

Ghana National Supply Chain Assessment

Capability and Performance

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Acronyms

3PL	third-party logistics
ACT	artemisinin-based combination therapy
ALu	artemether-lumefantrine
ART	antiretroviral therapy
ARTMIS	Automated Requisition Tracking Management Information System
ARV	antiretroviral
ASAQ	artesunate + amodiaquine
BI&A	Business Intelligence and Analytics
CDC	U.S. Centers for Disease Control and Prevention
CHAI	Clinton Health Access Initiative
CHPS	Community-Based Health Planning and Services
CMM	Capability Maturity Model
CMS	central medical store
COP	Country Operational Plan
CYP	couple years of protection
DHA	district health administration
eLMIS	Electronic Logistics Management Information System
EPI	Expanded Programme on Immunization
FASP	forecasting and supply planning
FDA	Food & Drug Authority
FHD	Family Health Division
FP	family planning
GF	Global Fund
GHS	Ghana Health Services
GHSC-PSM	Global Health Supply Chain-Procurement and Supply Management
GOG	Government of Ghana
HC	health center
HDI	human development index
HQ	headquarters
IHS	Imperial Health Sciences
LMIS	Logistics Management Information System
KPI	key performance indicator
MNCH	maternal, newborn, and child health
MOH	Ministry of Health
NACP	National AIDS Control Program
NEML	National Essential Medicines List
NHIA	National Health Insurance Authority
NHIS	National Health Insurance Scheme

Executive Summary

The Ministry of Health (MOH), Technical Working Group, Ghana Health Service (GHS), United States Agency for International Development (USAID), and USAID Global Health Supply Chain Program-Procurement and Supply Management (GHSC-PSM) project conducted fieldwork in Ghana for the National Supply Chain Assessment (NSCA 2.0) from August 19 to September 6, 2019. The NSCA measures the capability, functionality, and performance of supply chain functions at all desired levels of a national health supply chain system. The assessment toolkit collects information through three primary methods: a supply chain system mapping exercise, the Capability Maturity Model (CMM) questionnaire, and the collection of key performance indicators. The 11 functional areas of effective supply chains assessed by the CMM survey are shown in Exhibit I.

Exhibit I. NSCA 2.0 CMM functional areas

Strategic Planning and Management

Policy and Governance

Human Resources (HR)

Financial Sustainability

Forecasting and Supply Planning

Procurement and Customs Clearance

Warehousing and Storage

Distribution

Logistics Management Information System (LMIS)

Quality and Pharmacovigilance

Waste Management

The primary objectives of this assessment were as follows:

- Analyze and measure the performance, operational capacity, maturity, and capability of the national public sector–financed health commodity supply chain
- Identify progress to date on key technical areas outlined in the Supply Chain Master Plan (SCMP), 2016–2020, and gaps in implementation progress
- Develop a comprehensive baseline of stock availability and logistics data quality for the LMIS implementation activity
- Serve as a “source of truth” and strong quantitative basis to inform development of the next Supply Chain Master Plan, 2021–2025

The assessment focused exclusively on the public-sector supply chain, or that which is directly financed by the Government of Ghana (GOG) or public-sector funding. The NSCA sampled public facilities across multiple levels of the supply chain system—Community-Based Health Planning and Services (CHPS) and clinics, health centers and polyclinics, district hospitals, and district health administrations. Also, it censused all 10 regional hospitals, four teaching hospitals, and 10 regional medical stores. Finally, at the central level, the MOH, GHS, National Disease Programs, Temporary Central Medical Stores, and the Imperial Health Science warehouse were individually assessed on appropriate technical areas. The NSCA assed a total 254 sites.

Results from the assessment are presented below by technical area, with additional cross-cutting and concluding analysis. Each section begins by introducing prior analysis of the status of the technical area

in Ghana's system and outlining the recommendations and priority actions for implementing the 2015 SCMP. In this context, we then present and analyze the new NSCA data on the current state of capabilities and level of performance. Each technical section concludes with a set of tailored recommendations. Broadly assessing Ghana's supply chain in the context of the SCMP focuses the analysis on known challenges and established priorities, and thus highlights continued gaps or opportunities that require immediate prioritization to ensure progress toward these goals.

Overall, this assessment found broad presence of key capabilities (e.g., standard operating procedures (SOPs), policies, best practices, infrastructure, resources) throughout the system, especially at the higher levels of the system. Ghana's public health supply chain benefits from a plethora of existing systems and strategic-level plans and guidance for the overall health system, pharmaceutical sector, and supply chain management specifically—e.g., National Essential Medicines List and Standard Treatment Guidelines; the Supply Chain Master Plan; activity-specific policies, guidelines, and SOPs; program- and facility-level forecasts, supply plans, implementation plans, and more. This is a valuable starting point for improving system capabilities and performance.

To date, however, existing capabilities have failed to translate to consistently high performance on key supply chain indicators, especially in stockout rates. On the day of the assessment, 47 percent of health centers and polyclinics were stocked out of the first-line ACT, AL 6x4. Nonprogram drugs face the same issue; paracetamol 500mg tablets had a 42 percent stock-out rate on the day of the assessment at health centers and polyclinics. During data collection this was consistently and repeatedly explained by assessed facilities in the persistent challenge of delayed reimbursements and subsequent debt, which in turn undermine timely and sufficient procurement. However, this dynamic is not applicable to donor-financed commodities. Since the time of this data collection, PEPFAR specifically has focused their efforts on supporting select facilities in the Western Region of Ghana. Somewhat counterintuitively, the NSCA found that key capabilities related to financial management and responsible procurement exist at multiple levels throughout the system.

Without financial resources flowing freely through the system, capabilities do not translate into high performance. Large proportions of assessed sites reported budget shortfall for health commodities in the previous year, including more than a third of lower-level service delivery points, 40 percent of regional hospitals, 70 percent of regional medical stores, and 75 percent of teaching hospitals. The NSCA results thus add to those of previous assessments in identifying reliable and sufficient funding as a crucial bottleneck in the current supply chain system, with problematic and significant downstream implications for the availability of health commodities. Resolving outstanding debts and reforming funding streams remain an overwhelming priority for ensuring a strong supply chain into the future.

MOH and GHS share strategic planning and management responsibilities within the Ghanaian supply chain system. Individually, both approached but fell short of the NSCA's recommended 80 percent capability maturity scores in several key central-level technical areas—including strategic planning and management (67 percent and 51 percent, respectively), policy and governance (76 percent and 67 percent), financial sustainability (79 percent and 52 percent), and procurement (67 percent and 65 percent). An overarching strategic question remains whether these individual MOH and GHS scores are complementary and additive, or duplicative and potentially redundant. At the same time, the conglomeration of budget and authorities at the regional level creates the potential for mismatch in oversight and governance that poses a risk to effective supply chain management.

