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Strengthening public health supply chains in Ethiopia: PEPFAR-supported expansion of access and availability

Daniel Tadesse*, David Jamieson, and Logan Cochrane

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When the US President's Emergency Plan for AIDS Relief (PEPFAR)-supported Supply Chain Management System (SCMS) programme began working in Ethiopia in 2006, the estimated population of people living with HIV exceeded one million, while only 24,000 were on treatment and only 50 treatment sites were in operation. SCMS and other key partners entered into this context to support the Ethiopian government in significantly strengthening the public health supply chain system, with the aim of increasing the availability and accessibility of pharmaceutical products. The country now has 1,047 treatment sites and is nearing complete treatment coverage. This article discusses how priorities were set among many competing challenges from 2006 until 2014, and how the four-step strategy of build, operate, transfer, and optimise has resulted in a successful partnership.

Lorsque le programme *Supply Chain Management System* (SCMS — Système de gestion des chaînes d'approvisionnement) soutenu par l'*Emergency Plan for AIDS Relief* (PEPFAR — Plan d'urgence pour l'aide à la lutte contre le sida) du président des États-Unis a commencé à opérer en Éthiopie en 2006, la population estimée de personnes séropositives dépassait un million. Or, seulement 24 000 suivaient un traitement et on comptait seulement 50 sites de traitement opérationnels. Le SCMS et d'autres partenaires clés sont entrés dans ce contexte pour aider le gouvernement éthiopien à renforcer considérablement le système de chaîne d'approvisionnement en matière de santé publique, dans le but d'accroître la disponibilité et l'accessibilité des produits pharmaceutiques. Le pays compte maintenant 1,047 sites de traitement et approche d'une couverture de traitement presque complète. Cet article traite de la manière dont les priorités ont été établies dans un contexte de nombreux défis concurrents de 2006 à 2014, et du fait que la stratégie en quatre étapes consistant à construire, opérer, transférer et optimiser a abouti à un partenariat réussi.

Cuando en Etiopía empezó a funcionar el Sistema para la Administración de la Cadena de Suministro (SCMS) impulsado por el Plan Presidencial —de EE.UU.— de Emergencia para el Alivio del SIDA (PEPFAR por sus siglas en inglés) en 2006, la población de seropositivos excedía el millón de personas. Sin embargo, solo 24 mil de éstas recibían tratamiento y únicamente funcionaban 50 centros de tratamiento. El SCMS y otros importantes socios ingresaron a este contexto con la intención de coadyuvar a que el gobierno etíope fortaleciera significativamente el sistema de la cadena de suministro de la salud pública, orientado a elevar la disponibilidad y el acceso a productos farmacéuticos. Ahora el país cuenta con 1,047 centros de tratamiento, acercándose a alcanzar una cobertura de tratamiento del 100%. El presente artículo analiza cómo se establecieron las prioridades en un contexto de múltiples retos en competencia durante el periodo 2006-2014, y la manera en que la estrategia de cuatro pasos —construir, operar, transferir y optimizar— dio lugar a esta alianza exitosa.

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Keywords: Aid – Capacity development; Civil society – Partnership; Methods; Social sector – Health; HIV/AIDS and sexual health; Sub-Saharan Africa

Introduction

This article presents the experiences, successes, and challenges of a large-scale donor-funded project that sought to build and strengthen the public healthcare system of Ethiopia, and specifically in response to HIV/AIDS. As a several hundred-million dollar project implemented over a ten-year period, the activities and impacts were wide ranging. Many singular initiatives are analysed in the academic literature, however far fewer examine long-term and large-scale projects. This article aims to fill this gap, and in doing so presents many of the larger activities that were conducted. The authors recognise a large amount of information is presented and hope that the inclusion of multiple activities, as opposed to fewer activities, provides unique insight into how projects of this scale, complexity, and duration can function, the challenges that may be experienced, and the successes that can arise from sustained and scaled interventions.

The first two sections present an overview of HIV/AIDS globally and nationally. This is followed by an overview of the first phase of the project, lasting from 2006 to 2009. The third section details the activities conducted during the second phase, from 2010 to 2014, emphasising the model of build, operate, transfer, and optimise. The article concludes with lessons learnt and reflections for donors and implementing organisations working on and/or considering projects that strengthen public systems and operate at this scale.

