

WHITE PAPER

Private Sector Engagement to Advance and Sustain Health Supply Chain Resiliency

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Preface

Chemonics International Inc. is a development firm with more than 40 years of experience working in more than 150 countries. Chemonics is a trusted implementing partner that is committed to solving the world's toughest development challenges with multidisciplinary teams working across sectors. Chemonics' current global health and supply chain implementation portfolio includes projects funded by the United States Agency for International Development (USAID), The Global Fund, the Bill & Melinda Gates Foundation, and UNICEF. Most notably, Chemonics and partners lead the implementation of the USAID Global Health Supply Chain Program-Procurement and Supply Management (GHSC-PSM) project. GHSC-PSM has offices in 35 countries and collaborates with ministries of health (MOHs) and supply chain management professionals to build countries' capabilities to optimize public health supply chains, thereby increasing access to lifesaving health commodities. Among other projects, Chemonics also leads the implementation of the USAID Global Health Supply Chain-Technical Assistance Francophone Task Order, which provides specialized supply chain expertise to Benin, Burkina Faso, the Democratic Republic of the Congo, Haiti, Mauritania, Niger, Senegal, and Togo.

With this white paper, Chemonics seeks to analyze the spectrum of private sector engagement (PSE) in health supply chains in low-income (LIC) and lower middle-income countries (LMICs), as well as the effectiveness of those engagements in each country's supply chain maturity and performance.

This white paper draws from:

1. A desk review of peer-reviewed literature and gray literature;
2. Interviews from May to August 2020 with supply chain experts, donors, policymakers, and Chemonics' country project supply chain staff for guidance, practical examples, and case studies; and
3. Supply chain expertise and experience of the main authors.

This paper begins with an overview of the key benefits and challenges of PSE in health supply chains. Next, it describes a supply chain maturity framework to inform PSE approaches in different country contexts, as well as a thoughtful assessment tool to be completed to understand the nuances and implications of the country's political economy and stability, market capacity, and business enabling environment to determine if, when, and how to leverage the private sector. Finally, it presents case studies of PSE to accelerate health supply chain maturity.

Acronym List

3PL	Third-party logistics	n.d.	No date
4PL	Fourth-party logistics	NGO	Nongovernmental organization
ABC	Activity Based Costing	NSCA	USAID National Supply Chain Assessment
AIDS	Acquired immunodeficiency syndrome	OOP	Out of pocket
ARV	Antiretroviral	OTD	On-time delivery
CD4	Cluster of Differentiation 4	OTIF	On time and in full
CMS	Central medical store	PBC	Performance-based contract
COE	Center of Excellence	PEPFAR	U.S. President's Emergency Plan for AIDS Relief
DDD	Decentralized drug distribution	POC	point-of-care
EDI	Estimated date of infection	PSA	Procurement service agency
EPSA	Ethiopian Pharmaceuticals Supply Agency	PSE	Private sector engagement
ERP	Enterprise resource planning	QAT	Quantification Analytics Tool
FSN	Fast/Slow/Normal moving	SCOR	Supply Chain Operations Reference
GAVI	Gavi, the Vaccine Alliance	SHARP	USAID Nigeria Strategic HIV/AIDS and Tuberculosis Response Program
GhiLMIS	Ghana Integrated Logistics Management Information System	SOP	standard operating procedure
GHSC-PSM	USAID Global Health Supply Chain Program-Procurement and Supply Management project	TB	Tuberculosis
HIV	Human immunodeficiency virus	UAV	Unmanned aerial vehicle
KPI	Key performance indicator	UNAIDS	Joint United Nations Programme on HIV/AIDS
LabEQIP	Lab Efficiency and Quality Improvement Planning tool	USAID	United States Agency for International Development
LIC	Low-income country	VEN	Vital, essential, nonessential
LMIC	Lower-middle income country	VL	Viral load
LMIS	Logistics management information system	VMMC	Voluntary medical male circumcision
MOH	Ministry of Health	VSI	Vendor-stored inventory
MSL	Medical stores limited	UHC	Universal health coverage

Executive Summary

SUSTAINABLE DEVELOPMENT GOAL (SDG) 3.8 STATES:

“Achieve universal health coverage, including financial risk protection, access to quality essential health-care services, and access to safe, effective, quality and affordable essential medicines and vaccines for all.”

Well-functioning health supply chain systems are an essential prerequisite for universal health coverage (UHC). They also play a critical role in humanitarian and public health emergencies, such as natural disasters and epidemics, through the timely and sufficient delivery of quality-assured medicines, devices, equipment, and other medical supplies.

Private sector engagement (PSE) is a strategic approach to international development: donors and country governments consult, strategize, align, collaborate, and implement with the private sector for greater scale, sustainability, and effectiveness of development or humanitarian outcomes (USAID, 2018). Globally and locally, the private sector is playing an increasingly important role as a partner to LIC and LMIC

governments: They innovate, job create, and, ultimately, strengthen capacity and resources so countries are self-reliant to address health and other development and humanitarian priorities (USAID, 2018). As countries' economic and political environments stabilize and the private sector grows, PSE can be a powerful way to leverage market forces and private organizations to solve development challenges—including in health supply chains—to achieve consistent, reliable supply chain performance to ensure geographic access, availability, affordability, and quality of health commodities (Rockefeller Foundation, et al., 2008).

PSE comes with benefits as well as challenges. The advantages of engaging with and investing in the private sector for supply chain operations ultimately outweigh the

challenges. This is borne out by PSE's increasing role in moving supply chain systems from less mature and fragmented to more mature and better integrated. The private sector can help improve supply chain performance and accelerate supply chain maturity; a more mature supply chain allows for broader PSE. Highlighting the bidirectional and dynamic beneficial nature of PSE is, therefore, critically important.

PSE can advance and sustain health supply chain maturity. This paper provides a supply chain maturity framework for supply chain practitioners to better understand the maturity of health supply chains in LICs and LMICs before they determine if and how to leverage the private sector. The framework segments supply chains into five levels of maturity from least to most mature—1) reactive and siloed,

Benefits and Challenges of PSE in Health Supply Chains



CHALLENGES for government entities when engaging with the private sector

- Limited government capacity to manage contracts and payments
- Political and operational concerns over loss of control
- Lack of strong information systems
- Lack of activity-based costing
- Loss of jobs in the public sector



KEY BENEFITS of Private Sector Engagement

- Governments are able to focus on their core stewardship and strategic governance role to achieve UHC
- Operational efficiencies including cost savings
- Distribution of risk
- Access to innovation, skills, and expertise
- Intersectional benefits



CHALLENGES for the private sector when engaging with government entities

- Delayed payments and short contracts
- Incomplete and delayed information exchange
- Lack of clear performance metrics

2) centralized, 3) integrated, 4) collaborative, and 5) orchestrated—and draws from Gartner's demand-driven model for supply chain maturity, the Association for Supply Chain Management's Supply Chain Operations Reference (SCOR) model, and the Theory of Constraints (Lockamy & McCormack, 2004) (Association for Supply Chain Management, no date [n.d.]) (Gartner, 2017a) (Goldratt, n.d.). The framework then summarizes specific supply chain functional and operational capabilities, including for PSE, that are typical at each maturity level.

Countries may not fit neatly into one or more maturity levels. As they graduate from siloed and fragmented supply networks to integrated ones within often dynamic political economy and stability contexts, however, they likely will progress faster in some functional and operational domains than in others. In practice, it typically takes several years to realize systemwide improvements and move from one level of maturity to the next. A key reason is that private sector capacity in core supply chain operational areas such as storage and distribution typically exist across LMICs and in most LICs and can

be leveraged reasonably quickly—thoughtful and effective PSE requires key functional capabilities for sound stewardship to be in place, such as governance, financing, human resources, processes, and data systems. These functional capabilities typically take longer to develop. If countries choose not to invest in them, the challenges described earlier will likely manifest, and ensuring sustainable supply chains will be more challenging and extended.

Spectrum of PSE in health supply chains. This white paper describes several case studies to highlight functional and operational capabilities to enable PSE. The studies also represent a range of PSE approaches that advance supply chain maturity; they are drawn from diverse country contexts, including Ethiopia, Ghana, Malawi, Nigeria, Pakistan, Rwanda, and Zambia. Together, these case studies highlight how public and private sector actors, donors, and implementing partners must recognize that no single entity can solve a country's health supply chain challenges alone.