In 2015, the SCMP proposed creating a single Supply Chain Management Agency to consolidate and streamline system governance and management. This proposal was not subsequently implemented. Ultimately, a centralized supply chain agency is one option for ensuring a strategic, comprehensive, and

effective approach to governing, managing, and reforming the public health supply chain. In all cases, however, an overarching priority remains: ensuring that all necessary supply chain functions are covered; that existing entities are sufficiently empowered; and that the respective roles, responsibilities, and relationships among actors are clearly and universally understood. While the central-level structure of the system remains essentially a political decision, the NSCA helps to illustrate the extent to which the MOH and GHS retain important, yet individually insufficient, capabilities to independently and fully execute the core supply chain activities assessed.

The assessment also captured a distinct HR dynamic. Significant supply chain–specific training opportunities exist in Ghana, including classroom training, structured on-the-job training, e-learning and certificate programs, and collegiate programs in supply chain. However, these HR capabilities have yet to translate into positive performance in adequately and appropriately staffing supply chain functions throughout the health sector. While facilities generally reported low turnover ratios for supply chain personnel, the percentage of supply chain positions vacant is alarmingly high. In the most extreme case, GHS headquarters reported no turnover of supply chain personnel in 2018 or 2019, but 44 percent of its positions were vacant. A contributing factor may be the failure to universally prioritize and formally ensure that key supply chain functions are considered in staffing decisions at all levels. Storage and inventory management, for example, is formally included in the job descriptions of at least one site personnel in 75 percent or more of hospitals and regional medical stores; however, only 6 percent of CHPSs and clinics and 8 percent of health centers and polyclinics reported the same. Exclusion of supply chain functions from formal job descriptions risks them being deprioritized in daily operations.

Simultaneously, in the context of widespread shortages in human resources throughout Ghana’s public health system, one option is to consider decoupling supply chain qualifications from pharmaceutical qualifications and recognizing the supply chain as a distinct professional field within public health. A supply chain professional with a pharmaceutical background is certainly advantageous, especially when medicines are being managed in the warehouse, but in may not necessarily be required. Divorcing the qualifications may reduce the competition for pharmaceutical professionals (currently being recruited away from pharmaceutical-specific positions into supply chain ones) and increase the pool of personnel (to include pharmaceutical and supply chain experts), addressing the widespread personnel shortages.

Finally, waste management and pharmacovigilance capability scores were found to be consistently low across all last-mile facilities, from CHPSs to district hospitals—meaning that few basic capabilities are consistently in place for these facilities. Only 20 percent of regional medical stores, a key procurement point in the supply chain, reported that samples of pharmaceutical products are regularly taken for testing. In waste management, many key capabilities—including waste management regulations, guidelines and SOPs, reverse logistics, and a national regulatory agency—were found to exist at the national level; however, few lower-level facilities could produce extant guidelines or SOPs when asked. No assessed CHPSs or clinics, only 7 percent of health centers and polyclinics, and 36 percent of district hospitals produced the relevant SOPs. This vulnerability within the public health system exposes the country to the risk that poor-quality, unusable, and expired commodities remain in the distribution system. Reports of higher capabilities at higher-level facilities suggest that protocols and best practices exist in the system but have yet to be fully disseminated (including provision of sufficient funding and training), pointing to an opportunity for high-impact intervention at a relatively low cost.

In sum, the 2019 NSCA provides a detailed, updated assessment of the current state of the capabilities and performance of Ghana’s health supply chain system in advance of the coming revisions to the Supply Chain Master Plan. The prior 2015 SCMP systematically identified challenges within the system, outlined objectives for the future, and proposed numerous interventions toward that end. This 2019 NSCA demonstrates that progress has been made on several fronts, even as it identifies persistent gaps and

opportunities for improvement. The authors of this report are confident that with strong leadership, strategic investment of financial and human resources, and proper empowerment of key stakeholders, appropriate reforms, including those proposed here, can be implemented to further advance the capabilities and performance of Ghana's public health supply chain.

Background

Ghana's Public Health Context

The population in Ghana has almost surpassed 30 million (2018 estimate), with an annual population growth rate of 2.2 percent.¹ In 2017, the country scored a 0.592 on the human development index (HDI), which places Ghana in the medium human development category.² Since 1990, the country's HDI value has increased 30 percent, reflecting improvements in health, education, and standard of living outcomes over the past three decades. In this period, Ghana's life expectancy at birth increased by 6.2 years to 63 years, and gross national income per capita more than doubled to reach just over \$4,000 a year (2011 purchasing power parity).

In 2003, the Government of Ghana (GOG) set an ambitious goal of achieving universal access to a quality package of essential health care.³ Over the past decade and a half, the country has expanded access to health care by increasing the number of health care professionals, creating community-based primary health programs, and implementing a national health insurance scheme. Communicable diseases remain the biggest cost to the country, in the financial and mortality burden, accounting for 51 percent of total deaths. In 2016, three of the four leading causes of death—in order, malaria, lower respiratory infections, ischemic heart disease, and HIV/AIDS—were communicable diseases. In 2014, total health expenditures totaled 3.6 percent of gross domestic product for an average of \$145 per capita.⁴ The Ministry of Health (MOH) budget increased in the 2000s as the country's economy expanded, but then decreased as a proportion of the total government budget in recent years. In 2010, the domestic government health expenditure accounted for 12 percent of total government expenditures; by 2016, this decreased to 7 percent.⁵ Ghana has yet to reach the 15 percent target agreed upon by all African Union states in the Abuja Declaration of 2001.

In the health care workforce, Ghana has made some progress in training and retaining health workers. Between 2005 and 2015, the density of health care workers almost doubled from 1.07 to 2.14 per 1,000 population.⁶ While a remarkable increase, the average falls short of the recommended 2.3 doctors, nurses, and midwives per 1,000 population, an international benchmark linked to achieving assisted

¹ The World Bank (2019), *The World Bank: data*, Ghana, retrieved from <https://data.worldbank.org/country/ghana>.

² UNDP (2018). *Human development indices and indicators: 2018 statistical update*, Ghana, retrieved from http://hdr.undp.org/sites/all/themes/hdr_theme/country-notes/GHA.pdf. This is a summary measure for assessing long-term progress in three basic dimensions of human development: a long and healthy life, access to knowledge, and a decent standard of living.

³ As far back as the 1970s, Ghana committed to the "Health for All" movement and adopted the Ghana Primary Health Care Strategy in the late '70s and early '80s.

⁴ World Health Organization (WHO). (2018). Ghana. Retrieved from <https://www.who.int/countries/gha/en/>.

⁵ WHO. *Global health expenditure database*. Retrieved from <http://apps.who.int/nha/database/ViewData/Indicators/en>.