HIV/AIDS: the global context

The US President's Emergency Plan for AIDS Relief (PEPFAR) was launched in 2004 to address the global pandemic of HIV/AIDS. When PEPFAR started, many countries did not have the infrastructure and systems to ensure that needed health commodities and pharmaceutical products, such as test kits and anti-retroviral (ARV) treatments, reached their destinations in the correct quantity and at the right time. Supply chain systems needed to be developed and strengthened to meet the scale that the HIV/AIDS pandemic demanded.

In response to this need, PEPFAR launched Supply Chain Management System (SCMS) through the US Agency for International Development (USAID) in 2005. The aim of this initiative is to provide a reliable, cost-effective, and secure supply of products for HIV/AIDS programmes. SCMS operates in 22 countries. In partnership with the Government of Ethiopia, SCMS has contributed to major improvements in the country's health sector, including supporting the rapid expansion of health facilities and ARV treatment sites throughout the country, provision of prevention of mother-to-child transmission (PMTCT) services, and national anti-retroviral therapy (ART) coverage.

HIV/AIDS in Ethiopia: the national context

With approximately 90 million people, Ethiopia has the second-largest population in Africa (CSA 2007; UNDESA 2009). The growth rate of 3.2%, combined with 46.3% of the population being under the age of 15, contributes to projections that the country's population will expand to 119 million by 2030 (Evans 2012; UNFPA 2008). About 80% of the population lives in rural areas, which poses a number of challenges for the provision of healthcare services and commodities. However, Ethiopia is rapidly urbanising, with one-third of the population projected to be living in urban areas by 2030 (Evans 2012).

At the beginning of 2006, an estimated 24,400 people in Ethiopia were on ART (Raman et al. 2012). At the time, more than a quarter of a million people required ART and coverage

was only 8.8% (HAPCO 2006). In addition, only 21% of women were accessing PMTCT services (Asrade and Amanuel 2014), while there were over 75,000 women living with HIV giving birth annually and almost 900,000 children orphaned due to HIV/AIDS (National AIDS Resource Center 2007). Free government-provided treatment for HIV was not available until 2005, in limited quantities, while payment-based ARV treatment was available only as of 2003; internationally, however, the first approved ARV became available in 1987. The number of treatment sites in Ethiopia was expanding, from 25 in 2005 to 50 in 2006, but coverage was still insufficient for a population of 75 million (in 2005). Systems to support diagnosis, treatment, and logistics were absent in much of the country (Raman et al. 2012; SCMS 2012). These challenges were compounded by a shortage of skilled healthcare workers, the unavailability of data to make informed forecasting and procurement decisions, inadequate infrastructure for storage and distribution, and insufficient health commodities and pharmaceutical products (HAPCO 2006).

From an estimated 4.4% in 2003, national prevalence of HIV has dropped to 1.5% of the adult population; approximately 800,000 people (HAPCO 2012). Generalised trends include higher prevalence rates in urban areas (4.2%) compared with rural areas (0.6%) and in specific populations, such as widowed individuals (more than 10%) and commercial sex workers (CSA 2012). Significant regional differences are found in Ethiopia, with prevalence above 6% in Gambella and below 1% in Southern Nations, Nationalities, and Peoples' Region (CSA 2012).

Phase I: responding to the crisis (2006–09)

The initial response to the grim reality in Ethiopia in 2006 was broad and urgent, focused on addressing the critical needs of the population. The Government of Ethiopia and its public and private health sector partners agreed that diagnosis and treatment of HIV/AIDS would be provided at no charge. The Federal Ministry of Health (FMOH) and the National HIV/AIDS Prevention and Control Office (HAPCO) worked to ensure that the systems, skills, and capacity needed to provide the required services were being put in place. This process included scaling up voluntary counselling and testing services, ARV treatment provision, and prevention of mother-to-child transmission (PMTCT) services (HAPCO 2006).

Compliance posed a logistical challenge: once a person was diagnosed with HIV, he or she needed to visit a treatment site monthly for the first six months, and then quarterly after that. The limited number of treatment sites in operation were largely urban, while most Ethiopians resided in rural areas. Although higher prevalence rates existed in urban areas (10.5%) compared to rural ones (1.9%), the large proportion of the population living in rural areas meant that nearly half (48%) of all infections were in rural areas (HAPCO 2006). Getting treatment to those who needed it required much more robust distribution, and necessitated the development of systems for quantification, procurement, warehousing, distribution, and training.

