Supply Chain Strategy 2015

A five year plan for an efficient and effective public health supply chain in Liberia.

"To reform the health sector to efficiently deliver quality health and social welfare services to the people of Liberia. We are dedicated to equitable, accessible and sustainable health promotion and protection and the provision of comprehensive and affordable health care and social welfare services."

Liberia Ministry of Health and Social Welfare Mission Statement

9 July 2010

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Acronyms

AIDS	Acquired immunodeficiency syndrome
ARVs	Antiretroviral
BCC	Behavior Change Communications
CCM	Country Coordination Mechanism
CHAI	Clinton Health Access Initiative
DHT	District Health Team
CMO	Chief Medical Officer of Liberia
DMPR	Deputy Minister of Planning & Research
GDF	Global Drugs Facility
GFTAM	Global Fund to Fight AIDS, Tuberculosis and Malaria
H	Hospital
HIV	Human immunodeficiency virus
IRC	International Red Cross
LMRC	Liberia Medicine Regulatory Committee
MoC	Ministry of Commerce
MoF	Ministry of Finance
MoHSW	Ministry of Health and Social Welfare
MoHSW-EPI	Ministry of Health and Social Welfare Expanded Immunization Program
M&E Unit-MoHSW	Monitoring and Evaluation Unit
NACP	National Aids Control Program
NDS	National Drugs Services
NSCU	National Supply Chain Unit
NGO	Nongovernmental organization
NMCP	National Malaria Control Program
NTLCP	National Tuberculosis and Leprosy Control Program
OCDI	Organisation de la Charité pour un Développement Intégral (Organisation of Charity for Integral Development)
OI	Opportunistic Infections

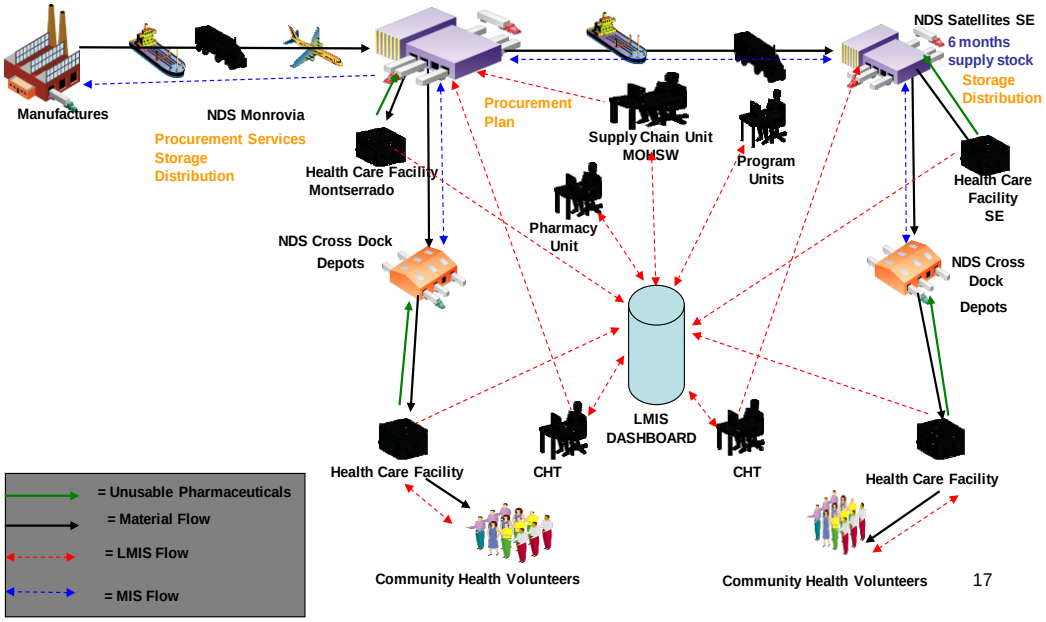
PHARMSAL	Pharmacetical Association of Liberia
PBL	Pharmacy Board of Liberia
PD	Pharmacy Division of Liberia
PNLT	Programme Nationale de lutte contre la Tuberculose (National Tuberculosis Program)
PNUD	UN Development Program (Le Programme des Nations Unies pour le développement)
PR	Principal Recipient
PU	Procurement Unit -MOHSW
PSI	Population Services International
RBHS	Rebuilding Basic Health Services
RHD	Reproductive Health Department
SLA	Service Level Agreement
SCMS	Supply Chain Management System
SCUK	Save the Children United Kingdoms
SR	Secondary Recipient
STI	Sexually transmitted infections
TB	Tuberculosis
TTC	Testing and treatment center
UNDP	United Nation Development Program
WHO	World Health Organization
UNAIDS	United Nations Programme on HIV/AIDS
UNDP	United Nations Development Program
UNFPA	United Nations Population Fund
UNICEF	United Nations International Children's Emergency Fund

Acknowledgement

Executive Summary

From May to August 2010, a supply chain master plan design team led by the MoHSW worked closely with implementing partners and technical experts to complete necessary assessment work, to test supply chain design scenarios, and to develop design elements for a 5-year supply chain strategy. The result is a strategy that improves supply chain performance while meeting MoHSW decentralization objectives, via the placement of budgetary control with county health teams, and taking advantage of cost savings and efficiencies available through shared procurement, warehousing and distribution services.

The Liberia Health Commodity Supply Chain, 2015



The preceding graphic provides a view of the design of the Liberia Supply Chain Master Plan 2020. Key participants and their roles include[1]: 1) The MoHSW which provides strategic and policy guidance and otherwise holds ultimate accountability for supply chain performance; 2) the Supply Chain Management Unit (SCMU) within the MoHSW. The SCMU is responsible for coordinating and overseeing all supply chain activities within the public health supply chain, for managing a Logistics Management Information System (LMIS) and for quantification and procurement planning; 3) the Program Units which advise the SCMU on product selection and overall supply chain performance to ensure that products critical to their programs are available when and where needed; 4) the Pharmacy Unit which sets and oversees national pharmaceutical policy, works closely with the SCMU and programs to support appropriate pharmaceutical

[1] In most cases, participants described here have responsibilities in health policy setting, clinical care or other areas that extend beyond the realm of supply chain management. This plan describes and addresses the roles of these participants only in the context of the public health supply chain management and does not describe their extended roles.

management throughout the supply chain, and works closely with county pharmacists to ensure that policies are implemented at the county and facility level; 5) the LMRHA (The Liberia Medicines and Health Products Regulatory Authority)[2] which conducts all activities related to the registration of medicines and health care products. LMRHA works closely with SCMU to ensure that supply chain activities support and are informed by LMRHA's work; 6) County Health Teams (CHTs) which manage the budget for the purchase of drugs and health commodities in their counties, and thus, function on behalf of clinicians and patients as the primary customers of the supply chain.[3] The system depends on the CHTs to communicate expectations and to share the logistics information that is so critical to SCMUs ability to manage the system effectively; 7) the National Drug Service (NDS) which will function as a single, customer-oriented, procurement, warehousing and distribution service operating at the pleasure of the MoHSW and County Health Teams; and 8) Health Facilities. In addition to their role in the rendering of health services directly to patients and through Community Health Volunteers, Health Facility responsibilities include adherence to treatment and prescription policies, good storage and inventory management, and diligence in collecting and sharing logistics data.

The Master Plan Strategy proposes other features that will be critical to the system's success, for example: 1) **service level agreements** to define terms between service providers (e.g. NDS) and customers (e.g. SCMU, CHT); 2) "cross-docks" or transit facilities that hold stock for distribution to health facilities, but that are not burdened with the management of stock. These transit facilities will be placed at locations of strategic advantage to customers based upon a resource optimization exercise; 3) **a Logistics Management Information System Dashboard** that provides real-time data for resupply and decision-making; 4) a national procurement plan that, among other things, enables improved organization and planning for purchasing, warehousing, and distribution; 5) a distribution system, including route planning, schedules, and vehicle selection that enables smaller and more frequent deliveries thereby reducing stress on national supply chain capacity; and 6) alignment of finite resources for training to specialized needs at each level of the system.

Supply Chain Strategy - Features & Benefits Summary

Features	Benefits
One system	•Improved transparency, adaptable, efficient, responsive
Supply chain management technical unit within MOHSW	•One entity responsible for supply chain from end-to-end •Provides checks and balances
Integrated logistics services provider	•Improved accountability through performance agreements •Specialization in storage and distribution •Control without holding stock at each level: lower inventory levels, better use of storage capacity •One management system: reduced stock-outs and wastage •Alignment of storage/distribution capacity to national need
Integrated information management system with real time data	•Visibility to all partners/stakeholders as appropriate •Improved supply chain decision-making
Specialized procurement agent	•Best value procurement through bulk buying and specialization
Role shifting and specialization	•Economical use of finite training resources •Alignment of expertise with corresponding needs

[2] LMRHA is pending approval in the Legislature as of June 9th, 2010

[3] A provision of Liberia Health System Decentralization. Decentralization of the health system is a key element of the Liberia National Health Strategy.

Introduction

Health programs and the people they serve depend on getting the right medicines, in good condition, when they expect them. Supply chain management is the active management of activities, within and among organizations to ensure that these objectives are achieved. Supply chain activities cover everything from procurement, to warehousing and distribution to the information systems needed to enable and coordinate these activities.

As early as 2007, the Liberia Ministry of Health and Social Welfare (MoHSW) identified the need to improve health commodity supply chains. In its 2007-2010 National Health Strategy, the MoHSW noted that efficient procurement and distributions system are vital to the provision of its Basic Package of Health Services (BPHS) for citizens. Still, the systems that are meant to supply essential health commodities to the people of Liberia require additional strengthening. Unreliable roads, unsuitable storage, inventory and warehouse management practices, and limited information sharing, for example, contribute to stock outs of commodities, uncertain drug quality, and a general lack of confidence. This lack of confidence further undermines the system as programs see no alternative other than to manage their own individual supply chains. This fragmentation adds to the burden on the national system in the form of unnecessary, duplicative costs, lack of visibility, misallocation of resources, misalignment of supply and demand and general underperformance.

To address these issues, in 2010, the MoHSW initiated a supply chain planning effort. It was intended that the output from this exercise would be a public health supply chain strategy that would serve to guide the development of an efficient and effective system over a five 5 year period. To support this effort, the MoHSW convened a supply chain design team comprised of MoHSW program and policy representatives as well as Liberian and international supply chain experts. The work would be closely integrated with a related supply chain assessment and planning effort funded by The Global Fund to Fight aids, Tuberculosis and Malaria to satisfy conditions precedent in their Round 8 GFATM grant. The work was also to draw upon the inputs of clinical, program and technical experts from among County Health Teams, health facilities, clinicians, patients, and public and private sector institutions with knowledge of the health sector in Liberia.