⁶ Asamani, J. A., Chebere, M. M., Barton, P. M., D'Almeida, S. A., Odam., E. A., & Oppong, R. (2018). Forecast of healthcare facilities and health workforce requirements for the public sector in Ghana, 2016–2026. *International Journal of Health Policy and Management*, 7(11):1,040–1,052.

delivery rates of 80 percent.⁷ One study estimates that the health care workforce currently fulfills only 68 percent of that required to attain the government's aim of universal health care by 2020.⁸

Further, averages mask significant geographic disparities throughout the country in access to health care. For example, in 2016 the GHS reported the presence of one doctor for every 3,582 persons in Greater Accra, but only one for over 25,000 persons in the Upper East region.⁹ Overall, the distribution of the health workforce is greatly skewed to the two popular urban cities in Ghana, Accra and Kumasi, while rural hospitals have fewer, often less-qualified, and generally overworked health personnel.¹⁰ The Ghanaian government has instituted programs aimed at incentivizing work in rural areas, but many studies document that challenges persist in rural workforce retention, including income disparity, limited career progression, the absence of proper equipment and infrastructure, and workload.¹¹ The proportion of the population living in urban areas continues to increase in the country—from 43.8 percent in 2000 to 50.9 percent in 2010, and is projected to exceed 63 percent by 2025.¹² In health implications, urbanization correlates with increased proximity and better access to health infrastructure, but these benefits are simultaneously undermined by negative health outcomes related to high-density living in poor sanitary conditions.¹³

Ghana's Public Health Supply Chain

Within the broader health ecosystem, an effective and efficient public health supply chain ensures that quality medicines and medical supplies are available in appropriate quantities when and where they are needed. Ghana's public health supply chain has been recognized as fundamentally important to the country's goal of universal health care and as an opportunity for significant improvement. This section introduces the country's current supply chain structure and the 2015 Supply Chain Master Plan, which outlined reforms and strategic activities intended to improve the system.

Ghana's public health system is organized hierarchically, with substantial overlap and decentralization of supply chain responsibilities. At the top is the MOH and its agencies, which are collectively responsible for establishing standard guidelines and operating processes, regulating the sector, directing actions, and coordinating and allocating resources. Numerous directorates and units within the MOH contribute to supply chain management, including the Procurement and Supply Directorate, Procurement Unit, Office

⁷ WHO. (2006). *Working together for health: the world health report 2006*. Geneva: WHO. And it falls even further from the updated 2016 benchmark of 4.45 physicians, nurses and midwives per 1,000 population. This more ambitious benchmark expands beyond one health service and considers needs to achieve universal health care and sustainable development goals. Global strategy on human resources for health: Workforce 2030, 2016, retrieved at https://www.who.int/hrh/resources/pub_globstrathrh-2030/en/.

⁸ Asamani, J. A., Chebere, M. M., Barton, P. M., D'Almeida, S. A., Odame, E. A., & Oppong, R. (2018). Forecast of healthcare facilities and health workforce requirements for the public sector in Ghana, 2016–2026. *International Journal of Health Policy and Management*, 7(11):1,040–1,052.

⁹ Ghana Health Service. (2017). *Health sector in Ghana: facts and figures*, p. 26.

¹⁰ Adua, E., et al. (2017). Emerging issues in public health: a perspective on Ghana's healthcare expenditure, policies and outcomes. *The EPMA Journal*, 8(3), 197–206. Retrieved from <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC5607056/>.

¹¹ e.g., Johnson, J. C., et al. (2011). For money or service? A cross-sectional survey of preference for financial versus non-financial rural practice characteristics among Ghanaian medical students. *BMC Health Services Research* 11, 300.

¹² Ghana Statistical Service. (2014). *Urbanisation: 2010 population and housing census report*. Retrieved from [www.statsghana.gov.gh/gssmain/fileUpload/pressrelease/Urbanisation in Ghana.pdf](http://www.statsghana.gov.gh/gssmain/fileUpload/pressrelease/Urbanisation%20in%20Ghana.pdf).

¹³ Ibid.

of the Chief Pharmacist, Food & Drug Authority (FDA), and National Health Insurance Authority (NHIA). Uniquely, implementation of Ghana's public health policies is managed by a second "autonomous executive agency," the Ghana Health Service (GHS). The GHS was established by the Ghana Health Service and Teaching Hospitals Act (525) of 1996, which created an agency model for the MOH. The GHS is a public health service delivery agency of the MOH, governed by the GHS Council. It is responsible for providing and managing health services at the regional, district, and subdistrict levels. Act 525 also established teaching hospitals as autonomous agencies under the Ministry of Health, mandated to provide advanced clinical health services to support health services provided by the GHS, serve as an undergraduate and post-graduate training ground for the medical profession, and research health issues to improve health in the country. Each teaching hospital is autonomous with its own board of directors.

Ostensibly, the MOH creates public health policies, including supply chain regulations and guidance, and the GHS implements them, although the division of labor in practice sometimes overlaps. The Public Health Programs (e.g., the National Malaria Control Program and the National Tuberculosis (TB) Control Program) sit within the GHS, and the GHS manages the country's 10 regional medical stores. The MOH, however, directs the Temporary Central Medical Store (TCMS), and MOH and GHS have separate procurement units/directorates. Finally, several functions that affect the public health supply chain are implemented by separate agencies of the MOH, including quality assurance (led by the FDA) and financing (NHIA).

Ghana's current health supply chain involves several layers of storage and distribution. The public supply chain remains in a transition period, which began after the 2015 CMS fire left product storage splintered across multiple central level entities. There are two main central-level warehouses. In Tema, the Imperial Health Sciences (IHS), a private sector pharma-grade warehouse, holds product donated by the Global Fund (GF) and USAID. In Accra, the TCMS stores products procured by other donor agencies, the MOH, and GHS. The public TCMS and private IHS in turn serve 14 lower facilities—the country's 10 regional medical stores (RMSs) and four teaching hospitals that serve patients directly. Commodities are distributed from the IHS warehouse to RMSs by third-party logistics (3PL) providers contracted by GF and USAID through GHSC-PSM. These deliveries are scheduled to occur six times a year, though the schedule has suffered some inherent delays in the process.¹⁴ RMSs often send their own trucks to pick products up from the TCMS. From each of the 10 RMSs, products flow directly to service delivery points (SDPs). Last-mile distribution has been streamlined in recent years, with a monthly or bimonthly scheduled delivery of commodities to SDPs, using USAID and or GF-funded 3PL partners or region-owned trucks.

At the SDP level, multiple types of health facilities in Ghana provide decreasing levels of health services—namely, regional and district hospitals, polyclinics, health centers, clinics, and CHPS facilities. In 2016, the World Bank estimated that Ghana has 3,500 public, private, and faith-based health care facilities.¹⁵ A total 57 percent of these facilities are public, 33 percent are private, and 7 percent are operated by the Christian Health Association of Ghana. The share of private facilities ranges from 5.4 percent in the Northern region to 74.9 percent in the Greater Accra region. At the lowest levels, district health administrations (DHAs) play a vital role in managing the supply chain for smaller facilities, especially in rural and difficult-to-reach communities—supporting professionals, ensuring availability of

¹⁴ In 2017, four distributions from the central level occurred. In 2018 and 2019, five were conducted.

¹⁵ Wang, H., Otoo, N., & Dsane-Selby, L. (2017). Ghana National Health Insurance Scheme: improving financial sustainability based on expenditure review, World Bank. Retrieved at <http://documents.worldbank.org/curated/en/493641501663722238/pdf/117828-PUB-PUBLIC-pubdate-7-31-17.pdf>.

essential medicines, balancing demand and stock across facilities, consolidating and relaying financial and logistics information, and managing accountability for insurance claims.