A diversity of donors and implementing partners during the early years brought logistical and supply chain problems, resulting in an unsustainable reliance on costly emergency orders of products. In an effort to address this challenge, the Government of Ethiopia centralised all stakeholders under the FMOH. While improvements occurred, coordination and collaboration challenges continued – particularly as expansion was sometimes directed by donors and implementing partners based on their own plans and priorities.

A master plan for distribution

To expand distribution, in 2006 SCMS, USAID|DELIVER PROJECT, UNICEF, the World Health Organization (WHO), and other stakeholders worked with the Ethiopian FMOH to

develop a Pharmaceutical Logistics Master Plan. This led to the creation of the Pharmaceuticals Fund and Supply Agency (PFSA), which would become the sole distributor of all health-related commodities for the public sector throughout Ethiopia, including all pharmaceuticals as well as related health commodities, such as medical equipment, test kits, laboratory equipment, and reagents.

Significant challenges included product shortages at diagnosis and treatment sites. If, for example, testing kits were not in stock, those who had made the important, yet difficult, decision to take an HIV test – often facing stigma and discrimination – would be redirected. In addition, those receiving ART needed a continuous and consistent supply of ARVs to maintain their personal health and to ensure that viral mutations were not facilitated due to inconsistent treatment. The myriad of products required for diagnosis and treatment, many new to Ethiopia, brought new forecasting, procurement, and distribution challenges.

A sustainable strategy

SCMS led efforts to create a system for overseeing activity expansion and ensuring that all required products were available and accessible. Doing so required prioritisation of the main areas for intervention, some of which would entail redesign of entire systems. SCMS set out to address these challenges in a more sustainable and coordinated fashion than the initial response to the crisis. A four-part process was designed to make lasting improvements: build, operate, transfer, and optimise. This included shifting from an activity-focused management system to a results-based one, changing a supply-driven system to a demand-driven one, and developing and expanding human and physical capacity. At the same time, information systems would need to be scaled-up to meet the maximum expanded coverage at the facility level, increasing the quantity and quality of available data for information-based decision-making, forecasting, procurement, and distribution. Warehouse management systems would be developed and implemented for all regional warehouses and the warehouses themselves would transition from leased facilities to purpose-built pharmaceutical warehouses equipped by SCMS with appropriate technologies and tools, such as vertical racking, forklifts, and cold rooms. The distribution system would be expanded with SCMS-provided transport vehicles. Seconded staff, training, technical assistance, and supportive supervision would be provided to facilitate the capacity building, transition, and transfer process.

Dramatic improvements

As a result of SCMS establishing systems for forecasting, procurement, warehousing, and distribution as well as direct support to health facilities, by the end of 2009 the total number of treatment sites supported had increased from 25 in 2005 to 412. Half of these were located in rural areas (Raman et al. 2012). Over this period the number of people receiving ART jumped from 24,400 to 155,000. The number of products managed rose from just a few to 588.

Multiple challenges remained, however. Implementation plans of individual stakeholders and of the collective partnership lacked detail, due in part to a continued lack of coordination and harmonised planning. Physical infrastructure, information systems, and human resources were not adequate for the size of the operations at the time, nor the speed of expansion necessary to meet the expected need. Many stakeholders, including SCMS, were working toward transferring activities and responsibilities to PFSA, but the process was slowed due to limited capacity and resources at PFSA. New programmes, such as food by prescription (FBP), were planned, but due to limited storage capacity had not begun in earnest.

Phase II: advancing the response (2010–14)

SCMS continued to pursue the build, operate, transfer, and optimise model in supporting the Ethiopian FMOH. The challenge it faced was how to determine the most effective ways to provide this support and establish appropriate, viable, and sustainable systems.

Build

Designing a workable information system

Effective supply chain management required a robust data collection system, which would enable data-driven decision-making, improve service coordination, facilitate scale-up, and enhance procurement and distribution of pharmaceutical products. SCMS, along with partner organisations, such as USAID | DELIVER, supported the design of the Integrated Pharmaceutical Logistics System, the roll-out of which in all regions and city administrations in the country was conducted by PFSA with the support of SCMS. Soon thereafter, the Health Commodities Tracking System (HCTS) – a web-based application with an offline option and a synchronisation tool – was designed to track and report on inventory. Because some regions lacked computers and internet connectivity, a paper-based system was used in tandem, which was then coded at regional warehouses.