> ***"We are committed to a reformed supply chain system in Liberia, a single system that is efficient, effective, and that makes possible clear communication across stakeholders. Further, the system must make essential and life-saving commodities available on-time and everywhere."***
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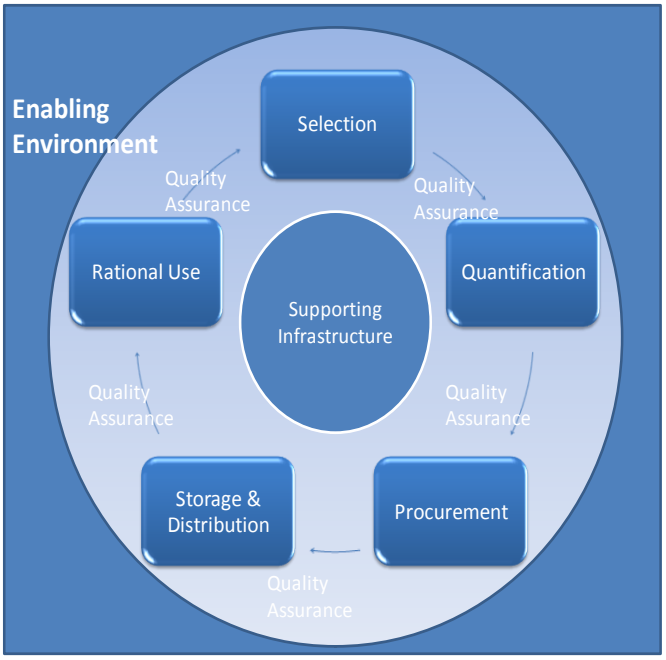
> Comments by Dr. Bernice Dahn, Deputy Health Minister and Chief Medical Officer for the MoHSW. Comments were made at the opening plenary of n MoHSW health commodity supply chain strategy workshop held in Monrovia, Liberia, May 27 and 28, 2010

To facilitate the development of the supply chain strategy, the MoHSW team applied a framework for organizing deliberations and supply chain design elements:

The SCMS Analysis & Planning Tool[4]



Enabling Environment - Policies, legal frameworks, political, economic, and social dynamics that influence the supply chain

Selection – Activities related to the review of health challenges and treatments and decisions concerning appropriate proscribing of drugs and dosage forms

Quantification – Activities related to the estimation of the quantities of drugs needed

Procurement – Activities related to the acquisition of supplies through purchase, donation or manufacture

Storage & Distribution – Activities related to the holding and movement of materials

Rational Use – Activities that encourage the dispensing of medications appropriate to clinical needs, in doses that meet patient requirements

Supporting Infrastructure – Systems that support supply chain management (e.g. information management, organizations, performance management systems)

Quality Assurance –Activities intended to ensure that products meet quality specifications

The SCMS Analysis and Planning Tool (APT) is a reference model for describing the components of supply chain management. These components should not be considered as distinct, but rather, as facets of a single supply chain organism. Supply chain excellence requires that each of these components work in concert. For example, decisions in the realm of product selection must inform decisions concerning distribution modes, frequency of delivery and storage specification. Similarly, rational use of pharmaceuticals is a critical determining factor for accurate quantification which, in turn, provides data necessary to plan for procurement. The relationships among each of components are vast and thus any supply chain strategy must consider these interactions and the associated trade-offs that exist among supply chain design alternatives.

This document represents the output of the MoHSW supply chain planning effort. In the chapters that follow, this strategy is articulated using the APT as a framework. The first section describes the supply chain enabling environment. The second section describes each of the supply chain component areas. The third section addresses recommended supporting infrastructure elements including a supply chain organization design. The strategy concludes with summary comments and anticipated next steps in the development of the Liberia Public Health Commodity Supply Chain –2015

[4] The Analysis and Planning Tool (APT) is a process reference model developed by the USAID Supply Chain Management System Project. The APT enables users to address, improve, and communicate supply chain management practices within and between parties involved in an extended enterprise. The APT was used in the development of the Liberia Supply Chain Master Plan Strategy 2020

Enabling Environment

The enabling environment for the Liberia Supply Chain involves elements of the policy and legal framework as well as the economic and social dynamics that influence the supply chain. The following section describes these dimensions. Where appropriate, strategies for mitigating risk are recommended or described where already in process. In other instances, the ability to mitigate may be limited but the dynamics described are pertinent to the consideration of supply chain design.[5] (Need to include Lisa's product selection section, Barry's process flow and planning assumptions section)

Policy & Legal Framework

Product Quality

The quality of pharmaceuticals is a global concern, and the lack of reliable drug quality assurance systems often contributes to the devastation of diseases. Poor quality medicines do not meet official standards for strength, quality, purity, packaging, and/or labeling. They may be legally registered innovator or generic products, or they could be counterfeits—deliberately mislabeled for identity, strength, or source. Whether counterfeit or unintentionally substandard, poor quality drugs result in serious health implications including treatment failure, adverse effects, increased morbidity, mortality, development of drug resistance, and wasted resources.

The Government of Liberia is committed to ensuring the quality, safety, and efficacy of medicines and health products. Under current law, the monitoring of drug quality falls to the National Pharmacy Board headed by the Chief Pharmacist within the MoHSW. The National Pharmacy Board mandate is limited however and thus enforcement of quality standards is not currently sufficient.

Liberia Medicines and Health Products Regulatory Act is intended…

- …to protect the Liberia the Liberian public from the harmful effects of substandard and counterfeit medicines and health products
- …to ensure fair trade practices in medicines and health products
- …to promulgate regulations to fight illegal trade in medicines including counterfeit and adulterated medicines and health products
- …to conduct or facilitate necessary research and development, promote Pharmacovigilence and disseminate timely drug information

The National Pharmacy Board has established the Liberia Medicines Regulatory Commission (LMRC). LMRC was set up to draft legislation, the Liberia Medicines and Health Products Regulatory Act (LMHRA). The LMRHA creates an authority responsible for conducting registration of all medicines and health care products and to

[5] In a presentation at the Supply Chain Strategy Workshop, Tornilavah Varpilah, Deputy Minister of Health for Planning & Performance described government plans for capital improvements over the next 10 years. The elements described by Minister Varpala became planning assumptions for the Supply Chain Design Team and are also reflected in the Supply Chain Enabling Environment narrative in this section.

ensure quality of medicines in Liberia, the Liberia Medicines and Health Products Regulatory Authority (LMRA).[6] Upon enactment of the law, the LMRA will be responsible for ensuring that all drugs entering Liberia meet quality standards.

For the Private sector, a Bureau Veritas[7], pre-shipment inspection will be enforced at the source of goods to ensure that only those goods that are registered and that have the necessary certificates to confirm quality are loaded for shipment. For the public sector, only goods registered on a pre-approved drugs and/or donations list should be loaded for shipment.

Customs Regulation

Closely related to product quality and the role of the LMRA is the customs regulatory system. Currently, there are no formal regulations governing the import, export and transit of medicines and health products and thus no legal means for the Government of Liberia to stem the importation of counterfeit commodities. The current draft of the LMRC legislation addresses this gap by conveying licensing authority to the LMRA. Specifically, the draft legislation states:

> *"No person/organization shall import, export, or transit into or out of the Republic of Liberia any medicine or health product, unless the product is duly registered by the LMRA, and the person/organization has been issued a license or permit by the Authority for the same… the conditions of issuance of a license or permit for the import, export, or transit of medicines or health products shall be stipulated in regulations promulgated by the Authority that shall provide for the issuance, renewal, suspension, cancellation and revocation of such licenses or permits"*

The passage of the LMRHA will have important implications for supply chain performance and health quality for citizens of Liberia. Once enacted, the legislation will require the LMRA to form a close collaboration with the Department of Customs and Excise to ensure that the Act is implemented and enforced through the confiscation and destruction of unregistered product prior to illegal entry.

Decentralization

In December of 2008, The MoHSW published guidelines for national decentralization of the health care system. The intent of this guidance was to deconcentrate management support systems in order that the national government could be relieved of a variety of repetitive tasks and functions which could otherwise be more effectively accomplished at the local level where those tasks and functions also reside. The stated desire of the MoHSW decentralization guidelines was to free the national government to more fully execute its policy-making, strategic planning, resource mobilization, monitoring and coordination duties. The guidelines were not intended to be viewed as rigid doctrine, but rather, as flexible principles to be taken into consideration along with other drivers of cost, efficiency and effectiveness.

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[6] As of July 9, 2010, legislation to enact LMRHA and create the LMRA is pending in the Liberia legislature

[7] Bureau Veritas Certification is a broadly accepted body for certification and accreditation. Relying on a global network of 5,700 auditors, Bureau Veritas Certification is recognized by international accreditation bodies for its standards certification and auditing services in the fields of quality, health and safety.

The MoHSW is well-versed in the potential benefits, in terms of cost, efficiency and effectiveness, of an integrated supply chain. Its supply chain strategic planning effort considered these potential benefits. However, the effort also took seriously the intent embedded in the MoHSW decentralization guidelines. As a result, the supply chain strategy calls for the integration of supply chain management functions where potential and justifiable cost, effectiveness and efficiency benefits exist and the deconcentration of such functions where benefits do not exist or are negligible. It is understood that county health teams, facilities, and patients are the ultimate customers of supply chain management services. The MoHSW's vision to place budgetary allocation responsibility in the hands of county health teams in the years to come aligns with this understanding insofar as resource allocation decisions in commodity selection and procurement reside with these consumers pursuant to this vision. The Supply Chain Strategy aims to accommodate each of these considerations. That is, it aims to maximize cost, efficiency and effectiveness while empowering counties, facilities and patients to exercise their rights as customers of the supply chain. This matter is further addressed in the "*Organizations, Roles and Responsibilities"* section of this document.

Health Care Financing Policy

Liberia currently offers health care free-of-charge to citizens with essential medications supplied and funded primarily by donor partners. The Supply Chain Strategy contemplates that this condition is likely to change over the long-term; it recognizes that health care services may be available to patients free-of-charge, but that the services themselves are not free - that players at all levels of the supply chain must work to ensure cost containment, to minimize system inefficiencies including product wastage, and to be prepared for the advancement of the Liberia Health System from donor-dependency to sustainability. The Strategy also proposes a system for transparency of data, including for example, a monitoring system, as part of the ordering process itself, to improve awareness of costs and trade-offs and to support the continued advancement of the Liberian System to one of greater sustainability. In addition, the MoHSW is developing a health financing strategy which will guide decisions about future revenue sources and thus must be considered as The Supply Chain Strategy is implemented.