Throughout the public health system, funding is a challenge, with implications for the country's supply chain. A major change in the Ghanaian health care sector occurred in 2003 with the enactment of the National Health Insurance Law and the subsequent creation of the National Health Insurance Scheme (NHIS) beginning in 2004. Ghana was the first sub-Saharan African country to introduce a national health insurance scheme. Its implementation has been a mixed success. The NHIS currently covers about one-third of the Ghanaian population, covers 95 percent of all diseases in Ghana, has greatly reduced out-of-pocket expenditures, and increased use of health services.¹⁶ It is funded through tax revenue (74 percent), social security deductions (20 percent) and household premiums (3 percent), and claim payments represent over 80 percent of health facilities operational expenses.¹⁷

Despite these achievements, a high proportion of the populace (often rural citizens) has yet to enroll because of poverty, as they cannot afford the NHIS registration fee, and universal coverage remains elusive.¹⁸ The scheme is also marred by persistent underfunding and liquidity challenges that have undermined the public health supply chain. NHIS reimbursements to facilities are often significantly delayed—averaging eight to 10 months in 2016—and rarely reflect market prices.¹⁹ The 2015 Supply Chain Master Plan explained the upstream implications: “The supply chain is marred by payment delays and long-standing indebtedness: from the NHIA to facilities, from facilities to the RMSs, from the RMS to the CMS, [and] these delays and debts have a significant negative impact [on] the ability of the CMS and RMSs to complete future procurements.” The plan concluded by emphasizing, “the financial sustainability of the NHIA also continues to be a serious threat for the health system.”

Ghana has a large wholesale pharmaceutical market, estimated at US\$522 million in 2014.²⁰ Imports comprise 70–80 percent of total pharmaceuticals by value, as most domestic manufactures can produce only low-cost generic drugs. Dependence on imported pharmaceuticals exposes NHIS to price changes and exchange-rate volatility. Procurement responsibilities are distributed throughout the system. Central procurement is largely limited to a few products, including antiretroviral drugs, antimalarial drugs, oxytocin, snake antivenin, rabies vaccine, and a few other special items. With the enactment of the Public Procurement Act, the RMSs assumed responsibility for procuring essential health commodities and medical consumables, while program commodities continued to be donated or procured at the central level by MOH. An estimated 80 percent of pharmaceuticals dispensed in public health facilities are procured by the RMSs, teaching hospitals, or downstream facilities directly from

¹⁶ Adua, E., et al. (2017). Emerging issues in public health: a perspective on Ghana's healthcare expenditure, policies and outcomes. *The EPMA Journal*, 8(3), 197–206. Retrieved from <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC5607056/>.

¹⁷ Wang, H., Otoo, N., & Dsane-Selby, L. (2017). Ghana National Health Insurance Scheme: improving financial sustainability based on expenditure review, World Bank.

¹⁸ e.g., Van der Wielen, N., Channon, A. A., Falkingham, J. (2018). Universal health coverage in the context of population ageing: what determines health insurance enrolment in rural Ghana?. *BMC Public Health*, 18(1):657; Kotoh, A., et al. (2018). “Factors that influence enrolment and retention in Ghana's National Health Insurance Scheme, *International Journal of Health Policy and Management*, 7(5), 443–454.

¹⁹ Global Fund. (2016). *Ghana public health supply chain, economic business case, final report*.

²⁰ Wang, H., Otoo, N., & Dsane-Selby, L. (2017). Ghana National Health Insurance Scheme: improving financial sustainability based on expenditure review, World Bank.

private distributors.²¹ Funding shortages and stock-outs at higher levels of the supply chain have resulted in increasing issues of “certificates of nonavailability” that allow nodes down the chain to buy direct from the private sector.²² The fragmented procurement process makes quality control and price regulation challenging and results in redundant administrative burdens throughout the system. Nationally, the Public Procurement Authority (PPA) is responsible for harmonizing the process of public procurement to ensure efficient, transparent, fair, and valued use of funds. The PPA’s mandate, however, is governmentwide, not specific to the MOH, and the practices are not always tailored to the uniqueness of health commodity procurement.

Beginning in 2011, the country began a process of strategic review intended to develop a vision for the future of the public health supply chain. Numerous studies and assessments had examined the supply chain, identifying strengths but also “major challenges to availability, quality, affordability and rational use.” One assessment concluded, the “supply chain is not adequately functioning [in that] medicines do not get where they are needed and stock-outs of essential medicines are a regular occurrence.”²³ Overall, the GOG recognized that its public health supply chain “suffers from serious fragmentation deficiencies, not just across commodity groups, but also in relation to functions, levels, and MOH agencies.”²⁴ A Technical Working Group multiple was created to lead the process of defining the vision, key principles, and strategic interventions needed to form a comprehensive improvement plan for the supply chain. The resulting document, the Supply Chain Master Plan (SCMP), provides a framework for reforming the supply chain to “ensure that good quality health commodities are available, accessible and affordable to all people living in Ghana and anchored by a sustainable, reliable, responsive, efficient and well-coordinated supply chain.” Owing to initial implementation challenges, the SCMP was revived and reviewed in 2014 and 2015. The finalized document establishes priorities for supply chain improvements over a five-year period, 2015–2020.

A key initiative in the SCMP is creating a new agency or authority within the Ministry of Health intended “to consolidate/coordinate many of the supply chain management functions currently scattered throughout various government departments.” The new Supply Chain Management Agency (SCMA) was intended to subsume key supply chain functions led by the SSDM of GHS and procurement and supplies director of MOH, as well as fuse the CMS and the 10 RMSs. It would assume numerous responsibilities, including “provid[ing] a direct supervisory and organizational relationship between the central and middle levels of the supply chain, strengthen[ing] information systems, advanc[ing] data visibility, emphasiz[ing] transparency, accountability, efficiency, and cost-effectiveness, and increas[ing] the value of the supply chain for end-users.” The SCMP outlined a process whereby this SCMA would be set up over a two-year period (2015–2016) and then lead t implementation of the supply chain reforms outlined within the master plan in the following years (2017–2020). As of 2019, this supply chain–specific body has yet to be created.

Nonetheless, the SCMP remains a key supply chain document, providing analysis of major challenges, clarifying vision and objectives for the future, and outlining prioritized activities system improvement.

²¹ Wang, H., Otoo, N., & Dsane-Selby, L. (2017). Ghana National Health Insurance Scheme: improving financial sustainability based on expenditure review, World Bank.

²² Global Fund. (2016). *Ghana public health supply chain, economic business case, final report*.

²³ Global Fund. (2016). *Ghana public health supply chain, economic business case, final report*.

²⁴ SCMP, 2012/2015, p. 1.

The plan is organized around eight thematic areas for strategic intervention:

1. Organization (institutional capacity and roles) and coordination, human resources, and supervision
2. Financing, resource mobilization, and commodity pricing
3. Procurement
4. Distribution, including storage, inventory management, transport, and waste management;
5. Information systems and processes, including LMIS
6. Quantification and product selection
7. Policy, legal, and regulatory reforms
8. Capability building

This NSCA report frequently returns to the analysis, objectives, and strategic activities outlined in the SCMP as a baseline against which to assess the current status of Ghana's supply chain, gauge progress made on intended improvements, and propose recommendations or adjustments for future improvements.