Conclusion. It is important to hold regular forums for public and private

Health supply chain actors must learn to trust each other and, together, build a national road map that is tailored to their local context.

sector supply chain actors to communicate needs and changes in policy, regulation, drug regimens, and other factors that affect supply chain systems; poor and inconsistent communication is a key factor in the failure of effective PSE. Donors and implementing partners, meanwhile, also are learning and adapting their approaches to support LIC and LMIC governments. The end goal is to build resilient, integrated, data-driven, efficient, and cost-effective health supply chain systems that leverage the comparative advantages of the public and private sectors to measurably improve and sustain strong supply chain performance—and that ultimately benefit the populations that rely upon these supply chain systems for their health and medical care.



Adicional Logistics completes a transfer of long-lasting insecticidal nets (LLINs). GHSC-PSM Mozambique/Mickael Breard

SECTION 1

Benefits and Challenges of PSE in Health Supply Chains

Benefits of PSE

Considering the complexity of health supply chains and the multiplicity of stages and roles, evidence supports a role for the private sector as an operational and innovation partner to achieve UHC goals (Lydon et al., 2015; Bornbusch et al., 2014). Public and private sector roles in health supply chains will continue to evolve as countries mature through supply chain management practices. The ultimate aim is to invest in strengthening health supply chain systems to become increasingly self-reliant and resilient over time; PSE is a key approach to achieve this mission.

There are no readily accessible, comparable, and consistently tracked measures of the proportion of health commodities that are procured and distributed through private vs. public sectors in LICs and LMICs. There is, however, growing evidence that using the private sector quantifiably improves supply chain performance and cost effectiveness (Agrawal, et. al., 2016). There is, therefore, increased

recognition of the role that PSE plays and can play where it is underleveraged, to accelerate the pace at which supply chain systems mature to provide reliable access to health commodities. PSE has several key benefits:

a. Governments are able to focus on their core stewardship and strategic governance roles to achieve UHC.

All key interviewees agreed that, if public agencies and MOHs pivot from operating their own government-owned supply chains and delegate to appropriate private sector service providers, governments can better fulfill their stewardship roles and improve supply chain performance (Bornbusch, et al., 2014; Agrawal, et al., 2016). Typical benefits of improved stewardship include:

- Stronger financing mechanisms and sources
- An enabling policy, legal, regulatory, and product and patient safety environment

- Public and common goods in health commodity selection and availability are addressed
- Supply chain functions are linked to health insurance and provider reimbursements
- Market-shaping interventions build more resilient supply chains over time

b. Operational efficiencies, including cost savings, are often realized.

As governments evolve from a direct implementing role and bring in strong private supply chain organizations, there is typically consistent adherence to supply chain best practices (Silverman, et. al., 2019). Typical benefits include (adapted from SCOR, Association for Supply Chain Management, n.d.):

- Improved supply chain reliability with order fulfillment on time and in full (OTIF) that includes correct product, place, quantity, condition/packaging, and documentation

- Logistics efficiency, including improved human resources management, route planning, and the resulting fuel and fleet maintenance cost savings
- Reduced order fulfillment cycle time that includes reduced time to submit a purchase order, receive an order at the shipping facility, process an order for shipping, order transit duration, receive an order, and turnaround for loading and offloading
- Improved stock management with decreased expiries, overstocking, and stockouts
- Improved housekeeping and warehouse management that, in turn, increases storage capacity, including use of visual management tools to reduce order search time and ensure consistent adherence to first expiry, first out best practice
- Organizations with deep supply chain expertise can also leverage private investment capital and drive innovation

c. Risk is more evenly distributed.

Because competitive sourcing increases private vendor diversity, there is less reliance on a single actor to perform critical functions and, therefore, less risk (Agrawal, et. al., 2016). Greater accountability, such as with performance-based contracts (PBCs), also may reduce performance risks (United Nations Commission on Life-Saving Commodities-Technical Reference Team on Private Sector Engagement, 2014). One trade-off in spreading risk, however, is the potential to reduce economies of scale; this should be assessed in the local context.

d. PSE provides access to a broader base of innovation, skills, and expertise.

Private sector actors must constantly innovate to remain competitive, and they often attract staff who have professional supply chain certification and experience. PSE, therefore, provides access to business process and technological

innovation, as well as human resource expertise to solve for supply chain issues (United Nations Commission on Life-Saving Commodities-Technical Reference Team on Private Sector Engagement, 2014).

e. While evidence is limited, there may be intersectional benefits in investing in PSE for health supply chains.

We have learned from other sectors, such as agriculture, that benefits realized in LICs and LMICs include increased job creation and a stronger supply chain industry over time that other sectors can leverage (McKinsey & Company, 2012; Beria Agricultural Growth Corridor Initiative, 2021). While there is limited evidence of a similar halo effect in the health sector, it is worth studying closely as these countries' economies and, therefore, private sector capabilities and supply chain talent needs continue to grow (Gavi, the Vaccine Alliance [GAVI] & Transaid, 2015; High Impact Practices in Family Planning, 2020).

Challenges of PSE for government entities when engaging with the private sector

LIC and LMIC governments and procurement service agencies (PSAs) face several challenges when they are working with the private sector:

a. Political and operational concerns over loss of control.

Governments may sometimes view private actors with distrust and may be unwilling to share information with them, particularly if they are concerned about misuse for profit or whether the information highlights sensitive performance issues. Some also highlight a potential risk that the private sector will not complete a project on time and on budget; this often stems from a realization that key performance indicators (KPIs), information systems, and other accountability approaches are weak (United Nations Commission on

Life-Saving Commodities-Technical Reference Team on Private Sector Engagement, 2014).

b. Limited government capacity to manage contracts and payments.

In many LICs and LMICs, government officials have limited capacity in PSE and related contract and subcontract management, including the use of appropriate and necessary KPIs to manage and improve supplier performance (United Nations Commission on Life-Saving Commodities-Technical Reference Team on Private Sector Engagement, 2014). They often lack the capacity to establish financial processes and flows to ensure smooth, timely, and transparent vendor payments that are based

on the completion of contract deliverables. While PBCs offer greater accountability, they also may create perverse incentives, such as misrepresentation of performance metrics or gaming. PBCs may come with a high measurement and reporting burden and associated high monitoring and verification costs, rather than reasonable, necessary, measurable, and frugal metrics, as well as transference of risk and upfront costs to private vendors (USAID & Palladium, 2017).

c. Loss of public sector supply chain jobs as PSE increases.

When operational supply chain functions are transferred to the private sector, MOHs need to manage evolving staff requirements, including the redundancy of some

public sector roles. There may be conflicting incentives, such as perceived influence of leaders based on the size of the public sector workforce they oversee, corruption, and conflicts of interest. These become difficult to hide with the accountability that often comes with PSE (United Nations Commission on Life-Saving Commodities-Technical Reference Team on Private Sector Engagement, 2014).

d. Decreased purchasing power caused by reductions in efficiencies of scale leads to devolved procurement responsibilities and budgets.

While decentralization and devolution are laudable governance and administration goals, subnational governments may have different procurement rules and budgets than the federal government. This increases the

potential to lose efficiencies of scale and cost advantages of ordering in greater volumes (Silverman, et. al., 2019).

e. Lack of effectiveness in data collection, analysis, and use due to weak information systems and private actors' limited access to data.

An information system that consistently captures routine data at all levels of a supply chain is a prerequisite to effectively track KPIs for core supply chain functions, as well as adherence to supply chain best practices. LIC and LMIC governments may lack capacity to set up and manage an information system or be reluctant to cede control and access to data to an outside logistics management information system (LMIS) vendor that has the requisite infrastructure and expertise. Often, even with

an LMIS in place, governments struggle to achieve interoperability with vendor LMIS or enterprise resource planning (ERP) systems. Without reliable administrative data from service delivery points and each tier of a supply chain system, forecasting and supply planning will continue to be suboptimal (Yadav, 2015).

f. There is a general lack of activity-based costing in health supply chain management.

Although activity-based costing is widely used in the private sector, it is rarely used in public sector supply chains. It is difficult, therefore, to perform cost-effectiveness analyses to compare government-run and private sector-run supply chain operations to build an evidence-based rationale of value-for-money and cost savings with PSE (USAID, 2021).

Challenges for the private sector when engaging with government entities

a. Delayed payments, short contracts, and unclear performance metrics.