Waste Management

Limited infrastructure for the proper disposal of medical waste, including counterfeit or expired drugs, continues to create undue burden on the Liberia Health Commodities Supply Chain. The 2009 *Assessment of Medical Supplies and Medical Waste Management Report* developed by the MoHSW and the International Development Association provided an important body of knowledge as well as a framework for the development and implementation of a comprehensive medical waste management plan. The success of The Supply Chain Strategy will be hastened by the continued development and implementation of this plan including a prioritization of strategic objectives, establishment of implementation milestones and timelines, and identification of implementing resources. Key elements of a waste management plan that will have important implications for supply chain improvement include:

- Creation of a national joint pharmaceutical and health care waste management committee of stakeholders comprised of MoHSW, the Environmental Protection Agency and the National Drug Service**.[Pharmacy Division,SCU,EPS & NDS]**

- Implementation of a national health care waste management policy that establishes the legal basis for an agency responsible for the disposal of pharmaceutical waste. Policy should also establish guidelines for waste minimization, separation, identification, handling, treatment, and final disposal.

- Identification of funding resources and establishment of partnerships necessary to enable sustainability of the waste management plan.

- Establishment of tools and standards for training, supervision, and reporting of waste management activities at all levels of the health commodity supply chain.

Public Procurement

In 2006, Liberia passed the Public Procurement and Concessions Act. This Act guides all public procurement and is aimed at ensuring best value for public expenditures, promoting fair and open competition, and ensuring transparency in procurement processes used and awards made.

In the context of the Liberia Public Health Supply Chain, the Act provides the regulatory framework for procurement undertaken on behalf of the MOHSW. The Act defines required processes and structures for public sector procurement. These include a procurement committee, which provides oversight, a procurement unit, which undertakes procurement, and a bid evaluation panel, which reviews bids and makes award recommendations. The Act also outlines accepted methods of procurement (e.g. open-competitive bidding, restricted bidding, sole source) as well as thresholds for each. It also provides guidance concerning requests for quotes (RFQs), requests for proposals (RFPs), bid documents, evaluation of bids, negotiation and contract awards. Finally, the Act created the Public Procurement and Concessions Commission (PPCC) to enforce the requirements laid out in the law. NDS, or any institution engaged in public procurement, must comply with the Act.

Economic and Social Dynamics

Health System

The Liberia Health System is **advantaged** by a pragmatic and visionary central leadership and a strong professional pharmacist sector. The National Health Plan anticipates increased numbers of health care workers with improved skill levels. The National Health Plan also calls for the renovation or new construction of health facilities to increase their number from the current 350 to 550. These plans provide a set of assumptions that informed the development of the Supply Chain Strategy.

In Liberia, health facilities are distinguished by size, treatment area, medical resource range, health commodity range and service area variation. The *health clinic* is a small facility with no more than five beds, providing basic preventive and curative care. The health service package at this level includes promotional health, basic mental health services and the management of common conditions in children and adults. These facilities can also support environmental health (water and sanitation) in the surrounding community. The *health center* is a primary care and referral facility with up to 40 beds, providing range of curative and preventive services, supported by a small laboratory. Basic emergency and inpatient care is included. The *county referral hospital* has more than 50 beds and permanent capacity to manage common surgical conditions, including basic intensive care. Both health centers and country referral hospitals are equipped with adequate power, communication equipment and ambulatory services. Finally, the highest level of the Liberian Health Facility System is comprised of the *regional referral hospitals* and the *John Fitzgerald Kennedy Medical Center* (JFK-MC). The regional referral hospitals are administered by County Health Teams[8] and JFK-MC is an autonomous, private hospital managed by a hospital administration department under the supervision of a board of directors.

Operating procedures and standards associated with each of these facility types have strong influence on the public health supply chain. For example, the extent to which facilities implement and comply with national standards and policies for the rational use of medicines, the essential medicines list and standard treatment guidelines have profound impact on the effectiveness and efficiency of the supply chain. Without strict adherence, the range of health commodities in use at a Health Facility can quickly expand in a way drives up cost via the limitation of economies of scale in procurement at the front end of the supply chain management system and via the complication of storage, distribution and information management functions. As such, MoHSW must be vigilant in the review and revision policies and in the implementation of same as the benefits of such diligence, in terms of advancing efficient and effective supply chain management, is profound.

Transportation Infrastructure

An important determining factor for efficient and effective distribution of health commodities is transportation infrastructure. Currently, Liberia is engaged in a systematic rehabilitation of its transportation infrastructure which can be expected to increase access to goods and services by rural populations, reduce transit times between destinations, and encourage increased trade and access to markets. These developments afford the Liberia Health Commodity Supply Chain with an opportunity to evolve toward a demand-driven, customer-focused business model catering to the specific needs of individual health facilities and patients. These developments were an important consideration in the formulation of The Supply Chain Strategy.
What is the Supply Chain Master Plan putting forward as recommendation for improved transport system in answering the question product distribution and collection of reports to the central SCU.

[8] National Health Policy, Ministry of Health and Social Welfare, Monrovia, Liberia, 2007

Information & Communication Technology (ICT)

A vital element present in high-performing supply chain systems is a high-performing system of communication. Communication in all forms (person-to-person, person-to-computer, computer-to-computer) allows for evidence-based decision-making, planning, coordination, oversight and performance improvement throughout the supply chain. Accurate data, exchanged at speeds commensurate with the requirements of any supply chain management activity or process, is at the core of supply chain excellence.

The information and communication technology (ICT) infrastructure in Liberia has shown significant improvement in recent years. In particular, the utilization of mobile phone technology is well-embedded nationwide and the subsequent roll-out of data communication functionality using that same infrastructure is promising. At the present time, all counties have some level of access to mobile network data communication technology which permits internet access and email communication if even on an intermittent basis. Mindful of these developments, service providers are actively investing ahead of the market and thus the costs associated with establishing connectivity can be expected to decrease leading to further expansion into increasingly remote geographies. In the coming years, the area of Management Information Systems (TMIS, LMIS and HMIS) can be expected to develop alongside this trend toward technology proliferation.

Given the current state of ICT in Liberia coupled with the Liberian Government's commitment to prioritizing ICT investment over the next ten years[9], ICT represents an excellent opportunity for enabling improved supply chain management. This dynamic is an integral part of the Supply Chain Strategy. Innovative methods for exchanging data sets of reasonable size using appropriate technology (e.g. forms attached to emails or direct access to web-based central systems and database systems) have been contemplated as part of this strategy.

Energy

Access to inexpensive, uninterrupted sources of energy has profound relevance to an effective and efficient health supply chain. Ready access to inexpensive fuel is required of any distribution system. Power is a necessary ingredient for any sustainable storage solution. And dependable electricity is the life-blood of any supply chain system that aspires to provide real-time data for decision making in support of supply chain management activities.

Mindful of the country's abundance of water, wind, sunshine, and biomass and the potential of these for producing clean and renewable power, the Government of Liberia has prioritized the development of new-technology energy sources as means to limit the country's dependency on traditional power sources. The Government's Comprehensive Energy Policy also encourages the development of clean, sustainable energy technology. This work is already beginning to bear fruit. In 2009, the Liberian Energy Assistance Program (LEAP) completed a program to install solar-powered streetlights at schools, clinics, and public institutions. The Liberia Energy Sector

[9] Liberia has developed an ICT strategy that contemplates that information and communication technology will continue to proliferate allowing for increased connectivity between central level supply chain organizations and local health facilities.

Support Program (LESSP) is currently examining cost-effective approaches to power generation including hydro power, wind energy and biomass. And, the reconstruction of the long-disabled Liberia power grid power is now underway. These measures, combined with the Government's forward-thinking approach to the development of sustainable energy sources will only serve to enhance the enabling environment within which the Health Supply Chain strategy will be implemented.

Water and Sanitation

Access to clean water and sanitation services are critical pre-conditions for human health. To the extent that Liberia water and sanitation services are not adequate, the MoHSW vision for improving access to high quality health care services cannot be realized. Though supply chain management activities have limited influence over this dimension of the supply chain enabling environment, contaminated water and the lack of access to sanitation do weaken the impacts on patient health of improved supply chain management practices. While current water and sanitation challenges in Liberia are not likely to improve drastically in the near term, the Government of Liberia has developed a plan to improve services over the next ten years. Specifically, plans are in place to: 1) rehabilitate reservoirs and piped water systems in heavily populated areas; 2) rebuild technical and managerial capacity of local utilities to manage water systems through arrangements with private sector entities; 3) introduce pilot systems (such as underground cisterns for rainwater) to expand access to clean water; and 4) increase proper sanitation and hygiene through the promotion of hand washing, the construction of hand washing stations and investment in human waste disposal. Over time, these measures will multiply the public health benefits of improved supply chain management

Private Sector

The private sector has a key role to play in the development of Liberia's health commodity supply chain. For example, the country has recently launched a public-private partnership program aimed, in part, at identifying existing models and fostering new models of "sustainable and responsible business practices". As part of this program, private companies investing in Liberia are also investing in health care services in the communities where they operate. Over time, the integration of such private sector efforts into the broader Liberia Health Supply Chain has potential to benefit the system in terms of increased price negotiating power, improved allocation of resources, and reduced burden on the public system. Private sector institutions, in turn, could derive cost savings as well as health care quality improvement for employees by adapting resources, infrastructure and best practices from the public health system where appropriate. Other opportunities for private sector participation in the supply chain include the potential for privatization of supply chain components. The most logical, immediate candidate for potential privatization is in product distribution especially from the county to health facility level.