Expanding warehousing capacity

In Ethiopia, the governmental agency PFSA operates a central warehouse, which supplies regional warehouses that distribute products to hospitals and thousands of health facilities throughout the country. Launched in 2007, PFSA is a relatively young organisation, and the diversity and volume of its pharmaceutical products continues to grow. In the past, physical capacity held back supply chain development. To address this issue, SCMS supported a major warehouse expansion initiative to meet immediate and anticipated needs of the expanding patient population by temporarily leasing regional warehouses, while USAID and the Government of Ethiopia co-funded the construction of 10 permanent and purpose-built regional warehouse facilities. For these sites, SCMS provided technical assistance with designing the warehouse network, developing warehouse layouts and structural designs, and outfitting the warehouses with vertical racking and materials handling equipment.

Multi-level racking systems, which SCMS introduced, allowed for vertical storage to maximise use of available space and prevent product damage, as boxes are stacked according to capacity (Figure 1). The racking system includes a location-based storage system, which improves product organisation by ensuring that products nearest to expiry are used first. Because the central and regional warehouses have an improved ability to quantify and locate stock, product shortages and overstocking have been reduced, which has resulted in cost savings as fewer emergency orders are required and product expiry has almost been eliminated due to improved management.

At one of the sites, located in Adama, vertical racking led to an increase in warehouse capacity of more than a third, to 880 pallets, which was increased exponentially to 5,160 pallet spaces in the new warehouse. Across the 10 new warehouses, the introduction of SCMS-provided vertical racking raised pallet capacity from 6,039 to 30,340 pallet spaces, a more than five-fold increase.

Building distribution and procurement capacity

To ensure that products reached their destination promptly, efficiently, and cost-effectively, SCMS provided 74 delivery trucks (19 of which are fitted with mobile cold rooms), five field vehicles, and five motorbikes. This support saved a significant amount of money that PFSA spent on rental trucks for delivering commodities to health facilities. These funds can now be used to procure



Figure 1. Left: Warehouse, Ethiopia (before) Right: Warehouse, Ethiopia (after).

essential lifesaving medicines. Vehicles and motorbikes also support ongoing data collection, monitoring and evaluation, and emergency deliveries. SCMS also provided mobile offices with 10 rooms, 355 refrigerators, and six cold rooms.

SCMS has played an important role in ensuring the required pharmaceutical products are available within and throughout the country. In 2009 SCMS procured more than US\$38.5 million of commodities, up to US\$31 million from 2010 to 2013, and US\$19 million in commodities in 2014. The reduced usage of SCMS for procurement reflects the transition to governmental ownership, as governmental procurement steadily rose during these years and the government is increasingly procuring commodities that SCMS had previously procured.

An essential component of expanding access to healthcare is ensuring facilities have the equipment they require. For example, the safe delivery of infants requires hospital beds, sterilising equipment, infection prevention materials, delivery equipment, and surgical tools; SCMS has procured and supplied health facilities with more than US\$10 million worth of such equipment.

Service expansion

The construction of new hospitals and health facilities was conducted by the Ministry of Health, the rapid growth of which demonstrates the commitment and leadership of the Government of Ethiopia in taking the initiative to bring about these successes. SCMS supported the development of forecasting, procurement, warehousing, and distribution systems that underpinned the expansion of health facilities and provided direct support (equipment, training, technical assistance, and supportive supervision) to health facilities to expand the services offered. The number of public health facilities expanded rapidly, reaching 1,463 in 2012, 2,028 in 2013, and 3,447 in 2014. ARV treatment sites increased from 412 in 2010 to 1,047 in 2014. Sites providing PMTCT services expanded significantly, with 646 in 2012 and 2,495 in 2014, most of which are located in rural areas. ART lab monitoring sites also expanded from 2011 onward. Figure 2 illustrates the growth in number of total sites, as well as ART, PMTCT, and ART lab monitoring sites, from January 2005 to April 2014.

Operate

Practical knowledge and skills building

Newly introduced technologies and procedures required new knowledge and skills. During the life of the SCMS project, almost 9,000 people have been trained in different aspects of supply