Private sector partners often view working with the government as risky. The most cited reason is that government agencies delay or default on payments because of bureaucracy or limited financial resources (United Nations Commission on Life-Saving Commodities-Technical Reference Team on Private Sector Engagement, 2014). Additionally, in countries where the private sector is emerging, short-term government contracts are a disincentive for private partners, because there is uncertainty on their return on investment (GAVI & Transaid, 2015). If performance metrics are not clear, consistent, and standardized, they can discourage private sector partners from engaging with governments.

b. An adverse enabling environment for business.

This may include ad hoc and sudden changes to contracting terms and conditions that are based on political influence or public outcry over drug shortages. If the private sector partner is not informed of changes and permitted time to adjust to emergent needs, it can lead to confusion and financial loss. Other important challenges include corruption and inconsistent, rapidly shifting, or contradictory regulations (United Nations Commission on Life-Saving Commodities-Technical

Reference Team on Private Sector Engagement, 2014).

Despite these challenges, the advantages of engaging with and investing in the private sector for supply chain operations ultimately outweigh the challenges. This is borne out by PSE's increasing role in moving supply chain systems from less mature and fragmented to more mature and better integrated systems. Highlighting the bidirectional and dynamic beneficial nature of PSE, therefore, is critically important.

The private sector can help improve supply chain performance and accelerate supply chain maturity; a more mature supply chain allows for broader PSE.



Worker operating a forklift in a warehouse in Mozambique. GHSC-PSM Mozambique/Mickael Breard

SECTION 2

Country Health Supply Chain Maturity and Readiness for PSE

Health Supply Chain Maturity Levels

There is wide variation in supply chain performance in LICs and LMICs. To understand the ways that PSE can strengthen health supply chain performance, it helps to comprehend the broad supply chain ecosystem in a given country.

To understand a supply chain system's maturity, practitioners rely on several supply chain maturity assessment methodologies that vary in complexity and cost. These

methodologies draw from a mix of sources: the SCOR model, Gartner's demand driven model for supply chain maturity, the Theory of Constraints, and the contextualization and adaptation of these models and theories through the public health supply chain community's learnings in LMIC and LIC settings (Lockamy & McCormack, 2004) (Association for Supply Chain Management, n.d.) (Gartner, 2017a) (Goldratt, n.d.). Drawing

from these models, we segment LIC and LMIC health supply chains along a continuum into five levels of maturity, least to most mature in terms of resiliency in supply chain management and operations and opportunities for PSE (*see Table 1*). This framework is designed to help supply chain practitioners appreciate the variables that determine a supply chain's maturity. It is not intended to replace current maturity assessment methodologies.

Framework Snapshot

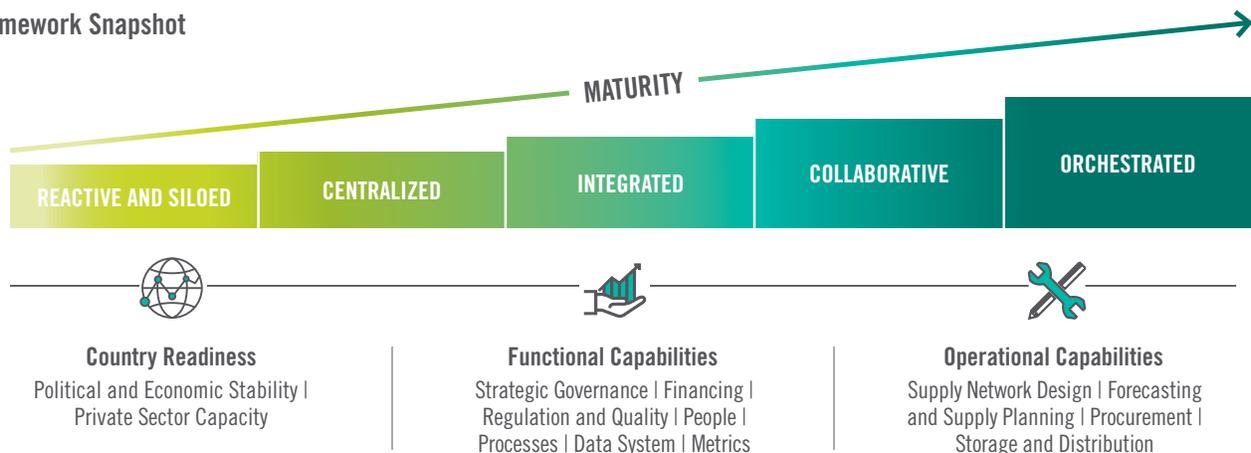


TABLE 1: Health Supply Chain Maturity Levels: Country Readiness, Functional Capabilities, and Operational Capabilities

MATURITY LEVEL <i>(Gartner, 2017b)</i>	REACTIVE AND SILOED	CENTRALIZED	INTEGRATED	COLLABORATIVE	ORCHESTRATED
COUNTRY READINESS FOR PSE					
Political Economy	Humanitarian crisis and/or conflict; political and economic instability	More stable macroeconomic and political environments	Stable macroeconomic and political environments	Resilient political economy	Resilient political economy
Market Capacity	Lower Human Development Index ranking (United Nations Development Programme, 2020) and fragmented private sector	Growing private sector, some outsourcing capabilities	Thriving private sector, increasing outsourcing capabilities	Robust private sector, deep outsourcing capabilities	Robust private sector, deep outsourcing capabilities
FUNCTIONAL CAPABILITIES					
Strategic Governance	Donor oversight	Government control and oversight	MOH oversight with transition to semi-autonomous PSA	MOH stewardship; autonomous PSA that may be privatized or contracted to a commercial entity	Government oversight for quality and pricing; fully relies on commercial pharmaceutical and medical equipment retail supply chain actors
Financing	Largely from donors, financial institutions	Mix of donor, financial institutions, and domestic sources	Increase in domestic financing; limited health insurance coverage, high out-of-pocket (OOP) spending	Stable domestic financing; increasing health insurance coverage, limited OOP spending	High health insurance coverage, low OOP spending
Regulation and Quality	None or minimal	Drugs regulatory agency	Drugs regulatory agency; some pharmacovigilance	Drugs regulatory agency; pharmacovigilance post-marketing surveillance	Drugs regulatory agency; pharmacovigilance post-marketing surveillance
People (Human Resources)	United Nations agency and/or humanitarian nongovernmental organization (NGO) staff/donors	Government staff, may lack supply chain training and certification opportunities	Staffing is increasingly professionalized	Professional third-party logistics (3PL) vendor staff; specific commodities (high cost, rare diseases) may be procured by government, so this capacity is also needed	Deep private sector supply chain expertise; specific commodities (high cost, rare diseases) may be procured by government
Processes	Siloed, manual, and disconnected	Central Medical Store (CMS) brings some standardization, but vertical and duplicative supply chains continue	Standardized and integrated for efficiencies of scale	Collaborative with visibility across suppliers, vendors, and customers	Information flows in real time for process optimization, efficiency, and cost savings
Data System	Manual or spreadsheet-based	Fragmented LMIS landscape	LMIS integration through interoperability and/or unified system	LMIS/ERP is stable and funded	ERP aggregates demand and information flows in real time; established control tower for larger countries
Metrics	Ad hoc metrics	On-time delivery (OTD), OTIF for each funding stream	OTD, OTIF	OTD, OTIF; vendor-managed inventory shifts to on-shelf availability	On-shelf availability
OPERATIONAL CAPABILITIES					
Supply Network Design	Siloed and fragmented	CMS with parallel supply chains	Increasing functional integration for efficiency	Full integration	Full integration
Forecasting and Supply Planning	Siloed, driven by program targets	Driven by program targets, historical allocations, and some consumption data	Driven increasingly by consumption data; considers effect on manufacturing and procurement	Driven by reliable and frequent consumption data	Driven by reliable and frequent consumption data
Procurement	Donors and humanitarian agencies	Mix of donors and CMS	CMS	CMS, with some vendor-managed inventory	Private
Storage and Distribution	United Nations agency/NGOs/donors	Government-owned and operated warehouses and fleet	Mix of government and 3PLs	3PLs, fourth-party logistics (4PLs)	3PLs, 4PLs; E-commerce innovations: drones, smart lockers, etc.