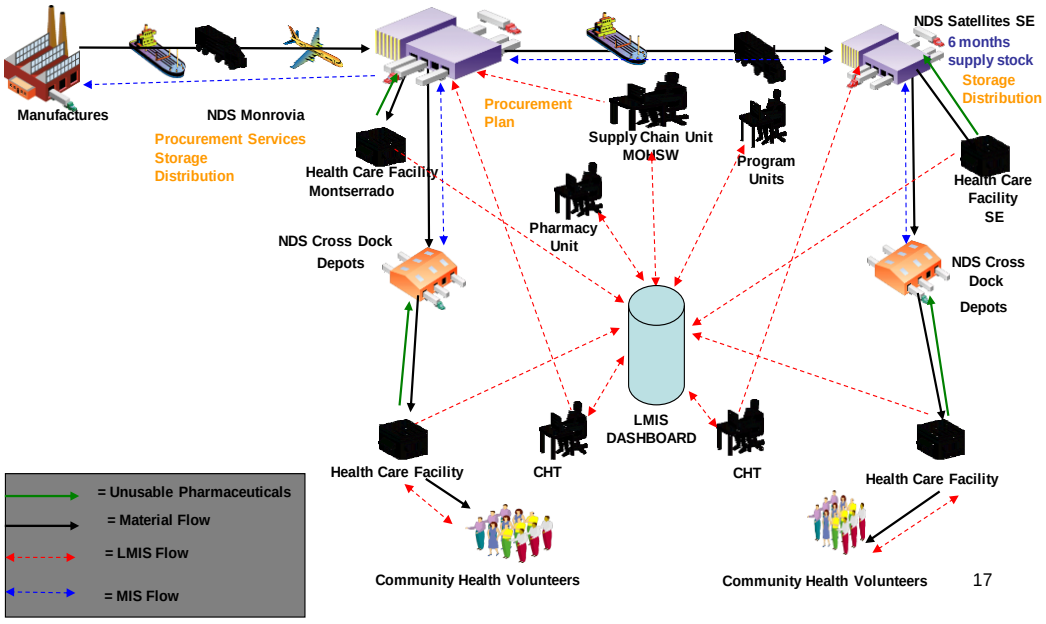
Supporting Infrastructure

Supply chain supporting infrastructure is made up of people, processes, and technologies. Decisions concerning how these people, processes and technologies are organized can enable efficient and effective supply chain management. These decisions can also impair supply chain performance if they are out of alignment. The following section describes elements of the supply chain supporting infrastructure recommended in this strategy including: 1) description of organizations, roles and alignment; 2) the role of information management; and 3) tools for monitoring and improving supply chain performance.

Organizations, Roles & Alignment

The success of the Liberian Public Health Supply Chain requires smooth interaction among multiple organizations to meet the MoHSW vision for improving access to health treatment. Each organization has a role in the operation of an efficient and effective supply chain system. These roles---ranging from setting and implementing policies that guide rational use of medicines, to storing and distributing health commodities, to providing visibility at all levels of the supply chain---are interdependent and contribute to the achievement of the singular goal of improving access to quality medicines and supplies.

The Liberia Health Commodity Supply Chain, 2015



The preceding graphic provides a view of the design of the Liberia Supply Chain Master Plan 2015.Key participants include: 1) The MoHSW; 2) Supply Chain Management Unit (SCMU)

within the MoHSW; 3) the Program Units; 4) the Pharmacy Division/Unit; 5) the LMRA; 6) County Health Teams (CHTs); 7) the National Drug Service (NDS); and 8) Health Facilities.

Ministry of Health and Social Welfare (MOHSW)

The MOHSW is ultimately accountable for ensuring that Liberians have access to quality health and social welfare services. An effective public health supply chain is essential for MoHSW to meet its mandate. Key to building an effective and sustainable supply chain system is recognition of and investments in the human resources and the necessary management structures required to effectively and efficiently manage these systems. Within the MOHSW, there are a number of programs and departments that undertake specific roles within the supply chain, all under the guidance of a newly established Supply Chain Management Unit (SCMU).

Supply Chain Management Unit

The SCMU is the management structure responsible for overseeing all supply chain activities within the Liberian Public Health Supply Chain. The SCMU strives to maximize customer service based on the resources available by facilitating seamless linkages between organizations and functions within the supply chain. SCMU functions include increasing the visibility of data up and down the system, facilitating greater coordination between stakeholders and ensuring alignment of demand with supply by via data-based quantifications and the development of unified procurement plans. As a focal point for coordination, the SCMU is involved in virtually all supply chain activities and system strengthening interventions. It serves as the primary mechanism for institutionalizing good supply chain management practices and linking logistics activities throughout the supply chain.

Given the critical role the supply chain plays in ensuring that the MOHSW meets it mandate, the SCMU should report directly to the Deputy Minister/Chief Medical Officer.

The SCU staff[SC officer administrator,Database Officer] & other needs will have be well defined / addressesed by the SCMP.TORs for these staff need be taken into consideration.

Liberia Public Health Supply Chain Roles and Responsibilities
SCMU

Role	Responsibilities
Oversee and monitor the supply chain	• Developing service level agreements with the National Drug Service (NDS) and monitoring NDS' performance against those SLAs • Coordinating with the M&E Unit on indicators to monitor the performance of the supply chain • Conducting facility level monitoring visits • Reviewing LMIS data including consumption and stock balance trends and initiating action to address stock imbalances • Reviewing NDS MIS data and sharing critical information, such as central level stock outs with programs, county health teams (CHT) and facilities
Manage the LMIS	• Revising and updating the standard operating procedures (SOPs) for the LMIS to reflect evolving technology, roles and responsibilities • Ensuring that people understand their respective responsibilities related to the LMIS and that they have the required skills/tools to fulfill their roles (training, job aids) • Ensuring that LMIS forms are regularly updated and that there are sufficient forms available at all levels for record keeping and reporting

	• Exploring and implementing options for automating the LMIS at appropriate levels of the system • Maintaining the automated LMIS, expanding and upgrading it as appropriate • Following up with county health teams, NDS delivery staff and facilities to ensure timely reporting • Reviewing CHT approved facility orders including order calculations and any adjustments • Monitoring data quality through data quality audits and supervision • Providing regular reports to stakeholders including MOHSW leadership and program units, county health teams, health facilities and donors. Reports can be printed or provided through web access.
Oversee national level forecasting and quantification	• Developing and implementing SOPs for forecasting and quantification • Ensuring that each program unit and the pharmacy department follow the procedures • Facilitating access to the required data from the LMIS, NDS MIS, and HMIS • Initiating annual forecasting and quantification exercise with the program units/pharmacy department and ensuring forecasts are submitted when scheduled • Reviewing forecasts and harmonizing across program areas (e.g. aligning common products across programs to national requirements) • Conducting regular reviews and updates of quantifications with program units/pharmacy department • Providing required forecast information for proposals, PSM plans, donor plans (e.g. malaria operating plans)
Undertake health commodity procurement planning and monitoring	• Determining resources available for commodity requirements and any potential gaps. Alerting MOHSW leadership to gaps so they can advocate for and mobilize additional resources • Developing a unified procurement plan that: includes Government of Liberia (GoL) and donor commitments, current and planned orders, and estimates of supplier lead times • Providing NDS, who services as a procurement agent, the procurement plan so it can procure on behalf of the MOHSW • Monitoring the procurement plan and adjusting based on changes in resources, consumption, in-country stock levels, delays in tendering or shipments, etc. • Participating on the tender board
Promote coordination and collaboration	• Leading coordination mechanisms, e.g. Supply Chain Technical Working Group • Facilitating regular coordination meetings between stakeholders including MOHSW programs/departments, NDS, CHTs, NGOs, implementing partners and donors • Sharing system performance updates with stakeholders • Providing regular reports to stakeholders • Identifying, prioritizing and requesting resources for system strengthening

The SCMU will require significant and sustained investment in order to fulfill its designated logistics responsibilities. As supply chain management responsibilities shift from individual programs to a central SCMU, the supply chain management resources currently **housed within the programs will move to the SCMU**. The SCMU, once established with dedicated, full-time staff, will have a lasting impact on the supply chain, resulting in significantly improved product availability and overall logistics system performance.

There is a need to insert the SCU Organogram to clearly distinct the its activities and reporting pattern the CMO Office as oppose to the Pharmacy division.

Program Units (FHD, NACP, NLTCP, NMCP, EPI & EDPL)

With the establishment of the SCMU, the logistics related roles of the individual programs will shift but they will still play a critical role in the supply chain. By defining the policies and selecting the products, programs ensure that effective medicines are used appropriately. Programs are also in the best position to identify and investigate discrepancies between morbidity, service and logistics data and identifying and highlighting the supply chain

implications of program activities, i.e. BCC campaigns, introduction of new diagnostic tools. The programs will work closely with the SCMU to ensure that products critical to their programs are available when and where needed. Specific program responsibilities related to the supply chain include:

Liberia Public Health Supply Chain Roles and Responsibilities
Program Units

Role	Responsibilities
Establish and update policies based on evidenced-based, best practices tailored to the Liberian context	• Reviewing standard treatment guidelines (STGs) • Reviewing product selection and specifications
Forecast and quantify annual program requirements following established SOPs	• Providing forecasts to the SCMU by agreed to deadline • Conducting regular reviews and updates of quantifications with the SCMU in collaboration with the SCMU • Participating in supply chain coordinating mechanisms and meetings as appropriate
Mobilize resources from the Government of Liberia, program partners and donors	• Ensuring and reporting progress against program performance indicators • Communicating program needs • Maintaining existing and developing new partnerships • Providing required reports to donors and other stakeholders
Ensure appropriate supply of commodities to programs	• Monitoring consumption and stock balances using LMIS and HMIS reports/data • Monitoring services for compliance with STGs • Identifying and addressing discrepancies among data sources • Identifying supply chain implications of program activities and policy changes
Promote rational drug use	• Monitoring adherence to STGs • Working with CHTs to identify and mitigate risks

Pharmacy Department

The Pharmacy Department has two critical functions in an effective supply chain system: 1) it serves as the essential medicines program unit with responsibilities similar to the other MOHSW program units; and 2) it sets and oversees national pharmaceutical policy. Both these functions are required to support an effective supply system. Pharmaceutical policies such as essential medicine lists, national formularies, and standard treatment guidelines promote rational use of medicines and efficient use of limited resources. They serve as the foundation upon which an effective and efficient supply chain is built. The pharmacy department works closely with the SCMU and programs to support appropriate pharmaceutical management throughout the supply chain and through its oversight of county pharmacists ensure that policies are implemented at the county and facility level. Specific responsibilities of the pharmacy department include:

Liberia Public Health Supply Chain Roles and Responsibilities
Pharmacy Department

Role	Responsibilities
Establish and update pharmaceutical policies based on evidenced-based, best practices tailored to the Liberian context.	• Establishing and regularly updating Essential Medicines List • Establishing and regularly updating National Formulary • Establishing and regularly updating standard treatment guidelines (STGs) • Establishing and regularly updating pharmaceutical donation guidelines • Engaging with programs, clinicians, and implementing partners to gather input to

	policy development • Participating in supply chain coordinating mechanisms and meetings as appropriate
Oversee implementation of pharmaceutical policies	• Publish and distribute policy revisions • Communicate policy revisions to county pharmacists and program officers
Strengthen pharmacy capabilities	• Ensuring that county pharmacists have access to the tools an training required to fulfill their roles • Monitoring the performance of county pharmacists • Identifying interventions to support improved performance of county pharmacists
Promote rational drug use	• Monitoring adherence to STGs • Working with programs and CHTs to identify and mitigate risks

Liberia Medicines and Health Products Regulatory Authority (LMRA)

The LMRHA creates an authority responsible for conducting registration of all medicines and health care products and to ensure quality of medicines in Liberia, the Liberia Medicines and Health Products Regulatory Authority (LMRA).[10] Upon enactment of the law, the LMRA will be responsible for ensuring that all drugs entering Liberia will be of the quality standard according to the Essential Drugs list.