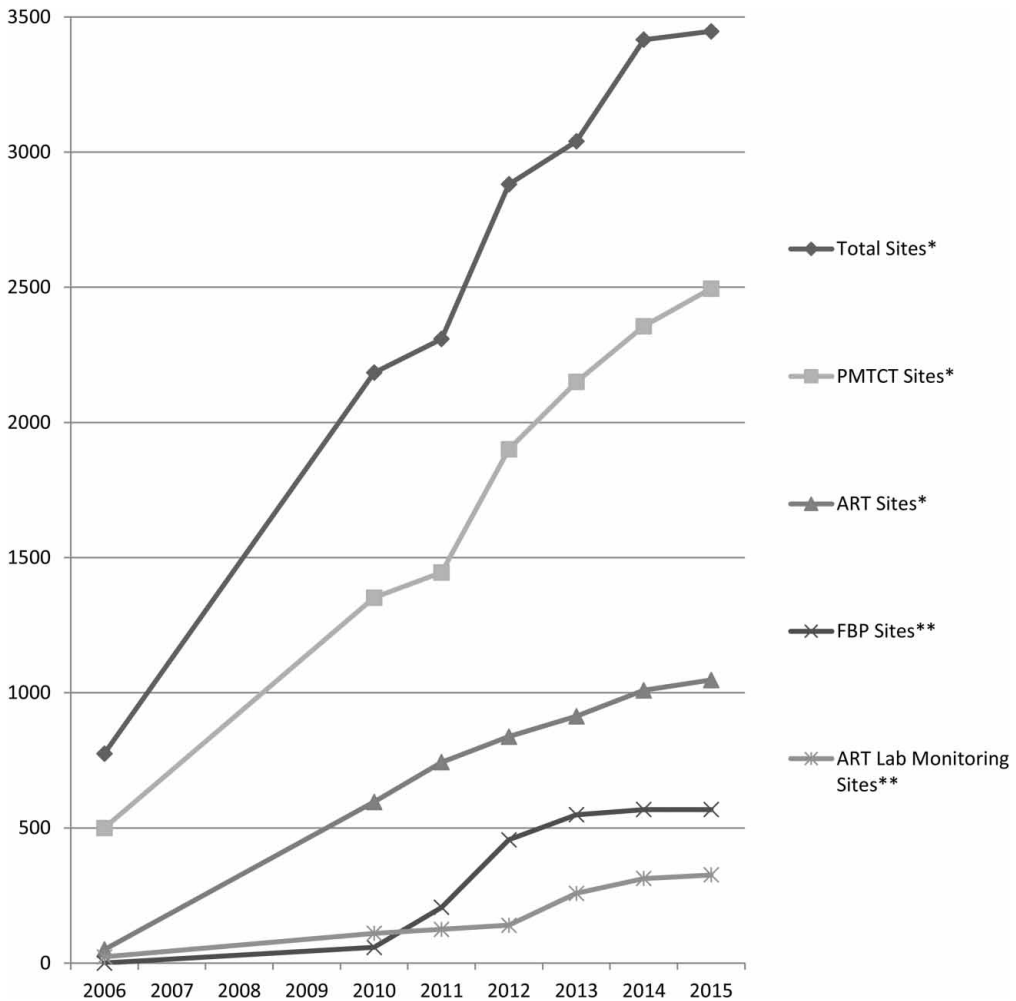


Figure 2. Expansion of service provision.

Notes: * Based Ministry of Health (2014) for recent data, and HAPCO (2014) for 2006–13.

** Based on SCMS data.

chain management, ranging from forklift operations, to defensive driving, to the logistics management information system. SCMS has sent 40 staff from PFSA and SCMS to South Africa for warehouse operations and management training. As a result of this training, each warehouse, on average, implemented at least 23 improvements and the participants gained first-hand experience working in a world-class facility as they learnt best practices (Cochrane 2013). The leased warehouses were not purpose-built pharmaceutical warehouses, resulting in some limitations in what could be done within them. Since the newly constructed warehouses were completed and transition into them began in 2014, improvements continue to be seen. The enhancements include space utilisation and commodity management, as the purpose-build warehouse layouts were designed with commodity flows in mind. Additionally, PFSA and SCMS recognise that international training is not a sustainable option for all current and future personnel, and therefore a domestic facility with customised curricula is being developed, which will be used for ongoing training.

Quantification and procurement

Quantification of commodity demand is crucial to ensuring that required pharmaceutical products are where they need to be, when they are needed and in the correct quantity. Taking into account the country's current, expected, and changing pharmaceutical needs, SCMS supported quantifications that were conducted in 2008, 2010, 2012, 2013, and 2014. These are national-level planning exercises that enumerate the country's financial needs and help to develop national procurement plans. As a primary partner of the FMOH and PFSA, SCMS was asked to coordinate donor partners and the quantification workshops, for which it also provided technical and financial assistance.