Overview of the Supply Chain Assessment Activity

Under MOH leadership, the TWG, GHS, USAID, and GHSC-PSM provided support for the requisite fieldwork for the National Supply Chain Assessment in Ghana from August 19 to September 6, 2019. The assessment had four primary objectives:

1. Analyze and measure the performance, operational capacity, maturity, and capability of the national public sector–financed health commodity supply chain
2. Identify progress to date on key technical areas outlined in the Supply Chain Master Plan, 2016–2020, and gaps in implementation progress
3. Develop a comprehensive baseline of stock availability and logistics data quality for the LMIS implementation activity
4. Serve as a “source of truth” and strong quantitative basis to inform development of the next Supply Chain Master Plan, 2021–2025

The NSCA 2.0 includes three distinct elements:

1. Results in a visual representation of the country's supply chain
2. Measures of the overall capability, resources, processes, and functionality of the country's supply chain
3. Collection of site-level data on key performance indicators to measure supply chain performance

Based on the findings, the Government of Ghana (GOG), in collaboration with key supply chain stakeholders, can revisit and refine strategic priorities and operational plans, leverage a shared understanding of the current context to build stakeholder support for collective action, and follow up on flagged areas of poor relative performance with targeted root-cause analyses.

The NSCA focused on those parts of the Ghanaian health supply chain directly financed or directed by the GOG. The assessment team collected capability and performance metrics on the Ministry of Health, the central and regional medical stores, hospitals, and health centers. Donors play a key role in Ghana's public health system, especially in procuring key commodities, and their actions certainly affect the public system. However, to the extent that donors feature in the NSCA, it is to assess how Ghana's public health actors effectively manage relations with them, rather than to assess donor capabilities or performance directly. Similarly, the private health market is an influential actor in Ghana's health, but one that remained mostly outside the scope of this assessment. Future assessments on donor effectiveness and the private health market would certainly be welcome complements to the NSCA. As is, the NSCA's value is in focusing on the public dimensions, across 11 technical areas and multiple levels, to inform future public system strengthening.

The following discussion is focused on providing interpretations of the capability and performance results and translating them into recommendations for future supply chain interventions. The Summary of Findings and Conclusions sections highlight key takeaways and suggestions for future areas of analysis. The report annexes, contained in a second volume, provide the complete assessment tools and other detailed information.

Methodology

Over eight months, from January to August 2019, the assessment team engaged relevant in-country stakeholders to define the scope of work (SOW), determine the tracer commodities for the assessment, and assemble and train data collection teams. This approach simultaneously aimed to strengthen buy-in and investment in the exercise from the MOH, the Technical Working Group multiple, GHS, USAID, and other key supply chain stakeholders. The team used the NSCA 2.0 toolkit to guide planning, data collection, and analysis. This section describes this process and the assessment's methodology in greater detail.

The National Supply Chain Assessment Toolkit

The NSCA 2.0 is an updated toolkit that measures the capability, functionality, and performance of supply chain functions at all desired levels of a national health supply chain system. The toolkit includes three primary assessment elements: supply chain mapping, the Capability Maturity Model (CMM) tool, and the key performance indicator (KPI) assessment tool (see Exhibit 2). The toolkit is freely available for download at www.ghsupplychain.org.

Exhibit 2. Overview of the Three Elements of NSCA 2.0 Assessment

ACTIVITY	DESCRIPTION
Supply chain mapping	The objective of mapping is to obtain an in-depth understanding of the supply chain, including the roles and responsibilities of key supply chain actors. This is achieved through facilitated group work to identify similarities and differences among various product groups flowing through the system.
CMM diagnostic tool	The CMM diagnostic tool assesses capability and processes across functional areas and cross-cutting enablers (e.g., HR, financial sustainability) using interviews and direct observation.
Supply chain KPIs	The KPIs include a set of indicators that measure supply chain performance in selected functional areas.

The toolkit also includes resources for planning and implementing the assessment activity, and for analyzing and disseminating.

Scope of Work

The scope of work for this assessment required the assessment team to conduct a comprehensive assessment of Ghana's public health system across levels: central, regional, and service delivery. Also, the assessment disaggregates data across multiple facility types: CHPSs and clinics; health centers and polyclinics; district hospitals; regional hospitals; teaching hospitals; and, regional medical stores (RMSs). At the central level, the team carried out assessments at the MOH, GHS, TCMS, and IHS. Exhibit 2 in the following section lists all sites where data were collected in August 2019. The complete SOW is attached to this report in the Annex.

Sampling

The NSCA 2.0 was designed to assess country-level supply chain infrastructure, with disaggregation at the level of facility type. Some facility types were lumped together due to similarities in size and capability and to reduce overall sample size. In Ghana, the sample frame consisted of all public health facilities across the country that are supplied by the Regional Medical Stores, and for which the national government has a census of sites. Some sites included are supported by the Christian Health Association of Ghana. However, this was not a priority in the sampling decisions.

The sampling frame thus consisted of 4,042 CHPSs and clinics, 917 health centers and polyclinics, 193 district hospitals, 220 district health administrations, 10 regional hospitals, four teaching hospitals, and 10 regional medical stores. The Ministry of Health, Ghana Health Service, National Disease Programs, Temporary Central Medical Stores, and the Imperial Health Science warehouse were also included. The sample frame excluded fully private facilities, as this assessment focused on public-sector entities.

The assessment team determined the minimum sample size using the hypergeometric sample size formula, assuming a margin of error of ± 10 percent, and a 90 percent level of confidence as the NSCA 2.0 guidance suggests. The team used a randomized two-stage sampling process to select health centers. The sample size was initially calculated for the number of districts, and later calculated for the number of health facilities needed, based on the above parameters and assuming a design effect of 1.6. The design effect used is based on post-assessment analysis of NSCA 2.0 pilots. Districts were selected with the probability of inclusion in the assessment proportional to the number of health facilities in each district. Within each selected district, two CHPSs and two health centers were selected at random, and the DHA for that district was also selected. For district hospitals, a random sample of 50 district hospitals across the country was taken. The district hospitals were handled differently from the DHAs because unlike the DHAs, the ratio of districts to district hospitals is not 1:1. Also, all regional hospitals, teaching hospitals, regional medical stores, and central medical stores were selected because of their outsized importance in the supply chain.

The final sample is detailed below along with the full sample frame (see Exhibit 3). We assessed a total of 253 sites. The full list of selected sites is provided in the annex.