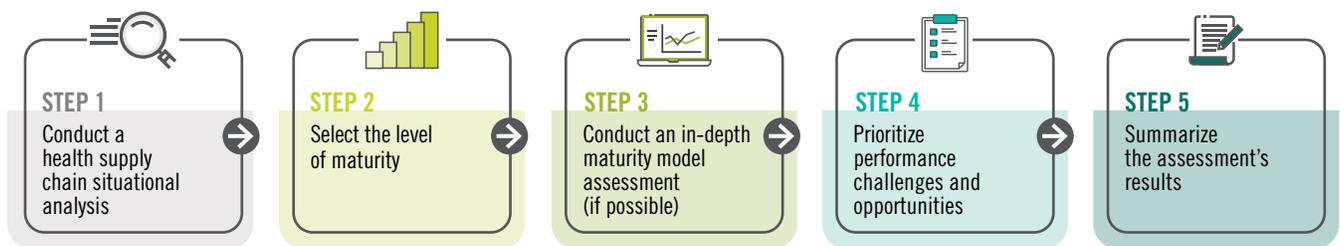
Country Readiness for PSE

There are many ways to foster and deepen PSE in health supply chains to achieve improved supply chain performance, such as increased geographic reach, availability, affordability, and quality of medicines. No single approach for PSE fits every operating context or each stakeholder's needs and capacities. Before engaging

the private sector, a thoughtful assessment should be completed to understand the nuances and implications of the country's political economy and stability, market capacity, and enabling environment for business. Rather than a prescriptive approach, we suggest a pragmatic approach that considers the root causes

and sequencing of supply chain problems to be solved and the need for careful preparation for the financial mechanisms and management to enable PSE. This approach allows relevant actors to make informed choices about the timing and types of PSE that may be appropriate in a country's broader context.

Steps to PSE Readiness



STEP 1: Conduct a health supply chain situational analysis using this job aid questionnaire.

Political Economy Analysis (Check ✓ once completed)

___ Who are the main stakeholders? What are their perspectives, priorities, interests, and objectives in relation to health supply chains?

___ How is the local system affecting dynamics for and against reform? Is the MOH seeking to deliver change now or in the future that could be facilitated by an external provider?

___ What is the broader institutional context for reform, including incentives and power dynamics (within public health supply chain operators and government agency hierarchies)?

___ What are the existing solutions, assets, opportunities, risks, and assumptions to engage the private sector?

___ What is the support or opposition of MOH staff and civil society, among others, to engaging the private sector?

___ Does significant corruption exist in the country?

___ Is the government committed to a long-term relationship/partnership with the private sector?

Market Capacity

___ What is the size of the country's economy? Is there an attractive market for private sector supply chain actors to invest and grow in the future?

___ What supply chain private sector exists locally and regionally? What is their share of the market (in total and specifically in health, if it exists)?

___ What are the private sector's core competencies? What is the purpose or the mandate under which they operate? What are the KPIs used to manage private sector performance?

___ What are the risks associated with working with the supply chain oversight body (MOH or other)? How can these be mitigated?

___ What are the minimum expected returns or conditions for the private sector to engage with the MOH?

___ Are the necessary people and assets available in the private sector/market? Are these accessible to the MOH?

___ What are the top private sector partners that can perform supply chain functions in your country/region?

___ Are there improvement opportunities that the private sector could deliver to the country's health supply chain?

Enabling Environment and Public Sector Capacity (Functional Capabilities)

___ Does the country have a supportive legal framework and an enabling business environment for engaging with the private sector?

___ What is the country's record on engaging the private sector? Are there any experiences at the MOH level?

___ What is the MOH's core competency? What is the purpose or the mandate under which it operates?

___ What are the risks associated with engaging the private sector to lead a function or multiple functions of the supply chain?

___ Are there any adverse impacts of engaging the private sector that cannot be measured directly (i.e., loss of control over the specific function of the supply chain, internal resistance within the organization)? Can these be overcome?

___ What are the KPIs that demonstrate the MOH's performance in managing their health supply chain? Is there a system for collecting and recording KPI data?

___ What is the level of data visibility in the supply chain leveraged for MOH decision-making?

___ Does the MOH have the technical capability to manage and steward private sector partners?

___ Does the country apply public financial management good practices that help secure funding for the health sector?

___ Are the financial systems set up to pay external partners in a timely manner?

___ Are the mechanisms in place to budget and segment costs by category (i.e., fuel, tires, wages) and region?

___ What is the percentage of health commodities that are purchased at the last mile through public sector channels?

___ Does the MOH have the capacity to meet current and future requirements? Does it have or can it attain the resources required to meet future demand (locally)?

___ Are supply chain education programs set up in national colleges and universities?

Step 2: Leveraging the insights from Step 1, select the level of maturity that best reflects the health supply chain's status on the maturity framework (Table 1). This provides a rapid identification of supply chain performance challenges and opportunities.

Step 3 (if possible): Conduct an in-depth maturity model assessment that leverages industry maturity models, such as the Association for Supply Chain Management, Gartner's, and USAID's National Supply Chain Assessment. Each model is unique. The ability to conduct an in-depth assessment will depend on stakeholders' levels of engagement, political will, timeline, and available funding.

Step 4: Prioritize the list of performance challenges and opportunities. Use industry prioritization models, such as value vs. effort and reach, impact, confidence, and effort, among others.

Step 5: Conduct a cost and cost-effectiveness analysis for the top-ranked opportunities. Use these questions as guidance:

___ What are the public sector costs associated with the supply chain functions that are to be outsourced? Is there cost visibility at the requisite level to understand whether an outsourced proposal would deliver value for money? Could some items be cost in budgets elsewhere, or does the budget include items associated with another activity?

___ What are the direct costs (salaries and related expenses, fuel, warehousing expenses) and indirect costs (maintenance, depreciation, utilities, and others)?

___ What is the unit cost for the function (management and handling of one warehouse, cost of delivery to or from one warehouse, etc.) by the private sector?

___ What is the result of comparing public sector and private sector costs? Would the overall benefits of outsourcing a function to the private sector exceed the costs of doing so?

Step 6: Summarize the assessment's results and ranked challenges and opportunities (including cost and cost-effectiveness analysis results) to produce an action plan for implementation, ideally including budget requirements. This report will serve as the country's holistic guidance for when and how to engage the private sector, and what activities must be accomplished to set up a sustainable PSE mechanism.

In Section 3, we will highlight the spectrum of PSE in health supply chains with illustrative examples of how to leverage PSE to strengthen functional and operational capabilities.



Yin Kevkanitha takes inventory in the store room of a hospital in the Sonikhum District of Cambodia. *Chemonics/Chris Norman*

SECTION 3

Spectrum of PSE in Health Supply Chains

All key interviewees for this paper recognize the benefits of PSE; they also acknowledge that it takes time and effort to fully realize improved supply chain performance. To sustain these improvements, however, it is equally important to—first or concurrently—equip governments and other development actors with the capacity and mechanisms to leverage the private sector appropriately and optimally. Also, as described above, the extent to which the private sector can play a role in a country's health supply chains varies as a function of the maturity of the underlying economy, and of related political and economic stability, including an enabling environment for business.

Government Stewardship Model and Private Sector Led Supply Chains

Governments play a critical stewardship role for health supply chains with vision, oversight, accountability mechanisms, and resources. These factors ensure the provision of accessible,

available, affordable, and quality-assured health commodities to improve health outcomes. A stewardship role requires skills in leadership, governance, financing, regulation, market research, and alliance building. Government staff and decision-makers also need capacity in contract design, negotiation, and management to allow them to execute and maintain fruitful partnerships with the private sector as service providers whose performance is measured through PBCs. Some important processes and responsibilities include:

- Ensuring sound financial flows and financial integrity
- Creating and maintaining regulatory policies and procedures for public and private sector actors to thrive
- Promoting product and patient safety by ensuring quality-assured products reach end users and that there are disincentives for counterfeiting
- Demonstrating leadership through commitments to disease eradication and national public

It is important to note that becoming a steward does not decrease a government's responsibilities for key supply chain functions.

health systems strengthening strategies

- Coordinating during public health emergencies or natural disasters

Domestic financing, including facilitating direct foreign investment, offers a substantial opportunity to increase the allocation and efficiency of public revenue within the health supply chain sector in LICs and LMICs. Financing steps begin with 1) resource mobilization at the national or international levels;

Because many health supply chains involve the public and private sectors, effective collaboration between all stakeholders is crucial to attain efficiency and high-performing health supply chains. Private sector actors can contribute innovative solutions to the problems faced by the public sector.

2) the pooling of these resources; 3) identifying an agency or mechanism that will administer those funds, budgeting adequately for priority activities; and 4) overseeing implementation and spending, which may be led by governments or with support from implementing partners. Improved stewardship is a long-term endeavor rather than a short-term goal.