New financial and accounting software

PFSA's procurement budget is several hundred million US dollars. However, the account closing process, which was largely manual, took months. A high error rate, due to manual data entry, added to the processing time. This was the case until 2012, when SCMS provided software and training on financial and accounting software. This resulted in a number of efficiencies; the time it took to reconcile accounts was reduced from two to three months to one week; bank reconciliation time was reduced from one month to three to five days; staff bookkeeping time reduced from 80% of staff time to 10%; and reporting time reduced from nine months to one month, with reporting errors reduced by 75%. Following the training, PFSA staff also cleared a three-year backlog (2009–12). These achievements were accomplished while also reducing payment processing staff and inventory management staff by 50%.

A new electronic system for all health commodities

As the quantity and number of healthcare products expanded, improved systems for data collection were required. The existing data collection system, HCTS (discussed above), was specifically designed for HIV/AIDS-related commodities. To make the system more inclusive, PFSA and SCMS developed the Pharmaceuticals Logistics Information Tracking System (PLITS) that included all health products. PLITS further enhanced supply planning, quantification, distribution, and decision-making across the country. Starting in 2013, SCMS supported the rollout of PLITS into 900 ART sites and 300 PMTCT sites. As a further means of enhancing data collection, quality and availability, SCMS collaborated with the USAID|DELIVER PROJECT to interface data collection systems, ensuring all data collection mechanisms automatically interact and share data as a single application. This integration process was designed to prevent the duplication of data entry.

A new workflow management system

Currently, 19 products are being procured that have a shelf-life under six months, the shortest of which is only 16 days upon arrival in the country. These products are required for machine calibration, to test machine functionality, and for performance tracking. SCMS developed a workflow management system, called the Short Shelf Life Product Management System (SSLPMS) to track commodities movement and the distribution process, as well as to reduce expiry. This electronic system replaced a paper-based one and uses a 16-step standard operating procedure developed for distribution. The SSLPMS ensures that all people involved in distributing short shelf-life products are updated on product movement and are automatically alerted to their responsibilities. In the case of delays, supervisors are automatically notified. The introduction of this system has

eliminated product expiry, which had been a problem in previous years. It has also ensured optimal service provision, as the products required for testing lab machines are available when needed.

Health systems strengthening in human capacity and data quality

The health systems strengthening field support (HSS FS) team came together in 2010, joining smaller teams working on commodity and lab support. Their objectives are to: (1) build the capacity and capability of coordination at the lower levels, from the regional level to the district level; (2) gain accurate, timely and quality data; and (3) build the capacity of regional, zonal, and district-level health offices.

To ensure regional ownership of supply chain activities, SCMS supported the development and implementation of regional intervention plans that addressed identified gaps. SCMS ensured the required capacity was present by training PFSA and SCMS staff as well as 800 personnel at the regional, zonal, and district levels. As a result, regionally developed intervention plans have been institutionalised for continuous improvement of supply chain management. SCMS also provided training and support to all regions so that monitoring and evaluation plans could be developed and implemented throughout the country. The approval of these plans at the regional level results in dissemination and adoption throughout the lower levels of the healthcare system within it.

In collaboration with PFSA, the USAID | DELIVER PROJECT and other partners, SCMS conducted training at more than 2,000 health facilities to improve product management, data collection, and reporting. Following the training, supportive supervision was provided to more than 500 sites to ensure that implementation is performed correctly and efficiently. Standardised forms are now being used at all facilities and are distributed along with pharmaceutical products within the healthcare system supply chain.

Health facilities do not operate in isolation, nor do they directly communicate with the federal authorities. In order to ensure that all levels of the supply chain system are managed appropriately and undertake their respective activities, SCMS provided orientations to staff at the regional, zonal, and district levels. In anticipation of continued staff turnover, SCMS also developed a skills and knowledge transfer system so that new staff are prepared to undertake their responsibilities. The transition of task responsibility from the implementing organisation and seconded staff to PFSA and its personnel was facilitated with supportive supervision. As a result of these activities, PFSA has improved qualitative and quantitative data for information-based decision-making on procurement, distribution, and resupply of products at the health facility level – significantly reducing the potential for shortages and emergency orders. PFSA has also successfully taken ownership of these tasks, ensuring the sustainability of these improvements beyond the life of the SCMS project.