Liberia Public Health Supply Chain Roles and Responsibilities
LMRA

Role	Responsibilities
Implement the Liberia Medicines and Health Product Regulatory Act	• Conducting registration of medicines and health products • Issuing licenses or permits for premises and personnel to engage in the manufacture, import, export, transit into or out of the Republic of Liberia, supply, storage, distribution, or sale of medicines and health products, excluding retail pharmaceutical outlets • Suspending, canceling, or revoking licenses or permits in accordance with regulations • Establishing an inspectorate and conduct inspections of premises where medicines or health products are manufactured, stored, distributed, supplied and sold • Confiscating expired, substandard, counterfeit, or unregistered medicines in accordance with regulations • Establishing and operating quality control laboratories to ensure safe, effective, and good quality medicines and health products for domestic and foreign markets • Conducting post-marketing surveillance of medicines and health product; • Conducting pharmacovigilence of medicines and health products • Issuing warnings and conduct recalls of products in accordance with regulations • Regulating the conduct of clinical studies of medicines and health products • Preparing, keeping, and updating a registry of medicines and health products registered and approved for marketing in the Republic of Liberia • Setting standards of quality, safety, and efficacy of medicines and health products • Promulgating regulations as necessary to meet its responsibilities including regulations providing for administrative hearings necessary for effective enforcement • Regulating advertising and promotion of medicines and health products • Receiving and investigating complaints regarding alleged violations of the Act or any regulations promulgated by the Authority, and impose appropriate sanctions in accordance with regulations • Establish and collect charges or fees for services rendered by the Authority
Educate the public	• Developing and disseminate guidelines, procedures, guidance and other materials necessary for effective implementation of the functions of the Authority • Providing current and unbiased information on medicines and health products to health care professionals and the general public

[10] As of July 9, 2010, legislation to enact LMRHA and create the LMRA is pending in the Liberia legislature

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County Health Teams

Liberia is in the process of decentralizing its health system and devolving greater responsibility and resources to the county health teams. Upon completion of this process, the MoHSW will allocate an annual budget to CHTs and the CHTs will be responsible for ensuring that their citizens have access to quality, affordable health services.

Having an effective supply system that guarantees the availability of essential medicines is critical to fulfilling the CHT's mandate. By controlling health resources, the CHT is a primary customer of NDS. NDS' chain of custody for health commodities ends at the health facility and the county, through its health facilities, assumes responsibility for their appropriate management and use. Within the CHT, the County Health Officer (CHO) and the County Pharmacist both play critical roles in the supply system. Their specific responsibilities in the supply chain include:

Liberia Public Health Supply Chain Roles and Responsibilities
County Health Officer

Role	Responsibilities
Oversee medical services within the county	• Supervising health facility officers in charge (OICs) • Ensuring that OICs understand their roles and have the skills required to undertake their responsibilities (through training and job aids) • Overseeing county health budget and user fees (if implemented) • Approving requisitions and orders in the absence of the County Pharmacist
Promote rational drug use	• Ensuring that treatment policies are followed • Ensuring that changes in policy are disseminated

Liberia Public Health Supply Chain Roles and Responsibilities
County Pharmacist

Role	Responsibilities
Oversee pharmaceutical management within the county	• Supervising health facility pharmacists and dispensers • Ensuring that health facility pharmacists and dispensers understand their roles and have the skills required to undertake their responsibilities (through training and job aids) • Communicating policy revisions to health facility pharmacists and dispensers
Ensure product availability	• Developing county specific service level agreements with NDS • Monitoring NDS' performance against SLAs • Reviewing facility level stock balance reporting and requisition forms • Calculating order quantities (if not calculated automatically) • Approving requisitions and orders • Monitoring consumption trends and stock levels • Initiating action to address stock imbalances (e.g. transfer stock or place emergency orders)

National Drug Service (NDS)

Over and over again, as demonstrated both in the public and commercial sectors, supply chain performance is greatly enhanced through the integration of like functions. For example, pooling of commodity procurement enhances negotiating power and can help ensure that products entering the system can be of highest quality and lowest cost and that specialization around the procurement of unique commodities can occur. Similarly, implementation of standard warehouse management processes provides significant potential for reducing product expiry and loss and reducing training and infrastructure costs. It was the understanding of this principle, in part, that has driven the MoHSW's calls for the development of "One" Public Health Commodity Supply Chain System for Liberia.

> ***"Customer service is a series of activities designed to enhance the level of customer satisfaction – that is, the feeling that a product or service has met the customer expectation."***
>
> James L. Scott, 2002

The Liberia Supply Chain Master Plan contemplates that a reformed NDS will fulfill the role of an independent, integrated Logistical Service Provider (LSP). In this role, NDS will provide procurement as well as end-to-end, warehousing and distribution services. In order to meet this requirement effectively, however, NDS will need to invest, staff-up, and evolve to become the performance-driven, customer service-oriented organization the system requires.

To encourage this evolution, it is proposed that expectations of performance among all partners in the distribution channel, including NDS and its customers, be articulated and monitored through service level agreements. Through the service level agreement, for example, the MoHSW can be assured that NDS operates in a manner consistent with its vision, the SCMU can be assured that NDS procurement activities meet expectations outlined in the SCMU procurement plan, and County Health Teams, Facilities and patients can have an instrument for ensuring that they receive the right products at the right time.

In addition, it is proposed that NDS be governed by a legislatively-recognized and autonomous board of directors comprised of stakeholders with appropriate understanding, constituency and access to the expertise required to build and guide the new NDS.

Liberia Public Health Supply Chain Roles and Responsibilities
NDS

Role	Responsibilities
Meet and exceed customer expectations	• Maintaining and regular publishing of product price list • Managing billing and payments • Engaging customers to understand their needs and adapting accordingly • Understanding customer data requirements including the types and frequency required and providing reports to meet these requirements • Developing, maintaining and adhering to Service Level Agreements with customers
Provide procurement services	• Maintaining supplier relationships • Managing the tender process • Providing in-transit shipment tracking
Provide importation and clearance services	• Preparing permit applications • Managing importation • Maintaining relationships with Customs and Excise authorities

	• Managing freight forwarder contracts
Provide physical warehousing services	• Receiving commodities • Managing inventory • Maintaining and managing warehouses and "cross-dock" transit centers • Maintaining stock counts • Maintaining of batch tracking • Maintaining First Expiry First Out (FEFO) order fulfillment • Managing warehouse information systems • Maintaining and disposing of obsolete inventory
Provide order management services	• Assembling products in warehouse per customer orders (picking and packing) • Dispatching of delivering vehicles
Provide physical distribution services	• Planning of distribution schedules and routes • Contracting for transport, transport maintenance or other services where cost-effective and • Managing reverse logistics

Health Facilities

The ultimate test of the performance of the Liberian Public Health Supply Chain occurs at the health facilities. It is here where health services are provided to the Liberian populace. It is here where the need for health commodities is vital for the adequate rendering of health services. It is also here where public opinion concerning the performance of the Liberian Health Care system is formed.

In addition to the health facilities' important role in managing public demand for health commodities as described in the "*Enabling Environment*" section of this document, health facilities also have a critical role in supply chain management. Every facility has a responsibility to exhibit good storage and inventory management practices of health commodities in their custody. This custody starts immediately upon NDS delivery of commodities and ends only upon the dispensing of commodities to patients.

Health facilities are also accountable for health commodities given over to the custody of community health workers. Typically, each health facility will house a store room under supervision of a store room keeper and a dispensing area under supervision of a lead dispenser. The Supply Chain Strategy contemplates that health commodities be received into the facility store room and that adequate records of receipt are maintained. Health commodities can, in turn, be supplied to the dispensing area or to a community health worker, again supported by adequate registration. Finally records should be kept during dispensing commodities to the patients.

The aforementioned records and registries should be updated promptly updated and have such integrity that these can form the basis for one of the most essential elements of the Liberian Public Health Supply Chain: the Logistic Management Information System (LMIS). The LMIS is the most effective tool for providing the information the SCMS requires to guide the resupply of facilities and to inform overall supply chain management decision-making.

Liberia Public Health Supply Chain Roles and Responsibilities
Health Facilities

Role	Responsibilities
Facilitate adherence to treatment and prescription	• Implementing of updated program policies on rational medicine use

policies	• Adhering to STGs during patient screening • Collaborating with County Health Team to identify issues and risks in treatment and prescription policy adherence
Practice good storage and inventory control of health commodities	• Ensuring availability of dedicated storeroom and dispensing room with appropriate storage conditions. • Effectively utilizing designated storeroom and dispensing room • Operating store in a secured environment and in compliance with standard operating procedures (SOPs) for pharmaceutical storage • Maintaining good inventory record keeping, either manually or electronically
Perform their critical role in ensuring health commodity availability	• Periodically consolidating the manual or electronic records into consumption data for that period • Determining stock status data (initiating resupply to their facility). • Reporting consumption and stock status information in a timely manner using paper LMIS forms or electronic tools as provided • Requesting emergency resupply in near-stock-out situations • Strengthening the public confidence on commodity availability • Discouraging hoarding behavior

Public Procurement and Concession Commission (PPCC)

As discussed in the *"Enabling Environment"* section of this document, The Public Procurement and Concessions Commission (PPCC) is the regulatory body that ensures that procurement processes are conducted in a fair, transparent and non-discriminatory manner. In this capacity, it is contemplated that PPCC would oversee the procurement services provided by NDS on behalf the MOHSW, ensuring that NDS complies with the PPCC Act.