In mature health supply chains, where the government is a steward and a market-based approach is operationalized, it is mostly the private sector that leads the supply chain operational capabilities, such as the storage and distribution of health products from the point of manufacture or from wholesalers to patients at retailers and health facilities. Although demand may be aggregated by a central authority, such as MOHs through outsourcing or other contracting mechanisms, private actors (companies, NGOs, faith-based organizations) manage the upstream and downstream supply chains by employing an entirely private sector workforce and by leveraging the retail supply

chain (pharmacies and drug shops) and other innovative service delivery points (smart lockers, e-commerce).

In the early stages of health supply chain maturity, public and private sector actors may leverage donor-funded programs to share risks. Donors and implementing partners can work to better capture the interests and incentives that drive the private sector in various operating contexts. Creating guidelines that respond to the political economy and local system characteristics of the region or country will enable the public and private sectors to continue collaborating in dynamic donor-supported initiatives, facilitating long-term planning and initiation of market-based approaches in the public sector. In addition to these insights, donors and implementing partners offer value by providing highly specialized technical assistance and advisory services that can inform government spending and budgeting strategy while developing organizational and staff capacity.

Some donors have established programs and mechanisms to encourage PSE in public health across countries that meet the necessary conditions. For example, USAID has set up 20-year Development Credit Authority programs, now under the Development Finance Corporation, which guarantee partial credit to loan beneficiaries from the private sector. The Bill & Melinda Gates Foundation extends direct equity investments, fund investments, low-interest loans, credit enhancements, and volume guarantees to entrepreneurs, companies, and organizations working throughout the health supply chain (Bill & Melinda Gates Foundation, n.d.). These instruments boost investor confidence by derisking private sector investment, which incentivizes the private sector to invest in projects that work toward achieving development objectives. This trend will increase engagement with financial institutions as credit sources to maximize the impact of private sector-led implementation at the patient level.

CASE STUDIES

Leveraging PSE to Strengthen Supply Chain Functional Capabilities



STRATEGIC GOVERNANCE AND FINANCING

Pakistan Commits to Several Firsts with Domestic Financing

In Pakistan, GHSC-PSM's advocacy and continued technical assistance resulted in the government of Pakistan's historic commitment to domestic financing of approximately US\$217 million for provincial and regional governments for supply chain systems strengthening, including US\$138.97 million for family planning (FP) product procurement and distribution until FY2021.

The project supported the first-ever provincial supply chain strategies for the Punjab and Khyber Pakhtunkhwa (KP) governments for financial years 2017 through 2022. GHSC-PSM also completed the first-ever forecasting exercise with the creation of the Maternal, Neonatal & Child Health (MNCH) Very Essential Medicines Lists (VEMs) for all provinces of Pakistan, which generated adequate financing for the period

2017-23, ensuring availability of critical life-saving commodities for mothers and children.

GHSC-PSM also helped the government of KP to develop a separate five-year scientific forecast for four strategic districts covering 2020-25 based on a standardized medicine list to meet the needs of the people and communities of the province. ■



HUMAN RESOURCE DEVELOPMENT

Center of Excellence for Inventory Management and Warehouse Operations in Ethiopia

The Ethiopian Pharmaceuticals Supply Agency (EPSA), which manages the public health commodities supply chain in Ethiopia, is committed to improving access to and equity of essential medicines and related health commodities. Despite significant process improvements, a 2017 warehouse assessment of all branches revealed that challenges remained, including poor warehousing and inventory management practices and storage conditions. These inefficiencies resulted in pharmaceutical waste and product stockouts.

The Center of Excellence (COE) initiative systematically addressed these gaps by improving transparency and the performance of people, processes, and governance with continuous improvement of warehouse and

inventory management operations. The COE was piloted at the EPSA warehouse in Adama to adopt the private sector's best practices before scaling to EPSA's 18 branches. GHSC-PSM supports four pillars of work with this initiative:

1. Training and mentorship
2. Infrastructure
3. Process improvement and standardization
4. Data analysis and utilization

With support from GHSC-PSM, the Hawassa branch conducted an ABC/FSN/VEN analysis, categorizing products by value (ABC), transaction frequency (Fast/Slow/Normal moving), and importance (vital/essential/non-essential items). The branch developed a product category matrix, which eventually was used to determine storage methods.

For example, the hubs relocated fast-moving items to decrease the distance between the picking and dispatch locations.

GHSC-PSM supported sustainable warehouse operations by developing and implementing standard operating procedures (SOPs) and on-the-job training for staff. SOPs included receiving, product put-away, product picking, inventory tracking, and order processing. These practices improved inventory accuracy, operations efficiency, performance measurement, and commodities refill to health facilities. Staff facilitated mentorship and experience-sharing visits between hubs to share lessons learned. The COE initiative is part of a broader effort to obtain ISO 9001:2015 certification and to embed a culture of continuous improvement at all levels of EPSA operations. ■

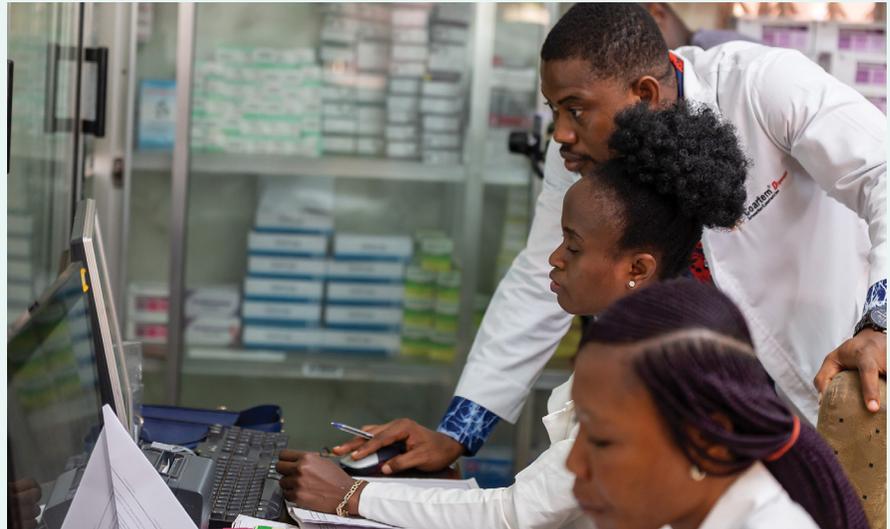


INFORMATION SYSTEMS AND DATA

Ghana Focuses on Governance and Change Management

The Ghanaian MOH's five-year Supply Chain Master Plan calls for strong supply chains that enable effective management of health commodities. The Global Fund-supported Ghana Logistics Management Information Systems program partnered with GHSC-PSM to help strengthen the country's LMIS, last-mile delivery, and warehousing and distribution services and expand PSE to expedite procurement of essential medicines. A central project goal is to have Ghana's regional supply chain users rely on data for decision-making. To this end, the project focused on the design, development, and implementation of a comprehensive, end-to-end LMIS that collects, records, and reports logistics data. This data enables supply chain decision-makers to operate accurate, timely, and rational medicine selection and delivery. The Ghana Integrated Logistics Management Information System (GhiLMIS) platform, in particular, was developed to provide visibility and analytics that would decrease operational costs; enhance collaboration with upstream and downstream suppliers, distributors, and 3PL providers; and improve management of chain of custody from Ghana's CMS to service delivery points.

After the project chose technology vendor One Network—a global supply chain software solutions firm which provides integrated demand, supply, and logistics management platforms—the GhiLMIS system requirements were defined by 35 use cases that emerged from the Ghanaian MOH's supply chain business processes. GhiLMIS triangulates data from multiple systems, including in-country and global platforms that



Pharmacists at Goaso Municipal Hospital entering consumption data on the GhiLMIS system. *GHSC-PSM Ghana*

With 2,500 end users and complete rollout to 161 sites including all of Ghana's Regional Medical Stores, GhiLMIS is providing a unified platform for the country's health supply chain stakeholders to report and collect data for decision making.

are focused on supply and demand planning, as well as warehouse, transportation, and performance management systems. By aggregating data instantly, GhiLMIS enables dynamic decision-making, reducing stockouts, expiries, and costs, and improving management of country resources. GhiLMIS data has been used to support and manage the distribution of lifesaving commodities from the central tier of the Ghana value chain. Ghana's government uses it as a single source for reporting on supply chain performance indices to its development and implementing partners. The

implementation of GhiLMIS has lowered inventory operations costs; it also provides real-time inventory and order visibility. By establishing a culture of data use as a business asset, the project promotes and enables system sustainability. With its focus on governance and change management, the project ensures that GhiLMIS will be fully utilized by the Ghanaian government and rolled out to all service delivery points—including last-mile facilities—proactively alerting and notifying users of important supply chain events. ■

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CASE STUDIES

Leveraging PSE to Strengthen Supply Chain Operational Capabilities



PROCUREMENT AND PURCHASING

An All-Inclusive Reagent Rental Model Optimizes Use of Laboratory Instruments

The Joint United Nations Programme on HIV/AIDS (UNAIDS) set an ambitious treatment target to help end the AIDS epidemic (UNAIDS, 2014): By 2030, 95 percent of all people 1) living with HIV will know their HIV status; 2) diagnosed with HIV infection will receive sustained ARV therapy; and 3) receiving ARV therapy will have viral suppression. Progress toward 95-95-95, however, is variable across sub-Saharan Africa, and efforts to move forward require laboratory networks that operate efficiently and at scale to ensure timely and accurate viral load (VL) testing.