Exhibit 3. NSCA Sampling Frame and Selected Sample		
Facility Type	Population	Sample
CHPSs and clinics	4,042	68
Health centers and polyclinics	917	67
District hospitals	193	50
District health administrations	220	35
Regional hospitals*	10	10
Teaching hospitals*	4	4
Regional medical stores*	10	10
Central medical stores*	2	2
Central-level entities*	7	7
Total	5,405	253

*Denotes that this facility type was censused

At each selected facility, data collectors completed a capability maturity model survey and collected data on key performance indicators. In all cases, they sought to talk with key informants most qualified to speak on given assessment modules or technical areas (e.g., financial sustainability, warehousing and storage, policy and governance). In larger facilities, this often resulted in multiple interviews per site—e.g., with the financial officer, warehouse manager, and head pharmacist. This was especially the case for the Ministry of Health, where we conducted over a dozen interviews to fully complete the CMM assessment. Conversely, in smaller facilities, individual staff members (e.g., the lead pharmacist) often played multiple supply chain roles and thus answered multiple modules within the assessment.

Team Composition and Training

Central-level and field teams were formed and trained to conduct this assessment. Central-level interviews with MOH, GHS, and subsidiary department officials were led by a senior assessment consultant team based in Accra, with support from a GHS representative and senior GHSC-PSM staff.

At the subcentral sites, 30 two- or three-person teams (65 members total) traveled to 253 sites over 13 days to collect data. Senior supply chain professionals, pharmacists, and supply chain managers were nominated by GHS regional directors to participate as data collectors in this national assessment. Selection was based on a set of outlined skills and credentials, including deep understanding of key health care commodities, comfort with diverse supply chain functional areas, experience with large assessments, high levels of professionalism, and significant autonomy. All data collectors participated in an intensive five-day training on the assessment tools, SurveyCTO, tracer commodities, and best practices in survey methods. On the fourth day of training, participants conducted pilot assessments of 10 health facilities in greater Accra. The pilot served as a practice exercise for data collectors, a low-stakes chance to troubleshoot technology, and a final opportunity to provide targeted feedback to the assessment team to further refine the survey to the Ghanaian context.

Procedures

Four weeks before the start of data collection, GHS-endorsed letters were sent to regional directorates to inform them that facilities in their respective region had been randomly selected to participate in a national assessment of the health supply chain system. Regional directorates were responsible for

communicating the exercise to the main points of contact at each health center under their oversight. Data collectors also carried with them a copy of the notification signed by the GHS, in case of communication failure, and were trained to explain or further reinforce the purpose and value of the assessment upon arrival.

Subcentral data were collected from August 19 to 30. On average, teams spent one full day assessing CHPS, clinics, health centers, and polyclinics; one to one and a half days at hospitals; two days at regional hospitals, teaching hospitals, and warehouses; and a half day at DHAs, with travel days in between. One team member would lead the CMM survey interviews, while the other collected KPI data. If one team member completed their respective interview early (usually the CMM lead), data collectors would support the team member. In a handful of cases, teams included a third member to support KPI data collection at large and predictably difficult sites.

The central-level team collected data from multiple department officials within the MOH and GHS, including vertical program leads and senior finance, human resource, FDA, warehousing, procurement, customs and regulatory officials. Access was facilitated with scheduling support by key GHS representatives and the GHSC-PSM staff, and reflected relationships developed throughout the planning process with key stakeholders and gatekeepers in the MOH and GHS. Central-level interviews were conducted over a three-week period, from August 19 to September 5. A total of 55 interviews were conducted with senior central officials across central-level institutions and departments.

The Capability Maturity Model (CMM) questionnaire measures the level of capability and functionality present in the supply chain across 11 functional areas, including storage and warehousing, distribution, financial sustainability, waste management, and human resources. Only relevant modules were assessed at specific sites, depending on their facility level. For example, health facilities were not assessed on their capabilities in forecasting and supply planning. Relevance was determined by consultations with Ghanaian counterparts to understand what supply chain functions were expected at different facility types throughout the system.

The survey primarily consists of an extensive set of binary yes/no-type questions that establish the presence—or lack thereof—of a set of supply chain capabilities, processes, and best practices. The structure facilitates the collection of data in a standardized way, reduces the impact of subjectivity in the assessment (compared to NSCA 1.0), and improves comparability of the results across countries and time.

Data were collected through a mix of key informant interviews, direct observation, and verification through supporting documents. Data collectors were trained to ask to speak with the facility staff best suited to respond to each module, based on the respondent's area of operation. For example, where present, a stock manager would be considered best suited to answer questions on warehousing and storage and the lead accountant to answer questions on financial sustainability. As part of the tool, a subset of respondent answers was paired with structured requests for documentation to verify the response (e.g., logistics reports, standard operating procedures (SOPs), financial records). In the warehousing and storage module, data collectors were instructed to conduct the interview itself in the storage space and directly observe capabilities (e.g., packets, generators, safety equipment). Depending on the number of modules completed, availability of key informants, and speed of retrieving verification documents, the CMM questionnaire might take many hours to a full day to complete. Data were collected electronically using the SurveyCTO platform on individual tablets.

Exhibits 4 and 5 provide an overview of the functional areas addressed in the CMM questionnaire by type of facility. The annexes include a complete list of the facilities assessed, and the geographic coverage in a map.

Exhibit 4. CMM Functional Area by Level in the Ghana Supply Chain System—Noncentral Levels						
#	FUNCTIONAL MODULES ASSESSED	CHPS and clinics	Health centers and polyclinics	DHAs	District hospitals	Regional & teaching hospitals Regional medical stores
1	Strategic Planning and Management					✓
2	Human Resources	✓	✓		✓	✓
3	Financial Sustainability	✓	✓	✓	✓	✓
4	Policy and Governance					✓
5	Quality and Pharmacovigilance	✓	✓		✓	✓
6	Forecasting and Supply Planning (FASP)					✓
7	Procurement and Customs Clearance			✓	✓	✓
8	Warehousing and Storage	✓	✓		✓	✓
9	Distribution					✓
10	Logistics Management Information Systems	✓	✓		✓	✓
11	Waste Management	✓	✓		✓	✓

Exhibit 5. CMM Functional Area by Level in the Ghana Supply Chain System—Central Level					
FUNCTIONAL MODULES ASSESSED	MOH	GHS	TCMS*	IHS	Vertical programs
Strategic Planning and Management	✓	✓	✓	✓	
Human Resources	✓	✓	✓	✓	
Financial Sustainability	✓	✓	✓	✓	
Policy and Governance	✓	✓	✓	✓	
Quality and Pharmacovigilance	✓		✓	✓	
Forecasting and Supply Planning	✓		✓	✓	✓
Procurement and Customs Clearance	✓	✓		✓	
Warehousing and Storage		✓	✓	✓	
Distribution		✓	✓	✓	
Logistics Management Information Systems		✓	✓	✓	
Waste Management		✓	✓	✓	

Key Performance Indicators

KPIs are used to measure current supply chain performance. The assessment teams used the KPI assessment tool to collect granular quantitative data for a core set of indicators that are aligned with international standards for health supply chain management. KPIs included stocked according to plan percentages (by tracer), stock card accuracy, stock-out rates (by tracer), temperature excursions, and staff turnover rates. The full list of KPIs and the facility level at which they were collected is presented in Exhibit 6.