Liberia Public Health Supply Chain Roles and Responsibilities
Public Procurement and Concessions Commission (PPCC)

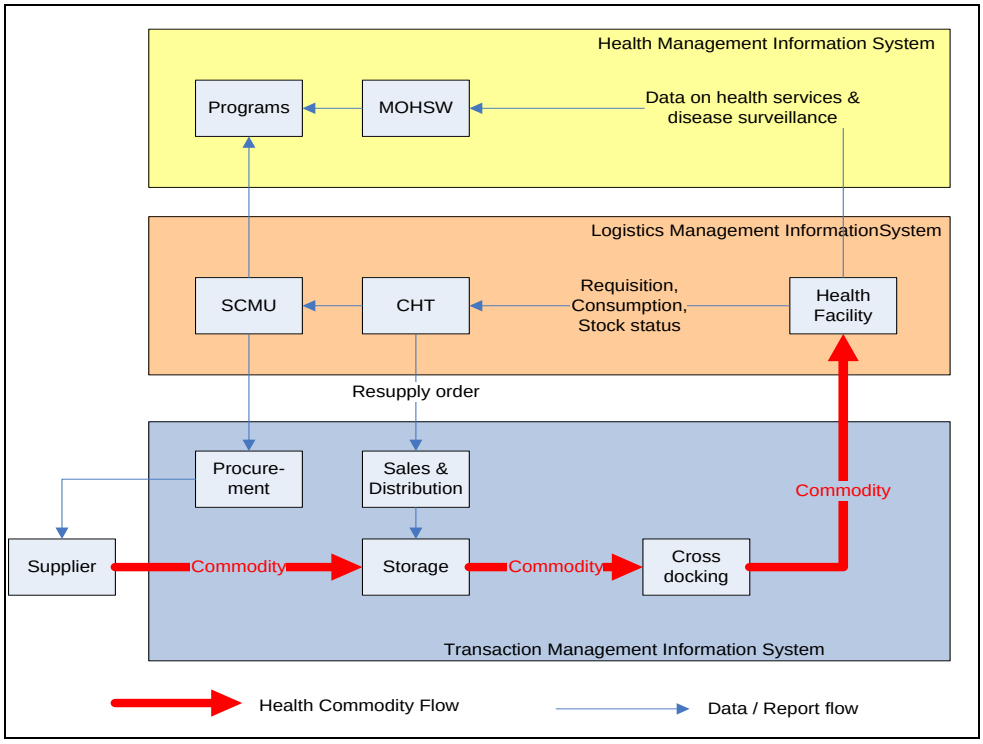
Role	Responsibilities
Ensure NDS compliance with the PPCC Act	• Ensuring that NDS has access to rules, instructions, regulations and related documentation on public procurement • Formulating procurement policy • Preparing standards for procurement forms and processes • Reviewing procurement documents and/or inspecting records as necessary to prevent intentional or unintentional circumvention of the PPCC Act • Developing guidance on the permissibility of waivers to the PPCC ACT • Approving waivers to the PPCC Act where the unique nature of pharmaceutical procurement advises such waivers (e.g. restricted bidding to wholesalers or vendors holding WHO prequalification or equivalent quality certifications

Information Management

The Liberian Health Supply Chain System, like any other supply chain system, will need a functioning data collection and information reporting system to provide essential feedback to the Supply Chain Management Unit (SCMU), and other stakeholders, to enable supply chain planning, supervision, resupply activities, procurement and national need forecasting. Three distinct but interrelated systems are envisioned and are already fully or partly in operation: 1) a Health Information Management System (HMIS); 2) a Logistics Management Information System (LMIS); and 3) a Transaction Management Information System (TMIS). While each of these systems have distinct functionality, The Supply Chain Strategy contemplates that they will

share common data sets in a seamless fashion. The following graphic provides a representation of these systems, how they relate to each other, how they support supply chain entities and functions, and how they facilitate the flow of commodities and data.

Information Management System Interaction



Health Management Information System (HMIS)

The HMIS focuses on the exchange of data to support and enhance health care services provided by the Liberian health care system. The HMIS houses financial information, human resource data, physical asset and equipment data, health care service delivery statistics and surveillance data. The HMIS enables monitoring of compliance to health policies and optimal resource allocation across the levels of care. It also informs policy discussion on issues of equity, efficiency, decentralization and adherence to the Basic Package of Health Services.[11] The HMIS is managed by the Ministry of Health and Social Welfare. The reporting frequency is limited to several occasions per year and starts at health service delivery points (health facilities). Originating from health facilities, data and information flows to the county and central level (SCMU). As the HMIS focuses primarily on health outcomes and treatment data, rather than supply chain logistics information, and is only germaine to the supply chain insofar as it provides data to the LMIS, it is not addressed further in the Supply Chain Strategy.

[11] National Health Policy, Ministry of Health & Social Welfare, Monrovia, Liberia, 2007

Logistics Management Information System (LMIS)

The LMIS focuses on record keeping and collection of supply chain data, such as stock levels at the various storage points in the supply chain and inventory and consumption data at health facilities. The LMIS also enables collected data to be reported to the county level to initiate resupply of health facilities and to the central level, where data processing and reporting takes place. Once aggregated at the central level, this data provides the overall stock status information needed to support effective SCMU supply chain management. The LMIS has similarities with a HMIS but also distinctions. Both are systems to ensure data feedback, however, the LMIS focuses on logistics information only and its reporting frequency is significantly higher. Therefore integration of LMIS and HMIS will not a priority for The Supply Chain Strategy

Conditional to the proper functioning of the NDS TMIS discussed later, a significant portion of stock record keeping in the LMIS will be furnished by the NDS TMIS. Reports periodically generated from the TMIS and inputted to the LMIS will go a long way to providing the information that the SCMU requires to enable supply chain oversight, however, this functionality is limited by the exclusion of inventory and consumption records of health facilities.

Late in 2009, a paper-based LMIS was designed and implemented, but this has not yet yielded the results anticipated. While the fundamental design of this paper-based LMIS is valuable, procedures need to be developed, tools and forms need to be improved, and stakeholder adoption needs to be secured if this system is to serve the information needs of the SCMU.

The strengthened LMIS envisioned in The Supply Chain Strategy will be managed by the SCMU, but will depend on the implementation of revised Standard Treatment Guidelines (STGs) and adherence to the Essential Medicines List (EML). Both policies have a positive influence on reducing administrative burden on health facility personnel as forms can be simplified to meet the reporting requirements of individual health facilities.

The Supply Chain Strategy contemplates the design, development and deployment of a dual (paper and electronic) LMIS system. Building on the current LMIS, data recording and reporting is initiated on forms completed at health facilities then submitted to the county levels and on to the SCMU. This LMIS data is aggregated at each level of the system and channeled up from the facility level to the central level using several paper-based forms:

For daily data recording purposes – daily tally sheets, daily consumption books, bin cards, stock ledgers and internal request forms. Eventually, inventory control at the facility level could be migrated to stand-alone electronic systems where local conditions allow.

For reporting purposes: the stock balance reporting and requisition forms (SBRRs), items damaged or items at risk reports, and eventually others depending on the local context at individual health facilities. These inputs would be inputted to an electronic database system hosted and deployed at SCMU for electronic processing. Health facility data would be captured in a database, initially via manual data entry at the SCMU level until remote access for direct data entry is made available. The electronic database system will allow for improved data

management, automated reporting and the use of electronic dashboards published with restricted access on intranet or internet. Further, the use of queries and filters will allow for the generation of customized supply information without the burden of manual inputting.

Initially the strengthened paper-based LMIS system will be deployed at all health facilities. Paper-based forms require physical transportation from the facility to the county level then aggregated at the SCMU at periodic, agreed to intervals. However if data communication infrastructure is available and the capability (power, computer access, technical skill) exists at the health facilities and county levels exist, LMIS data can be submitted in electronic form or directly into a web-enabled database via internet connection.

Web-enabled, commercial LMIS database systems are not widely available and would depend heavily on the development of a customized software application tailored to the requirements of the Liberian context. Selection of an appropriate database platform and related query and report design functionality is of vital importance as annual licensing fees for such a database platform are not insignificant. This matter must be addressed as part of the LMIS and broader Supply chain Strategy Implementation.

Transaction Management Information System (TMIS)

The Transaction Management Information System (TMIS) facilitates health commodity flow from the central level to health facilities and includes functionality to support procurement management, inventory control, warehouse management, customer service, sales orders and distribution management. It may also include functionality to support finance and budget management.[12] TMIS is distinguished from HMIS and LMIS by its ability to enable the registration of transactions. In principle the TMIS could provide stock status information to the LMIS.

The value of a well-implemented and operationally embedded TMIS system resides in its ability to maintain, continuously update and generate for analysis, the data that is so critical to the efficient and effective functioning of the supply chain. The system maintains pending purchase requisitions, pending purchase orders and contracts including timeframes, inventory positions, stock status, pending distribution activities as well as the historical data related to each of these. Armed with this information, the SCMU can realize vastly increased ability to understand what is happening across the Liberian Health Commodity Supply Chain, and more importantly, take action to intervene.

As discussed in the *"Organizations, Roles and Alignment"* section above, NDS is to provide procurement, storage and distribution services to the Liberian Health Commodity Supply Chain under the supervision of the SCMU. As such, ownership and management of the TMIS will reside with NDS. It should be noted that this end-to-end operational role for NDS provides an important benefit in terms of cost savings and effectiveness of the TMIS in the sense that it simplifies the chain of custody governing the system and thus simplifies the design, development and operation of the TMIS.

[12] TMIS is sometimes referred to as "Transactional System". Depending on the specific functionalities included it may also be referred to as "Inventory Control System", "Warehouse Management System (WMS)" or "Enterprise Resource Planning System (ERP)".

Operating costs of the TMIS will be borne by NDS and funded through fees paid by its customers in exchange for services rendered and negotiated as part of service level agreements. Customers will realize improved service with the existence of an operational TMIS insofar as the TMIS will afford NDS with the ability to provide them with information such as updated stock levels and delivery schedules. Once again, services provided by NDS, including the types and frequency of reports will be established through service level agreements.

The TMIS is envisioned as a fully electronic, centralized database application, hosted at the NDS central office in Monrovia with local accessibility provided through a Local Area Network (LAN). Remote users, such as NDS satellite and cross-dock facilities and the SCMU will be afforded access to TMIS data through fixed data lines or internet-based connections such as terminal services or direct web-based application. In addition, NDS business processes will be adapted to maximize the functionality of the TMIS.