Across Africa, laboratory networks face several challenges: uncoordinated instrument procurement, lack of long-term pricing, long procurement cycle times, breaks in cold chain during reagent delivery, weak sample referral networks, and laboratory site infrastructure issues. Sites experience low instrument

utilization, weak inventory management, reagent and supply stockouts, and expiries. Instrument management, too, has gaps, with irregular routine maintenance, frequent breakdown of test instruments, and lack of or delays with servicing and maintenance.

To solve these challenges, GHSC-PSM took an all-inclusive reagent rental approach through the Global VL request for proposals that looks at entire value chain.

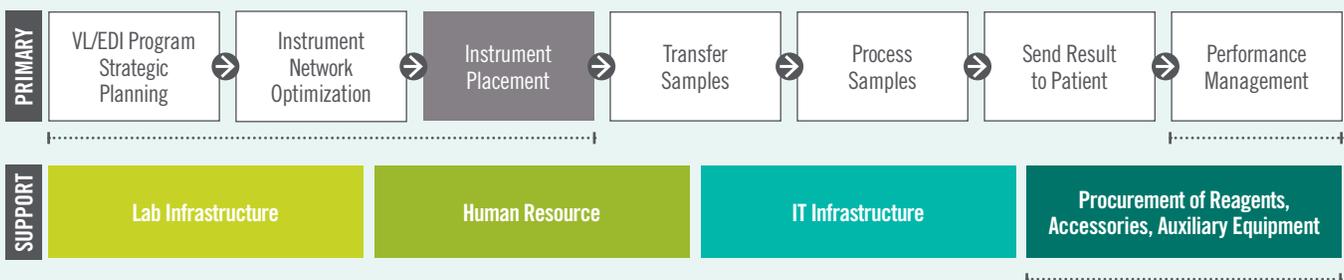
Instrument placement, preferably through an all-inclusive/reagent rental model, is a primary activity that adds tremendous value to the laboratory network. An all-inclusive per-test cost structure spread across all same-branded instruments within the network and available to all stakeholders is also a useful approach for efficiencies of scale. This model includes consumables, service, maintenance, vendor-managed inventory (in some cases), and

equipment placement in testing laboratories. This model also includes data solutions for patient result transmission and instrument/user performance to inform the VL dashboard, as well as network staff training and quality improvement.

Preparation to implement the all-inclusive model included several steps:

1. Baseline mapping of public health laboratory network and systems—including functional instruments, current utilization rates, and patient demand—to provide a dynamic understanding of the functionality of the national laboratory network and supportive systems, including commodity distribution.
2. Forecasting and supply planning to quantify numbers of sites, tests, products, etc.
3. Procurement and strategic sourcing included a shift from capital procurement to all-inclusive reagent rental pricing

Figure 1. Lab Value Chain



based on an optimized network, with robust contracts that include defined service terms and expectations, transparent pricing broken down by key elements, and incoterms and volumes that are defined in collaboration with all stakeholders. In October 2019, GHSC-PSM issued final awards to Abbott, Hologic, and Roche to meet U.S. President’s Emergency Plan for AIDS Relief’s (PEPFAR) goals. This approach has provided better data for donors and country governments to plan and budget; competitive pricing and terms to procure laboratory supplies and services; appropriate supplier diversity to reduce the impact of quality and supply risks; and increased cost savings and efficient funds use.

4. Performance management is an essential part of the approach, with KPIs that measure service, maintenance, reporting, and management; supply chain management that defines service expectations and holds vendors

accountable; and regular reports and check-ins for distributors and stakeholders to identify and address issues.

The reagent rental approach resulted in a lower, predictable price per test; easier budgeting; higher supplier performance; greater coordination; and a sharing of risk between manufacturers and stakeholders. For example, instruments under the Mozambique reagent rental agreements have 34 percent less down time compared to those under traditional, stand-alone service contracts, optimizing their use and return on investment. Figure 3 compares traditional equipment purchase-based models with all-inclusive advantages.

Implementation of the all-inclusive approach included these steps:

1. Mapping of laboratories’ and facilities’ geolocations.
2. Equipment optimization with appropriate site selection

and placement; point-of-care (POC), tuberculosis (TB), and HIV referral service integration; and careful consideration of utilization rates and equipment throughput.

3. Design of optimized laboratory and commodity distribution networks that consider future program growth and scale, as well as establishment of national integrated sample transportation networks.
4. Scenario modeling to refine assumptions; MOH used the Lab Efficiency and Quality Improvement Planning tool (LabEQIP) to model scenarios and laboratory networks, revealing several challenges, including data gaps, choices between sample referral network optimization, and budgetary and political constraints that redesigning a laboratory network can entail. ■

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Figure 2. Traditional Procurement Approach vs. All-Inclusive Reagent Rental Network Approach

	TRADITIONAL APPROACH	NETWORK APPROACH
	Separate Upfront Capital Procurement EQUIPMENT PURCHASE	Reagent Rental All-Inclusive Procurement EQUIPMENT PLACEMENT
Price Per Test	High, Variable	Lower and Predictable
Budgeting	Difficult	Easier
Supplier Performance	Poor	High
Infrastructural Requirements	Poorly Defined	Clearly Defined
Coordination	Poor	High
Risk	Client	Manufacturer/Distributor
Result Transmission	Poor	High
Efficiency	Poor	High



SUPPLY NETWORK DESIGN AND OPTIMIZATION

Leveraging Digital Tools for Network Optimization in Rwanda

To achieve UNAIDS “Treat All” strategy, the government of Rwanda implemented World Health Organization recommendations to emphasize VL testing to monitor antiretrovirals’ (ARVs) therapeutic effects. In 2017, the GHSC-PSM project partnered with LLamasoft, an international software firm that enables logistics providers to interconnect across their supply chain function. They convened Rwanda’s government stakeholders to demonstrate the value of referral network visualization and optimization through 1) the Cluster of Differentiation 4 (CD4) program’s scale down of conventional machines and redistribution of POC machines, or 2) VL program scale-up.

LabEQIP, an easy-to-use open-source platform developed by USAID, U.S. Centers for Disease Control and Prevention, and LLamasoft—is a data repository for laboratory network performance information; it also aggregates and analyzes data. Rwanda was the second country to use LabEQIP for network optimization. The platform links data from laboratories and other sources and aggregates it visually with maps, charts, and infographics. LabEQIP allowed Rwanda to analyze data and create efficient laboratory networks with data-driven optimization and geographic information system-based visualizations. The tool monitored laboratory instrumentation, location, sample referral networks, human resources

complement, and External Quality Assessment performance. After running data scenarios, the team recommended either of the two programs above. The government adopted the first scenario: to scale down CD4 machines from 92 (conventional and POC) to 22 POC machines, redistributing POC machines to recommended sites.