Transfer

Skills transfer, in the form of training, technical assistance, and job support supervision, is essential if the improvements and successes described above are to be sustained. Long-term planning between PFSA and SCMS regarding the transfer of tasks and responsibilities allowed for sufficient transfer planning and time for both parties. The smooth transition that has been experienced to date is one of the greatest successes of the project. Of note is that throughout the building, operating, and transitioning processes there was not a single ARV treatment interruption. The size and distribution of the population in Ethiopia make this particularly noteworthy.

PFSA has the sole responsibility for ARV procurement and all healthcare commodity deliveries, with support from SCMS through seconded staff, training, mentoring and, when needed, emergency orders. SCMS continues to procure certain products for PEPFAR-supported national health programmes, which are distributed mainly through PFSA. Locally produced products save time and cost while supporting the expansion of local capacity and boosting the local economy. To shift to local suppliers, SCMS assessed local importers and manufacturers to ensure that they met country as well as USAID requirements. One local manufacturer was approved initially, and the first order of 310,000 bottles of Co-trimoxazole suspension was placed in 2012. Initially, the quality of imported and locally manufactured products was ensured by batch testing internationally; however, with SCMS support, product testing has begun in Ethiopia, saving time and cost while expanding local capacity.

From the more than 70 SCMS seconded staff in place as of 2010, less than one-third remain, following one-to-one task transfer from SCMS seconded staff to PFSA permanent staff. This process will be complete by the end of 2015. In a few locations, such as the Adama and Jimma warehouses, most HIV/AIDS commodities management and distribution-related tasks have been fully transferred to PFSA. Most warehouse and transport supervision activities are also entirely handled by PFSA.

Optimise

Optimising SCMS and Government of Ethiopia efforts relied on several key factors for success including planning, coordination, and communication.

Planning

To ensure that the network is optimised and that distribution is managed efficiently, distribution planning is essential. SCMS conducted a distribution route analysis to enable route optimisation even though only half of the health facilities were geo-coded. The distribution optimisation plan improves distribution efficiency, maximises resource use, and supports the development and enhancement of other projects, such as the lab referral network and efforts to geo-code all health facilities. The map will include locations, distances, and road conditions to improve distribution planning and make the distribution process more efficient and cost-effective.

Detailed planning is essential for optimisation, in particular for larger projects such as warehouse development, software development, procurement planning, maintenance, waste management, and security. Planning of this nature enables accurate timetable estimation, tasks to be appropriately scheduled, resources used accordingly, and facilitates accurate costing. Detailed planning processes were integrated into joint work plans with government partners, which clarified expectations, responsibilities, and management for all parties.

Coordination and communication

Early in the project a major challenge for SCMS, as one partner to the Government of Ethiopia among many, was a lack of coordinated, and therefore strategic, action. This lack of coordination also affected planning activities, resulting in different stakeholders simultaneously engaging in a particular activity, often in different ways. Creating and supporting platforms to increase coordination, collaboration, and communication has been a key factor in enabling more strategic implementation. SCMS has taken a lead role in coordination activities, such as managing bimonthly logistics partners meetings, government-led bimonthly Pharmaceutical Logistics Partners Meetings, Supply Coordination Group meetings, and regular warehouse transition meetings.

Lessons learnt

Government leadership is the foundation for success

The successes achieved since 2006 are built on a foundation of leadership and support from the Government of Ethiopia and its commitment to strengthen the national pharmaceutical supply chain. In making the public health supply chain a priority and actively supporting public health expansion plans, the federal government has played a major role in the successes achieved to date. Government leadership facilitated the rapid expansion of treatment coverage and the vastly expanded public healthcare system.

Appropriate technology is important

A large number of laboratory machines were procured for installation and use at health facilities throughout the country. Several factors resulted in delayed installation, including inadequate assessments of the readiness of health facilities for the installation, limited capacity of local contractors, and an insufficient assessment of contractors' capacity to handle the expected workload. Similar projects ought to include more thorough assessments and be phased in line with the capacity of all parties.

Equipment and training go hand-in-hand

To improve waste management and prevent infection as a result of mishandled waste, SCMS procured waste segregation bins of different volumes, and distributed them to health facilities in partnership with PFSA. Although distribution efforts achieved high coverage, implementation was low. Most facilities did not receive assembly manuals, many did not have a focal person responsible for managing the introduction of waste bins and as a result many were not aware of their correct use. In similar projects, when new systems and/or products are introduced, they should be accompanied with clear instructions, and assembly directions if required. If the distribution is large, a delegated person ought to be identified for coordination, and training or orientation provided if needed. Where training is needed, an assessment should be made, including representation from different levels of health facilities, and from all regions of intended distribution. The key lesson is that providing new equipment must be part of a greater change management process, it cannot be assumed that new processes will be implemented automatically with the arrival of the equipment.