Data sources for KPI data included stock cards, the logistics management information system (LMIS), and eLMIS reports, invoices, orders, proof of delivery notes, temperature monitoring logs, and dispatch notes. Retrospective data (six months to one year) were also collected in some cases to better illustrate the consistency of past performance. Depending on the size of the facility, availability and state of documentation, and quantity of stock on hand, KPI data collection could be a time-consuming endeavor, requiring one data collector to spend anywhere from several hours reviewing reports and counting stock to up to two full days. Data were collected on tablets using SurveyCTO.

Exhibit 6. KPIs by Level in the Ghana Supply Chain System

#	Key performance indicators	MOH	GHS	CMS	Regional medical stores	Teaching hospitals	Regional hospitals	District hospitals	Health centers & polyclinics	CHPSs & clinics
1	Stock data			✓	✓	✓	✓	✓	✓	✓
2	Delivery data				✓	✓	✓	✓	✓	✓
3	Human resource	✓	✓	✓	✓	✓	✓	✓	✓	✓
4	Warehousing and distribution cost				✓					
5	Facility reporting rates					✓	✓	✓	✓	✓
6	Temperature excursions			✓	✓	✓	✓	✓	✓	✓
7	Forecast accuracy	✓	✓							
8	Supply plan accuracy	✓	✓							
9	Source of funds data	✓								
10	Prices paid	✓	✓		✓	✓	✓	✓		

In collaboration with the GOG NSCA TWG, the tracer commodities shown in Exhibit 7 were selected for the NSCA. Collectively, they provide a fair representation of the commodity types that can be found in the Ghanaian public health supply chain, account for unique supply chain challenges (e.g., cold chain transport), are nominally available at the health center level, and provide enough information to inform strategic decision making.

Exhibit 7. Tracer Commodities

#	PRODUCT NAME	DOSAGE	PRODUCT CATEGORY
1	Efavirenz/lamivudine/tenofovir	600/300/300 mg	HIV
2	Lamivudine/zidovudine	30/60 mg tablet	HIV
3	First Response HIV rapid test kit	NA	HIV
4	Artemether/lumefantrine (AL) 6x4	20/120 mg	Malaria
5	Malaria rapid diagnostic test (RDT)	NA	Malaria
6	Depot medroxyprogesterone acetate (IM)	150 mg/mL	Family planning/ reproductive health (FP/RH)
7	Levonorgestrel I-rod implant (Implanon)	I-rod	FP/RH
8	Oxytocin injectable	10 IU/mL	Maternal, newborn, and child health (MNCH)
9	Magnesium sulphate injection (50 percent)	5 g/10 mL	MNCH
10	2 RHZE + 4RH (category I*3) kits	150 + 75 mg	TB

11	Pentavalent vaccine	1 dose	Vaccine
12	ORS low osmolarity powder	250mg	Essential meds
13	Amoxicillin	250mg	Essential meds
14	Paracetamol	500 mg	Essential meds
15	Examination gloves, medium	Size 7.5	Nondrug

During the scoping of the assessment, the team determined that procurement data, particularly prices paid, should be collected at the various service delivery points that occasionally must turn to the private market when the RMS cannot fulfill their needs. To allow continued comparisons, the team selected six commodities from the main tracer list. That subset of commodities is shown in Exhibit 8.

Exhibit 8. Tracer Commodities for Review of Procurement Practices

#	PRODUCT NAME	DOSAGE	PRODUCT CATEGORY
1	Oxytocin injectable	10 IU/mL	MNCH
2	Magnesium sulphate injection (50%)	5 g/10 mL	MNCH
3	ORS low-osmolarity powder	250mg	Essential Meds
4	Amoxicillin	250mg	Essential Meds
5	Paracetamol	500 mg	Essential Meds
6	Examination gloves, medium	Size 7.5	Non-Drug

Data Management

Each data collector was provided with an individual tablet programmed with SurveyCTO to electronically collect, enter, and upload data. All completed CMM and KPI questionnaires were uploaded daily to the SurveyCTO secure data server. After upload, a team of four monitoring and evaluation (M&E) specialists from GHSC-PSM reviewed submitted data daily for quality assurance. In cases of data oddities or discrepancies, the specialists followed up directly with the data collection teams (through a Quality Assurance WhatsApp, supplemented by direct calls from the logistics lead) to confirm data points, resolve issues, and provide future guidance. This structured process served to verify that all answers were correctly coded and nonresponse data points removed, facilitating more efficient analysis. Further, the frequency of this data review (sometimes referred to as “cleaning”) enabled us to quickly identify unexpected issues, which were systematically addressed. After this daily review and response process, validated data were accepted by the M&E team for inclusion in the final datasets.

SurveyCTO exports data using a comma-separated values format. Data analysis workbooks that are part of the standard NSCA 2.0 toolkits were coordinately designed in Microsoft Excel to leverage this format. This minimized the data transformation process, streamlined data cleaning, and significantly increased automation of KPI calculation during data analysis. By using coding values that created clear “signal spikes,” nonresponse values were easily identified by the values populating a summary metrics page. The data analysis workbooks also produced charts, graphs, and data dashboards to enable top-line analysis that contributed to field-based debriefs for local stakeholders. Results will be discussed by examining all three components of the data collection: the supply chain map, CMM interviews, and KPI data collected.

Limitations

Replacing CHPSs

In Ghana, the most common last-mile facility is a CHPS. The Ghana health sector has continuously worked on strategies for delivering care directly to communities. Over time, CHPS has emerged as the main strategy for doing this.²⁵ “In 1999, a community-based project was developed in Navrongo to examine the feasibility of using trained community health workers to provide basic health services. This task-shifting project was successful and was adopted by the Ghana Health Service and rebranded as the community-based health planning and services (CHPS) program (Nyonator et al., 2005). CHPS trains community health workers to provide curative and preventive care, typically on immunizations, family planning and minor health issues and focuses on remote and underserved areas... undermined by financial, resource and logistical challenges: compounds and providers are not well equipped, for example with diagnostic tools, medicines, and transport (MOH, 2015).”²⁶

In recent years, many of these CHPS programs were determined to require a physical structure to provide the health services needed by the local population. With the support of the donor community, GOG erected many permanent structures across the country for these CHPS programs. However, not every CHPS program received a permanent structure. Also, there is no definitive list of which CHPS programs are permanent structures (functional CHPSs) and which are not (CHPS zones).

While conducting sampling for the NSCA, all CHPS programs were considered in the sample frame. A sample of 69 CHPSs was drawn and enumerators were sent to those locations. Of those 69 CHPS programs or clinics sampled, 31 were discovered to not have a physical structure in place. As a result, locating the community health worker who oversees the facility was difficult. These 31 facilities were then randomly replaced with another CHPS within the same district to ensure equal sampling weight. Sometimes, multiple random replacement facilities had to be used for a CHPS compound to be physically located. The sample of CHPS programs therefore is weighted more toward programs that have a physical structure in which services are provided. Also, in one district, no satisfactory replacement could be determined. This facility, the Sraneso CHPS program in Offinso North district, located in the Ashanti region, was removed from the sample.