The result was that travel distance was reduced by 14 percent, and new referral sites reported workload reduction of 6 percent from the National Reference Laboratory side, which was overburdened. In addition, an order of 22 machines was cancelled, saving US\$240,000 in equipment and installation. ■

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FORECASTING AND SUPPLY PLANNING

Using Predictive Analytics Tools for Forecasting and Supply Planning: The Quantification Analytics Tool

Forecasting and supply planning, or quantification, are critical supply chain tasks. Each year, dozens of countries place orders with GHSC-PSM for essential health commodities. Quantification enables countries to know how much to procure and when commodities should be delivered to support patients. Many forecasting and supply planning tools, however, lack consistent user interfaces, fail to meet basic pipeline management requirements, and do not allow data integration from multiple sources without manual manipulation, often resulting in quality and version-control issues. To address these challenges, GHSC-PSM developed the Quantification Analytics Tool (QAT), a modern open-source, web-enabled forecasting and supply planning

solution that enhances data access and system interoperability. Building on years of forecasting and supply planning experience and utilizing open-source and pay-to-use private sector software—including Python, Power BI, Jura, and Amazon Web Services—QAT is the first open-source, program-agnostic, customizable global health forecasting and supply planning tool that links ERP systems to program managers’ forecasts and supply plans. Since December 2020, forecasting and supply planning personnel in Benin, Zimbabwe, Ethiopia, Botswana, Nigeria, Zambia, Burundi, and Laos have been trained on QAT; 10 country programs are submitting quarterly supply plans in QAT, with dozens to follow in coming quarters. Additional training

and program onboarding is planned for 2021. For long-term sustainability, QAT is hosted on Amazon Web services as a free, open-source platform for multiple supply planning initiatives. The tool also manages authentication, authorization, and auditing through an open-source Identity Access Management tool and produces comprehensive user, manager, and software documentation. By combining private sector resources with innovative approaches and enhanced features, QAT will enable further automation, integrative predictive analytics, and optimization, ultimately bringing greater stakeholder-partner connectivity in modern public health supply chains. ■

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STORAGE AND DISTRIBUTION

Vendor-Stored Inventory: Shorter Lead Times and Greater Cost Savings for Voluntary Medical Male Circumcision and Male Condoms in Malawi

The global demand for voluntary medical male circumcision (VMMC) kits and male condoms as HIV/AIDS preventive measures has been steadily increasing. With that increase, lead times to manufacture and deliver commodities by a limited number of qualified vendors also have increased. With several social marketing campaigns for VMMC and male condoms in the PEPFAR countries, it is critical to improve availability by reducing lead times and costs of these products.

Vendor-stored inventory (VSI) requires vendors to hold a specified amount of commodities for the buyer's sole use. GHSC-PSM has negotiated VSI agreements for several health commodities, including VMMC kits and male condoms. Under this approach, inventory is available to address urgent needs and is guaranteed to be shipped within 8-10 business days from vendor warehouses

to any GHSC-PSM and PEPFAR-implementing country.

In June 2018, GHSC-PSM received an urgent request for VMMC kits in Malawi. The request came less than a month before the country's peak VMMC campaign (July-September), when demand is at its highest. This campaign, in support of HIV prevention, accounts for up to 40 percent of all VMMC procedures for the entire year. Under normal circumstances, a procurement of this size would take at least seven months to manufacture and deliver. GHSC-PSM, however, had recently introduced VSI agreements with two prequalified VMMC kit manufacturers—Hong Kong-based SA Health Limited and South Africa-based PrionTexMicronclean Gauteng (Pty) Ltd.—and made 18,321 kits available within six weeks to meet Malawi's needs. Two additional shipments were made in the following weeks, fulfilling immediate demand as well as the

country's VMMC needs for the first quarter of FY2019. VSI has made it possible for GHSC-PSM to procure 790,000 VMMC kits in five countries and reduce lead times by 10 weeks, because kits are assembled and ready for processing within 10-14 days. The project can ship stock within 10 days of an order, reducing the risk of stockouts in critical times, preventing expiries and overstocks, and decreasing regional warehouse costs by circumventing regional distribution centers and shipping directly from the supplier to the recipient country.

GHSC-PSM recently expanded use of VSI to no-logo male condoms, saving more than over \$76,000 in storage and shipping costs. This is projected to cut costs by reducing the need for shipping and storage at regional distribution centers and will reduce lead times by completing quality assurance procedures well before shipment. ■



STORAGE AND DISTRIBUTION

Outsourcing Through a 3PL Service Model in Zambia

An important type of PSE occurs when public health supply chain managers outsource or contract core private sector services, such as warehousing, transportation, inventory management, and procurement. This can take many forms, ranging from contracting commercial sector storage and transport companies to transferring inventory control to commercial companies with vendor-managed inventory models. These supply chain functions can be partially or completely outsourced, depending on factors such as capabilities of the private sector, expertise of public sector health supply chain managers,

and public sector funding levels for contract agreements.

The Africa Resource Centre's Outsourcing Toolkit for African Healthcare Supply Chains highlights that there are several enabling, crosscutting components that support successful outsourcing with the private sector. First, those that are considering outsourcing must understand the government policies and regulations for outsourcing in the private sector, and prepare a business case that is based on improved performance and cost savings over time through outsourcing. Another factor is

the assessment of outsourcing as a driver of cost savings while maintaining or improving supply chain performance. It also is important to transition the responsibility for strengthening human resources and capabilities to the private sector partner to maintain a successful partnership. Additionally, advocacy practices and tools enhance outsourcing buy-in, contributing to an enabling workforce environment. Systems and technology should be used to enhance data visibility, reporting, decision-making, and overall supply chain operations throughout outsourcing.

Outsourcing has become increasingly common across developing country contexts as emerging economies take advantage of private sector growth. Commercial or NGO 3PL organizations and distributors support functions such as storage, transportation, and logistics. There are many benefits to outsourcing supply chain functions to 3PLs, including cost reduction, improved efficiency, risk mitigation, and gaining private sector expertise. Outsourcing reduces organizational risks and enables access to external resources, which can positively impact operating costs and improve efficiencies while improving supply chain performance.

For more developed private sector partners, there is another contracting approach called the 4PL strategy. These providers are system integrators that coordinate quantification; plan and conduct procurement; and manage freight forwarders, customs clearance, and other 3PLs—essentially taking responsibility for end-to-end supply chain operations on behalf of a client.

It is essential for government decision-makers to follow sound procurement and contract management processes, as well as to establish KPIs and have data systems that design and manage contracts. To support outsourcing, governments must increase capacity to design and manage contracts that are advantageous and beneficial to both sectors. Government entities, including MOHs, must manage contract length, terms, and finances to promote sustainability of the partnership, minimize financial risk for the private sector, and achieve supply chain outcomes. If contracts with the private sector are too short, significant upfront investments may not be made.

As a result, shorter contracts support larger, more diversified service providers, preventing local companies from engaging and participating (Beale, 2016).

In Zambia, the national public health supply chain network is doing its part to meet the universal test-and-treat initiative to reach the 95-95-95 target. Its Medical Stores Limited (MSL) are fulfilling individual orders for each HIV logistics system, including ARVs, HIV tests, lab commodities, and essential medicines to each health facility. GHSC-PSM supported the MSL to implement an innovative health commodity distribution system through a 3PL service model. The tripartite subcontract allowed for easy information exchange among parties, as well as MSL training in managing a 3PL contract. The 3PL subcontractor, Lechwe Express Zambia, provides fleet for distribution. It specializes in handling ARVs, HIV testing kits, and malaria drugs. Lechwe utilizes a comprehensive live-tracking system, Hawkeye Trackers, to track shipments.

The system allows users to create reports, including route maps, route animation, locations where the vehicle stopped (including duration), and boundary breach alerts. MSL provides purchase orders, loads commodities, and monitors the fleet. GHSC-PSM provides support and technical assistance to MSL to manage Lechwe. The 3PL system handles routine deliveries from MSL's central store to regional hubs and high-volume health facilities and emergency deliveries to districts or facilities. The intervention sought to improve Lechwe's management and performance and to promote commodity security by increasing essential operations data for performance monitoring, decision-making, improvement, and training

in contract management for MSL. By using a KPI tracking tool that the project developed in May and June 2018, the 3PL provided coverage to an estimated 409,000 HIV/AIDS patients by delivering to high-volume facilities that accounted for 43 percent of the MSL's distribution. From June to August 2018, average results tracked were based on new KPIs that demonstrated improved performance in delivery:

- MSL alert notice shared (Yes/No) improved from 56 percent to 83 percent, resulting in reduced emergency requests
- Vendor response time (within 8-24 hours) improved from 28 percent to 88 percent, allowing ample time for MSL to plan loading time
- Loading time at MSL (6 hours) improved from 6 percent to 61 percent, providing timely dispatch of trucks and delivery of commodities
- Lead time to destination (24 hours) improved from 33 percent to 89 percent, increasing stock availability at the SDPs
- Condition of truck at delivery (Good) improved from 96 percent to 100 percent, assuring good distribution practices for vital commodities

The tracking tool increased data visibility allowing for better subcontract management of truck availability and loading and lead times so that lifesaving commodities were at the right place at the right time. MSL and GHSC-PSM measured the KPIs weekly after an MSL focal person uploaded data. Monthly, a review team—MSL, the project, and the 3PL provider—discuss performance based on KPIs, acknowledge successes, identify areas for improvement, and agree on interventions. ■

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STORAGE AND DISTRIBUTION

Patient Segmentation and Community-Based Drug Distribution— Pharmacy Partnerships in Nigeria

Decentralized drug distribution (DDD) benefits overwhelmed public health supply chains in developing countries: It improves patients' ARV adherence and care retention, reduces transportation and human resource costs, and better serves urban and suburban populations.