While NDS will manage the selection, implementation and operation of the TMIS, consumers of TMIS information, including the SCMU, Program Units, and CHTs and authorities such as LMRA and PPCC will be consulted to ensure the selection of the most appropriate and most sustainable solution available. The solution will also be adaptable to changes in the supply chain enabling environment. For example, in consideration of potential changes to health care financing in Liberia, the TIMS will be capable of supporting health commodity budget management at the facilities level as this requirement arises.

Features of the NDS TMIS

- Purchase requisition management
- Request for Quotation/Proposal (RFQ/RFP) management
- Purchase order/contract management and supplier performance management
- Goods receipts (quantitative and qualitative, including quarantine and "batch on hold")
- Quality Assurance and Control functionality (Optional)
- Inventory control
- Warehouse management
- Sales order intake, fulfillment and management
- Distribution planning and freight management
- Batch traceability, product recall, and reverse logistics
- Source data entry (e.g. goods receipts staff at the NDS will enter receiving data directly into the system)
- Finance and health facility commodity budget management

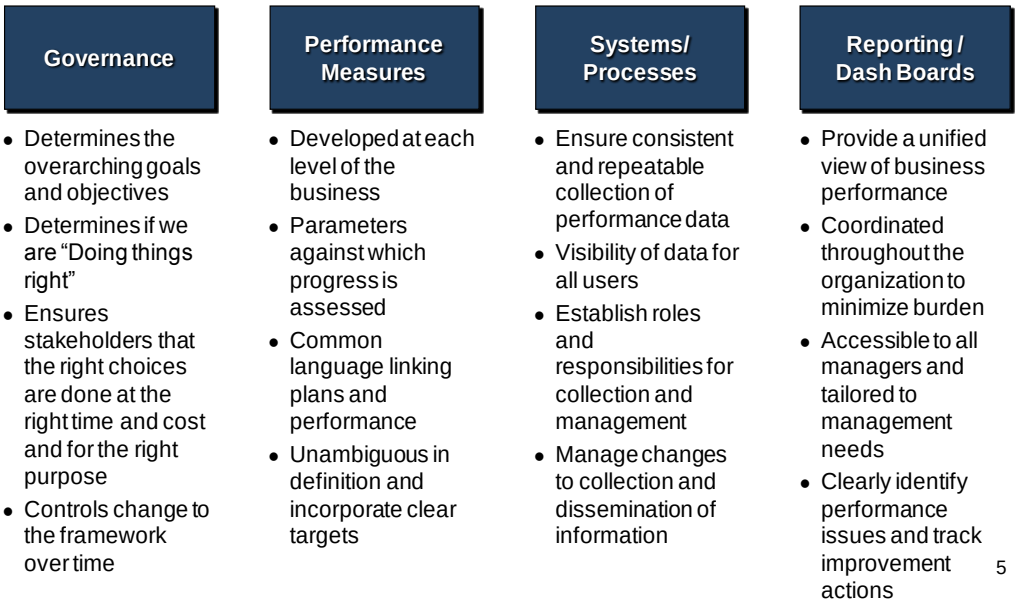
The TMIS is expected to be obtained from the commercial market. Considering the nature of NDS' business, an off-the-shelf software package would bring a practical and cost-effective system to NDS. More detail on the required selection, testing, implementation and training processes will be provided as the Supply Chain Strategy moves to implementation.

Performance Management

Performance management can be thought of as the use of data to drive organizational or system effectiveness. Meaningful performance management systems include: 1) performance measures - the parameters of desired performance; 2) processes for data collection, analysis and feedback; 3) technologies to enable the system; 4) an organizational or system-wide initiative to align

enterprise strategies with business unit activities and personnel motivations; and 5) careful road-mapping to ensure that all organizational entities and personnel can identify with and are aligned to the performance management vision and strategy.[13]

Performance Management Framework: Key Building Blocks



The preceding graphic outlines steps in performance management system development. The system is not intended as a one-time event, but rather as an approach to management and operations that is embedded in the system and evolved as the system evolves.

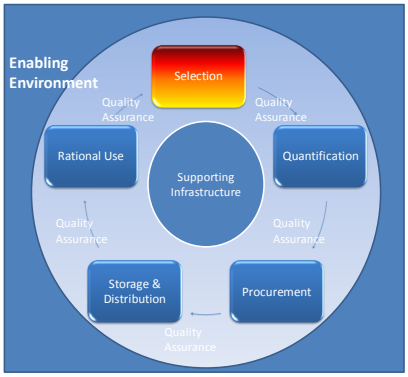
All institutions engaged in the Liberia Health Supply Chain should develop internal performance management systems to encourage internal continuous improvement and participate as part of an SCMU led integrated performance management exercise to encourage the continuous improvement of the overall system. SCMU will lead the development of a supply chain performance management plan with key stakeholders, the outputs of which will inform indictors that populate the LMIS dashboard.

[13] The MoHSW Supply Chain Design Team Formulation, Supply Chain Planning Workshop, and collaborative supply chain strategy development are steps enterprise performance management readiness and improvement already undertaken or currently in process as of July, 2010

Supply Chain Functions

The supply chain is comprised of a number of functions that must work together seamlessly to ensure that the right products reach the right places when needed and for a reasonable cost. The key functions are outlined in the SCMS Analysis and Planning Tool, presented in the *Introduction,* and described in detail below. When these functions are well managed and coordinated it improves customer service and lowers costs by better connecting demand with supply. The Liberian Public Health Supply Chain strives to better integrate its functions by promoting visibility of information and activity up and down the chain, limiting the number of steps in the process, and encouraging greater coordination and improved predictability of demand between all the levels in the system.

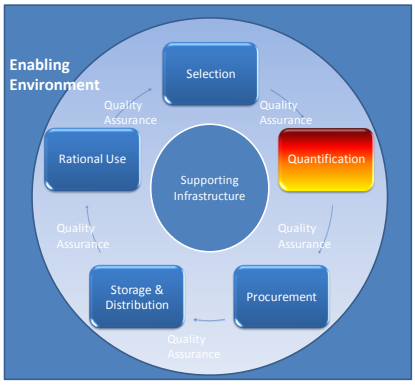
Product Selection



Product selection is an essential step in ensuring access to quality medicines and supplies and a vital function within the supply chain. Product selection, based on standard treatment guidelines, targets public resources to a limited set of safe and effective products, defines priorities for government pharmaceutical and supply procurement, and promotes rational use of medicines and supplies.

Within the Liberian Public Sector Supply Chain, the Pharmacy Department together with the Programs is responsible for selecting products and incorporating them into the essential medicines list and national formulary. The products selected should support the diagnosis and treatment of the most prevalent diseases, be safe and effective, meet basic standards of quality, demonstrate a favorable cost-benefit ratio in terms of total treatment cost, and have adequate scientific evidence of performance in a variety of medical settings.

Quantification



Quantification, including forecasting national needs, quantifying requirements and translating these requirements into a procurement plan, are critical supply chain activities that link information on services and commodities from the facility level with program policies and plans at the national level. They are used to inform higher level decision making on the financing and procurement of commodities by providing information on how many of which products should arrive in the country at what time. The process consists of forecasting the quantities of commodities that are expected to be dispensed to/used by clients, and then determining the

quantities of commodities that should be procured for the program as a whole. The results of this process can be used to help maximize the use of available resources for procurement; advocate for mobilization of additional resources, when needed; and inform manufacturer production cycles and supplier shipment schedules.

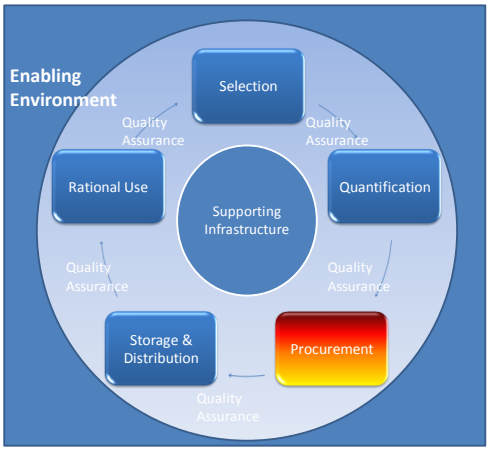
Within the Liberian Public Health Supply Chain, the SCMU oversees the process, developing SOPs that guide the programs and the pharmacy department, who generate program specific forecasts and quantifications annually. The forecasts and quantifications cover a two year period and the SCMU and programs and the pharmacy department will review and update them quarterly. They are based on data from the LMIS (consumption and stock on hand), HMIS (morbidity and service statistics), NDS MIS (inventory levels and planned deliveries) and program policies and plans (prevention activities, BCC campaigns). The forecasts will cover estimated national public sector requirements and not be restricted to available funding or to a specific funder. The products forecast will be standardized and confined to those on the essential medicine list and in standard treatment guidelines. Given the overlap in use of some products among the different programs, the SCMU will harmonize the quantifications and combine them into a single procurement plan.

The procurement plan specifies the quantities of each product to be procured and when the products should arrive in country to ensure an uninterrupted supply at all levels of the system. The SCMU will determine the resources available to meet the requirements including GOL/county budgets, donor commitments, and facility revenue (if national health insurance or user fees are implemented). If there are gaps between available resources and requirements, the SCMU will work with MOHSW leadership to mobilize additional resources. As part of resource mobilization, it will work closely with the MOHSW and programs to provide PSM requirements during proposal development. The procurement plan will include commodities procured directly by donors and those procured by NDS on behalf of the MOHSW. LMIS and HMIS data and average supplier lead times inform the timing of and quantities in shipments.

The procurement plan is a living document. The SCMU will use information on orders and scheduled deliveries provided by NDS and donors to develop and update it. It will also monitor consumption trends and inventory levels and make any required adjustments to the procurement plan such as changing desired shipment dates to ensure steady and sufficient supply.

Procurement

The actual procurement is a critical function within the supply chain and its proper management is essential to ensuring the availability of medicines and supplies when and where they are needed. The purchase of required medicines is one of the largest expenditures in the national health budget, often only second to personnel costs. As such it is critical that good procurement practices are applied to ensure high quality medicines and supplies are procured at the lowest possible price.



