intended to increase utilization of these services (Mohamed 2013).

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