Recently, there has been an increased focus on patient segmentation and differentiated care delivery approaches, aiming to bring medicines and health care to patients rather than requiring them to go to facilities. With regard to ARV distribution in particular, various models have been utilized to provide patient-centered care to improve patients' long-term ARV adherence.

Emerging efforts such as DDD are being used to reach population segments that rely on community-based and private clinics and drug shops. DDD increases the number of locations for clients to get their medicine, particularly ARV for HIV/AIDS. More patients remain in care when they have easy access to medicines, helping them to achieve viral suppression. DDD uses the controlled distribution of health products, allowing for price markups and increased engagement of the robust small-business network and pickup points.

The USAID Nigeria Strategic HIV/AIDS and Tuberculosis (TB) Response Program (Nigeria SHARP) works to improve the quality of high-impact HIV and TB prevention and treatment services and to strengthen local health systems to respond to the epidemic. With the emergence of the COVID-19 pandemic in Nigeria in early 2020, movement restrictions and curfews hampered services. Additionally, because of the COVID-19 infection risk, many individuals avoided health facilities. The SHARP program responded by rapidly decentralizing services from the facility to the community level. To expand service delivery and further enable DDD, the program partnered with community pharmacies for ARV therapy distribution. The Pharmaceutical Society of Nigeria contacted community pharmacies; 55 were enlisted to provide HIV/AIDS and reproductive health commodities.

This approach will prove beneficial for the public and private sectors.

Consultation fees will be paid to community pharmacies at the patient level to offset the cost of client tracking and reporting. Additionally, with these partnerships, the community pharmacies' business and networks have the potential for expansion, because patients are likely to return for future health needs and medications. By partnering with community pharmacies, the SHARP program seeks to achieve significant gains to HIV treatment initiation, adherence, and retention. Specifically, partnerships with community pharmacies ensure continuity of HIV services and reduce overcrowding of health facilities, minimizing COVID-19 transmission and protecting people living with HIV. Partnering with community pharmacies alleviates the burden on generally high-volume, understaffed public facilities, resulting in reduced patient wait times and ensuring timely medication delivery. ■

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STORAGE AND DISTRIBUTION

Unmanned Aerial Vehicles for Health Commodity Transportation and Delivery in Malawi

The strategic deployment of Unmanned Aerial Vehicles (UAVs) or drones can increase availability and access to lifesaving health commodities. This option reduces lengthy delivery times for treatment, lab samples, and test results for hard-to-reach health facilities and patients; it can also be advantageously integrated into existing supply chain systems. The use of cargo UAVs in development is limited, due in part to a lack of funding, challenging regulatory hurdles, and inadequate coordination between donors and implementers. Moreover, there has been a lack of transparent information sharing from past or existing UAV activities, most of which have been limited to one- to two-week periods. Consequently, the USAID GHSC-PSM project conducted a comprehensive eight-month UAV-integration activity in Malawi that explored the benefits, cost, and operational considerations in using drones for public health delivery.

After a competitive procurement from UAV manufacturing and flight operating partners Wingcopter and Swoop Aero, GHSC-PSM used drones to deliver sputum and blood samples from seven hard-to-reach points across Malawi to a testing facility (Dubin, et al., 2019). The results were dispatched the same way. With the drone, the activity quickly and efficiently tested and dispatched results for HIV and TB, bypassing traditional transportation methods that would have taken days or weeks by motorbike, ferry, and hired boat.

Although it sought to demonstrate improved health outcomes, the activity also trained local stakeholders and partners. Trained

UAV operators and safety pilots represent an expanded pool of professionals in the drone industry in developing countries; they will have new opportunities to promote and support the use of UAVs in the commercial space. The GHSC-PSM project laid the foundation for this activity by conducting a landscape assessment and a series of scoping trips to validate the existence of a clear-use case for UAVs; determine the level of existing local support; and understand the regulatory, technical, and logistical challenges.

There are several key logistical and operational preparations for smooth implementation of UAV activities: understanding regulatory concerns, conducting scoping visits, securing stakeholder buy-in; setting up a monitoring and evaluation framework, and planning for activity localization. The careful selection of Swoop Aero, the Australian small business and UAV provider that was contracted by the GHSC-PSM project, was central to this multimonth activity. Swoop Aero guaranteed the availability of assets and had an in-country presence, so it could quickly provide three-dimensional printing of replacement parts, as well as onsite maintenance. The provider also provided flight data monitoring that was accessible to all project stakeholders worldwide so they could track progress and take corrective action. Swoop Aero's UAVs could assess return logistics for bidirectional flights, enabling the activity team to plan takeoffs and landings in small spaces.

The project developed a detailed work plan that included flight communication, safety protocols, UAV maintenance and repair schedule, risk mitigation strategies, proposed applications with the



Cargo drone pilot program in Malawi as a last-mile delivery solution for the country's health supply-chain. *Moving Minds Multimedia for UNICEF Malawi*

greatest impact, and community engagement approaches. Subsequently, GHSC-PSM secured clearance from Malawi's Department of Civil Aviation to proceed with the activity. At the end of June 2019, flight tests began at Malawi's national park, Nkhata Bay district hospital, and Likoma Island to demonstrate UAV capability and to sensitize communities living in flight paths. Today, the drones are making 162-kilometer round trips daily, marking the first directional drone deliveries in Malawi.

The UAVs carried VL and early infant diagnosis laboratory results to patients and returned with samples for processing at Malawi's Saint Peters Hospital. For 140 patients on the island, the new method decreased test result delivery by eight weeks; it also reduced resupply time of lifesaving medicines and vaccines for emergencies. This operation has become the first to conduct bidirectional delivery and collection of commodities over multiple months. ■

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Conclusion

While they benefit from working with the private sector, public health supply chain actors still face a number of challenges when engaging with the private sector for the right functions at the right time. Challenges include limited organizational or skilled human resource capacity to manage private sector contracts, as well as misalignment with private sector incentives and KPIs. There also is a lack of visibility into and timely data for the true operational costs for decision-making, and political and operational concerns persist over a perceived loss of control. On the other hand, the private sector faces challenges with the public sector, such as short contracts, disparate quality control approaches, delayed payments, inaccurate information, and limited operational capacity.

PSE in health supply chains will continue to evolve as countries mature in their supply chain management practices and respond to dynamic shifts in public health needs and markets. Meanwhile, donors and donor-aligned implementing partners are also learning and adapting their approaches to facilitate higher levels

of PSE in LICs and LMICs. Donors aim to focus support in pivotal areas, such as procurement mechanisms and health financing, to help LICs and LMICs move from overreliance on donor funding toward innovative, resilient, efficient, sustainable supply chains. Their support can include schemes for financial management backing to derisk private sector investments, funding public sector staff capacity development on governance and oversight of supply chain activities, or supporting cost-effective analysis to outsource key functions and better grasp the business case for bringing in private actors. In this environment, donors and implementing partners can play a key role in developing educational and certification programs and opportunities that institutionalize the professionalization of supply chain and pharmaceutical management.

The transformation of roles in health supply chains and the timeline in which these changes take place will differ between countries; no single model will fit every operating context or stakeholder need and capacity. Ultimately, public and

private sector actors, donors, and implementing partners must recognize that no single actor can solve a country's health supply chain challenges alone. Government and the public perception of the private sector's inability or unwillingness to serve hard-to-reach populations can be overcome with the right partnerships and contracting mechanisms which combine services used by profitable population segments with those used by less affluent populations that rely on public health service. Because poor and inconsistent communication is a key factor in the failure of effective PSE, it is important to hold regular forums for public and private sector supply chain actors to communicate needs and changes in policy, regimens, or other factors that affect supply planning and procurement. The end goal is to have a resilient, integrated, data-driven, efficient, cost-effective health supply chain that leverages the comparative advantages of the public and private sectors to measurably improve and sustain strong supply chain performance—one that ultimately benefits the populations that rely upon strong performance for their health and medical care.

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