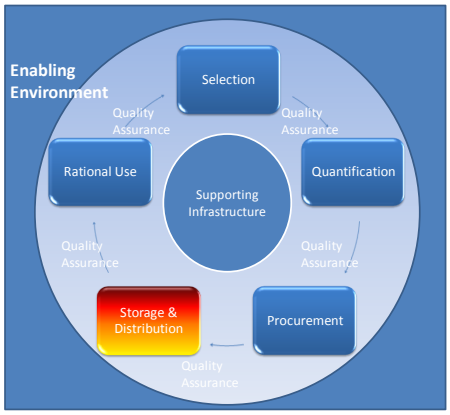
Within the Liberian Public Health Supply Chain, the first steps of the procurement process—forecasting, quantification and procurement planning are undertaken by the SCMU. Once the procurement plan is finalized, the SCMU provides it NDS, which in turn provides procurement services. These include choosing the procurement method, identifying suppliers that can assure that their medicines and goods meet recognized standards for quality, issuing requests for proposal/quotation, participating in bid evaluation panels, specifying contract terms and negotiating contracts, monitoring order status and updating the SCMU on changes, receiving and inspecting goods upon arrival and making payment.

To comply with the PPCC regulations, NDS must establish a procurement committee, a procurement unit, and bid evaluation panels for each procurement. The committee oversees the procurement functions within NDS including ensuring compliance with the PPCC Act, approving bid evaluation panels, and reporting to the PPC. It will be led by NDS' managing director, and include the head of finance and a representative of the SCMU. The procurement unit manages and administers the procurement process including sourcing and profiling of all suppliers, preparation and dissemination of invitations to bid, receiving and safeguarding bids, conducting bid opening procedures, administrating and monitoring contracts, and assessing the quality of the medicines and supplies upon arrival. For each procurement, the procurement committee establishes a bid evaluation panel with the required expertise to evaluate the bids. The bid evaluation panel will include one representative from the SCMU. It will evaluate bids based on the evaluation criteria specified in the bid documents and will submit an evaluation report to the procurement committee.

Storage and Distribution

Importation

The NDS would be responsible for the importation of all commodities for the public health sector into Liberia. This step is important, as it restricts unregistered and un-approved drugs from entering the system in Liberia. NDS will work closely with LMRA to ensure that the necessary permits are obtained and pre-clearance inspection documents are received ahead of the importation of the products. A clear service level agreement will be in place between NDS and Customs to enable the setting of clear guidelines and lead-times. This will be monitored on a monthly basis and feedback provided to key players.



Clearance

In Liberia all local clearance must be handled by a local Liberian organization and not a multi-national organization. The physical clearance of the commodities and necessary duties and tax payments will be handled by a clearing and forwarding agent who will be managed and monitored by NDS. The guidelines of importation and allowable goods will be provided by the LMRA and enforced by the Department of Customs. In addition, a clear service level agreement

will be in place between NDS and the clearing and forwarding agent to clearly articulate lead-times and costs to ensure that all shipments are cleared as quickly as possible to maximize the useable life of commodities and to minimize costs related to storage charges at the port.

Quality Control

Effective quality control must have at its heart an objective review to assess the quality of inventory and to identify opportunities for improvements. In its role as LSP, NDS will be responsible for ensuring that all commodities that come into its custody undergo standard visual testing. Upon completion of this review, irregularities (i.e. broken or crushed boxes, mold, dampness, etc.) should be alerted to managed, goods quarantined until the necessary Quality Control procedures have been followed. Commodities must be put on hold in the inventory system to ensure it is not despatched. Should samples need to be analyzed, it would be done by the NDS Lab or by the Lab appointed by the LMRA.

Storage Infrastructure

As NDS will provide inventory and warehouse management services for the entire public health sector in Liberia, its storage infrastructure and human resource capacity require fortification. The current central depot will require a new structure in order to hold and enable internal movement of inventory at the volumes contemplated by this increased role. NDS storage infrastructure would consist of three components: 1) central warehouse which will receive goods directly from customs or Liberia-based manufacturers of health commodities and hold inventory before providing inventory to satellite warehouse(s), picking, packing and distribution to cross-dock depots and health facilities within close proximity; 2) satellite warehouse(s) which receives goods from the central warehouse and also holds inventory before picking, packing and distribution to cross-dock depots and health facilities; and 3) cross-dock depots which will hold and distribute pre-packed commodities to health facilities.

Functions of NDS Managed Facilities

Facility Type	Functions
Central warehouse	• Procurement • Importation and clearance • Physical warehousing • Order management including picking and packing • Picking and packing • Physical distribution
Satellite warehouse	• Physical warehousing • Order management including picking and packing • Physical distribution
Cross-dock depot	• Physical warehousing of pre-packed orders • Physical distribution

Transportation

Transportation is a key element within the Supply Chain. The Supply Chain Master Plan must take the impact of the road infrastructure into account as the mode of transport will evolve as the transportation infrastructure in Liberia improves. A network optimization study, completed as part of the supply chain strategy implementation, will examine cost, sustainability, resource limitation, and other consideration in defining appropriate modes of transportation for the Liberia

Supply Chain. There are a number of options that will be considered as part of this analysis. For example: 1) The existence and conditions of roadway infrastructure, cost, delivery frequency, and other considerations will determine the selection of heavy trucks, four-wheel-drive vehicles and/or motorbikes in areas accessible by roadway; 2) sea freight represents a possible option for delivery of product to Liberia's southeastern provinces; 3) air freight represents a possible option for emergency orders to remote areas. Once again, the costs and benefits of alternative transportation modes will be examined as part of a network optimization study to be conducted early on in strategy implementation.

The timing of regular deliveries is to be established at a frequency negotiated between NDS and customers as part of service level agreements and dictated, in part by given requirements (e.g. drug expiry, seasonality, etc.). A different set of understandings, also negotiated as part of a service level agreement, would govern the management of emergency orders.

The current vehicle fleet configuration needs to be adjusted pending the conclusions from the network optimization study, then scaled over time. Ultimately, fleet at the central level is envisioned to provide bulk transport between the central and NDS satellite warehouses. Further down the chain, satellite warehouses and cross-dock facilities would be served by smaller vehicles enabling transport of picked and packed orders to county and local health facilities.

Finally, as the transportation infrastructure in Liberia continues to improve, barriers to private sector entry to the transportation market will fall creating increased opportunity for the privatization of transport. Privatization provides significant promise in terms of cost-savings and sustainability. The terms of outsourcing arrangements must be defined through service level agreements and closely managed by NDS as part of their total distribution responsibility.

Reverse Logistics

Reverse logistics covers three areas pertinent to effective and efficient supply chain management and is a subcomponent of the storage and distribution function of a supply chain: 1) pharmaceutical waste management; 2) drug recalls; 3) redistribution.

Pharmaceutical waste management aims to ensure that safe practices and proper management of unusable pharmaceuticals is adhered to at all levels of the supply chain. Waste management is effectuated through the appropriate procurement, distribution and monitoring of supplies and the institution of good waste management practices. Facilities at all levels require waste management plans which include: 1) written policies and standard operating procedures that outline the practices for handling, storing, treating, and disposing of hazardous and non-hazardous waste, as well as personnel training requirements; 2) clear roles and responsibilities that assign accountability to specific individuals; 3) training curricula to ensure awareness, good hygiene, and proper packaging, labeling, storage, and disposal of waste; 4) a designated quarantine storage location that is protected from the elements and accessible only by authorized personnel; 5) accommodation for disposal according to WHO recommended standards; and 6) periodic review to ensure that the practices to minimize damage and disease are sustained.

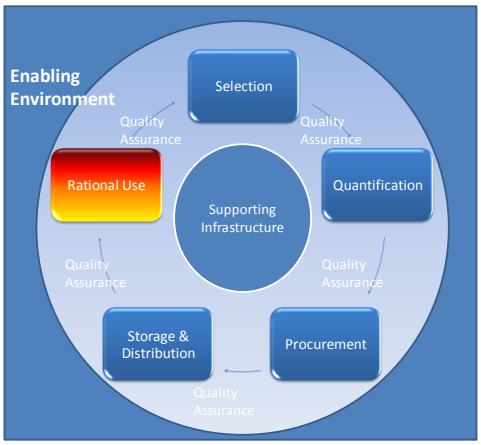
Drug recalls are to be expected and thus management of such recalls through the reverse logistics system is a standard function of health supply chain management. Product recalls can originate with manufacturers of products through their own adverse event reporting systems, while products reside in NDS custody, or at the facilities themselves. The LMRA and the Pharmacy Board in Liberia will be responsible to alert the SCMU of decisions to recall and clear roles and responsibilities need to be defined the LMRA, the SCMU and NDS. The NDS will work with the SCMU to track all the products impacted by the recall and procedures must be developed that enable batch tracking/allocation, collection, warehousing and destruction, if necessary, of recalled product. In addition, a procedure needs to be developed to enable accurate reporting to manufacturers of actions taken and impacts of any recall.

The ideal of an effective and efficient supply chain is the provision of the correct product in the right location, where it is needed at all times. In reality, this ideal is not always achieved. Demand changes, lack of visibility, forces of nature, and human error conspire against even the most effective and efficient of supply chain systems. Even increased availability of data cannot fully eliminate incorrect orders or product shortages or the financial losses incurred as a result.

While errors cannot be eliminated completely, the adverse impacts of these errors can be minimized through appropriate redistribution measures: 1) standard operating procedures to guide product redistribution; 2) diligence in inventory management at storage facilities; and 3) clear roles and responsibilities for product redistribution at health facilities, cross-docking depots satellite and central warehouses and for fleet/distribution systems that link each of these.

Rational Use of Medicines

Rational use of medicines requires that "patients receive medications appropriate to their clinical needs, in doses that meet their own individual requirements, for an adequate period of time, and at the lowest cost to them and their community" (WHO). It requires appropriate diagnosis, prescribing the appropriate medicine at the right dosage; correct dispensing with information for the patients, and patient adherence to the treatment. The impact of irrational use can be significant and include excessive cost and waste of limited public sector financial resources, poor quality of care and treatment outcomes and increased risk of adverse reactions and resistance.



There are a number of policies that support the rational use of medicines. These include: standard treatment guidelines, essential medicine lists and formularies and guidelines or regulations around donation and importation of medicines. In Liberia, a number of these policies exist but require updates and have not been fully implemented. As an essential component of the supply chain system, these policies must be updated regularly, disseminated widely and enforced through training and supervision. The Pharmacy Department leads the process of updating and disseminating the policies in close collaboration with the programs. By shifting responsibility

for logistics management from county pharmacists to NDS, pharmacists can be freed to attend to the implementation of policies and practices and ensuring that providers have the knowledge and skills to follow the guidelines and SOPs that govern appropriate proscribing and dispensing.

Conclusion

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