Real-time data are essential

In the past, quantification and procurements managed by SCMS were based on information and recommendations from experts and field-level practitioners. This was partly due to necessity, as consumption data were not readily available. The result was overstocking, product expiry, product shortages, and emergency orders. The issue was addressed by improving data collection systems, and now forecasting and procurement are based on actual consumption data. In turn, overstocking, expiries, shortages, and emergency orders, and their respective costs, have been significantly reduced.

Capacity building is key

Building and expanding local capacity – from the central offices to the health facilities – is the foundation for Ethiopia's achievements. Capacity building includes training and job support

supervision. It also incorporates the creation of robust systems and structures, the provision of information systems, expanding physical capacity, such as shelving and materials handling equipment, and introduces new processes and policies, such as standard operating procedures. Capacity building enables service provision to expand geographically, increase beneficiaries, and handle rapid growth in volume and quantity of pharmaceutical commodities to provide the required services and products.

Newly established capacity can also facilitate the creation of new projects. For example, although the need and interest in having a FBP programme existed in Ethiopia, the capacity did not. As a result of enhanced capacity, improved efficiency and the development of new systems, the FBP programme was started in 2009. It has two main implementing partners, Save the Children US and the World Food Program (WFP), while SCMS supported it with logistics, quantification, procurement, storage, and distribution of nutritional products. As of 2014, the FBP programme operated at 568 sites and the success of the programme is founded upon the expanded healthcare system described in this article, as it utilises the public health supply chain and distribution network to operate.

Reflections

Less than a decade ago, PFSA began the daunting task of procuring and delivering healthcare products to a large, and mostly rural, population. The estimated population of people living with HIV at that time exceeded one million, while only 24,000 were on treatment (8.8% of those requiring it). SCMS and other key partners entered into this context to support the government in significantly strengthening the public health supply chain system. SCMS followed a four-step process: build, operate, transfer, and optimise. Systems were put in place for forecasting, procurement, logistics management, warehousing, distribution, workflow management, accounting, and other related areas.

This four-step process has reached its final stage and SCMS is moving towards project phase-out (in 2016). The systems established, in collaboration with PFSA, have laid the foundation for delivering HIV/AIDS commodities to patients and have made significant progress toward addressing the critical need that existed in 2006. After systems were built and operational, the long-term local capacity building initiative began, with the aim of transferring operations to governmental partners. As the government took ownership, SCMS worked to ensure that systems were operating as efficiently and effectively as possible, based on continuous improvement that optimises capacity and capability and can respond to changes in the public healthcare supply chain systems.

From 8.8% in 2006, ARV treatment coverage is now 80%, the number of people on ART has risen from 24,400 to over 344,000, and the percentage of women accessing PMTCT services has increased from 21 to 57% (Ministry of Health 2014). From an estimated 4.4% in 2003, national prevalence of HIV is currently 1.5% of the adult population, approximately 800,000 people (HAPCO 2012). During the life of the project, the total number of healthcare sites increased from 775 to 3,447, PMTCT-providing sites from 500 to 2,495, ART-providing sites from 25 to 1,047, and ART lab monitoring sites from 106 to 326. The expansion of the healthcare system, service provided, and treatment coverage is remarkable.

SCMS Ethiopia, as one of the largest operations of its kind globally, has played an important role in supporting the Government of Ethiopia to achieve these successes. Although many successes have been realised, other challenges remain. Ongoing SCMS plans include ensuring a smooth transition of all activities, continuing to optimise the supply chain, supporting

procurement planning and donor coordination, and institutionalising supply chain management training at educational institutions throughout the country. These activities are planned to be completed before the project closes out in 2016.

Many government and non-government bodies seek to partner with governmental entities to create and/or develop stronger public systems, from healthcare to education and security. This article provides a practical example of how one such partnership formed, thrived, and managed the many challenges it faced in enabling the government to meet its targets for those living with and affected by HIV/AIDS. The activities presented in this article ought not be understood as a prescription for other programmes, rather they should serve as examples for building, operating, transferring, and optimising large-scale and long-term projects. The challenges presented should be understood as general lessons, considered within other contexts, and incorporated where appropriate. The successes experienced in Ethiopia demonstrate that donors can play an important role in creating and developing effective public systems.

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