Interpreting Scores for IHS

As part of the sample for the Ghana NSCA, the privately-owned Imperial Health Sciences warehouse was included. This warehouse currently plays a critical role in the Ghanaian public health supply chain, acting as the central medical stores for donor-funded commodities (primarily USAID and Global Fund). Given its important role, it was necessary to include it in the scope of the assessment. However, IHS is the only truly private sector entity in a supply chain assessment whose tools & methodologies are focused on public-sector entities and ask questions that are geared towards government-owned

²⁵ Ministry of Health. (2015). CHPS Policy, Accelerating attainment of universal health coverage and bridging the access inequity gap. Retrieved from <http://www.moh.gov.gh/wp-content/uploads/2016/02/CHPS-policy-final-working-draft-for-validation.pdf>.

²⁶ de-Graft Aikins, A., and Koram, K. A. (2017). Health and health care in Ghana, 1957–2017, in *The Economy of Ghana: Sixty Years after Independence*, Ernest Aryeetey, E., & Ravi Kanbur, R. (Eds.). New York, NY: Oxford University Press.

infrastructure. As such, many questions across the 11 CMM modules do not necessarily pertain to the limited but important scope that IHS is contracted to implement. As such, there are modules where IHS' CMM scores are lower than would be expected. This does not reflect a lack of capability but rather questions that simply did not apply to IHS. NSCA methodology does not allow for any questions to be removed from the scoring in order to maintain consistency in methodology implementation.

Comparing CMM and KPI Scores

The NSCA 2.0 uses a two-stage cluster-sampling approach designed to yield a maximum error of ± 10 percent. We used this approach to ensure a representative sample of public health facilities and to leverage statistical principles to extrapolate the findings back to the larger population of health facility entities in the country. The NSCA 2.0 data analysis template in its current format does not calculate standard error for the numerous variables assessed with the collected data. Without the standard error, the precision of the KPI or CMM module score value is unknown (but presumably $\leq \pm 10$ percent).

While individual scores are meaningful, comparisons between two facility types for any CMM score or KPI are more challenging. Without calculated errors, any differences less than 20 percent (assuming the maximum possible error of ± 10 percent) cannot be stated with complete confidence. Therefore, to err on the side of caution, this report will not attempt to interpret differences between facility types within a CMM module, unless the computed difference is greater than 20 percent. Each KPI will be examined individually, by facility type, within the context of that facility type, rather than drawing comparisons across the supply chain. For facility types that were censused (regional hospitals, regional medical stores, teaching hospitals, and central-level entities), no error is associated with those scores.

This does not imply that scores or KPIs are unimportant or the underlying data are not useful. It is simply a function of sampling that limits the discrimination of small differences of scores because the precision is too low or unknown. In this case, making definitive statements about one score being higher than the other (unless the scores differ by more than 20 percent) is not appropriate. Note that the underlying questions asked in the CMM are still insightful and will help drive analysis and recommendations.

Margin of Error for DHAs

As explained above, NSCA methodology uses a two-stage cluster-sampling approach to determine the sample for the assessment. This approach uses the lowest distribution point in the system as the first selection unit in the sampling process. Based on the parameters selected, in this case a 90 percent confidence level and 10 percent confidence interval, the number of districts required is determined and then the number of facilities within each district is determined. This is done intentionally to ensure that entities below the lowest distribution point (for Ghana it is the district level) are sampled at full statistical power. Entities at or above the district level, depending on their overall population, may not reach the same level of precision. As DHAs have a one-to-one relationship with districts, and districts are selected randomly, it can be difficult to harness software to simultaneously sample additional districts while generating a sample for the entities below the district level. All of this simply means that the DHAs have a maximum possible sampling error of 12.66 percent rather than 10 percent because of their under-sampling in this process. This is a consideration to keep in mind when reviewing CMM scores of DHAs in this report.

An additional consideration is needed for CMM scores for the Procurement and Customs Clearance module. The first question in this module is, "Does this location procure drugs/medical supplies from the private sector?" If the answer to this question is no, the entire module is skipped, as it is no longer relevant. As procurement is a distributed capability in the Ghanaian system, some lower-level facilities will procure and some will not. As the DHAs are answering on behalf of the facilities for which they

manage, they may say no to this question. During data collection, only 19 of 35 DHAs sampled responded affirmatively to this question. Therefore, the maximum margin of error for this section is actually 18.1 percent. Exhibit 9 summarizes the maximum possible sampling error for each facility and CMM module combination.

Exhibit 9. Maximum Sampling Error, by Facility Type, by CMM Module			
FUNCTIONAL MODULES ASSESSED	DHAs	CHPS, health centers, district hospitals	Censused facilities
Financial Sustainability	12.66%	10%	0%
Procurement and Customs Clearance	18.1%	10%	0%
All Other CMM Modules	NA	10%	0%

Summary Results

Overall, we collected data from 253 sites across all levels of the Ghanaian public health supply chain system, including:

- Central level (n=9), including the MOH, GHS, TCMS, IHS, and five vertical programs
- Regional level, including regional medical stores (n=10), teaching hospitals (n=4), and regional hospitals (n=10)
- Service delivery points, including CHPSs and clinics (n=68), health centers and polyclinics (n=67), and district hospitals (n=50)
- District health administrations (n=35)

For DHAs, we decided to collect targeted financial sustainability and procurement capability data at district health administrations to reflect their unique position in the country's public health supply chain system and to complement data collected at lower-level service delivery points.

This section provides a snapshot overview of collected data. The supply chain maps are presented first to establish the flow of products and information through the Ghanaian public health supply chain system. Next, an overall table of CMM results, followed by select KPIs provides, synthesizes the assessment findings. In other sections of the report, results and findings are detailed first for each functional module and then for each level of service. Within each module, relevant KPIs are presented first, then CMM scores. Discussion and recommendations specific to that module or service level follow the presentation of findings.

Supply Chain Maps: Commodity and Information Flows

All NSCA 2.0 implementations include, as a first step, a participatory exercise to comprehensively map the national supply chain. The objective is not only to obtain an in-depth understanding of the structure and processes of the supply chain, but also to create an opportunity for key stakeholders to contribute meaningfully to this assessment. The activity pushes participants to go beyond distribution routes, to elaborate on the roles and responsibilities of key participants; clarify information flows; differentiate between various program streams and commodity paths; and identify strengths, weaknesses, and opportunities throughout the system.

On August 12, 30 participants convened for the one-day supply chain mapping workshop in Ada, Ghana. Participants included representatives from the MOH and GHS NSCA TWG multiple, the vertical programs, supply chain partners, and invited professionals (see report annex for the workshop slides, agenda, and final participant list). Participants were organized by their expertise into six working groups based on salient vertical programs, and each team was asked to produce a comprehensive map of commodity and information flows from procurement to service delivery. After the workshop, the assessment team integrated these maps into an illustration of the Ghanaian public health supply chain with the goal of illuminating bottlenecks, inefficiencies, and opportunities for improvement.

Exhibits 10 and 11 illustrate the organization and elements within the Ghanaian supply chain as well as the flow of commodities and information through the system. The final versions presented here have been reviewed and endorsed by the TWG.

Exhibit 10. Map of Commodity Flow



Public Health Supply Chain in Ghana

Flow of health commodities and information

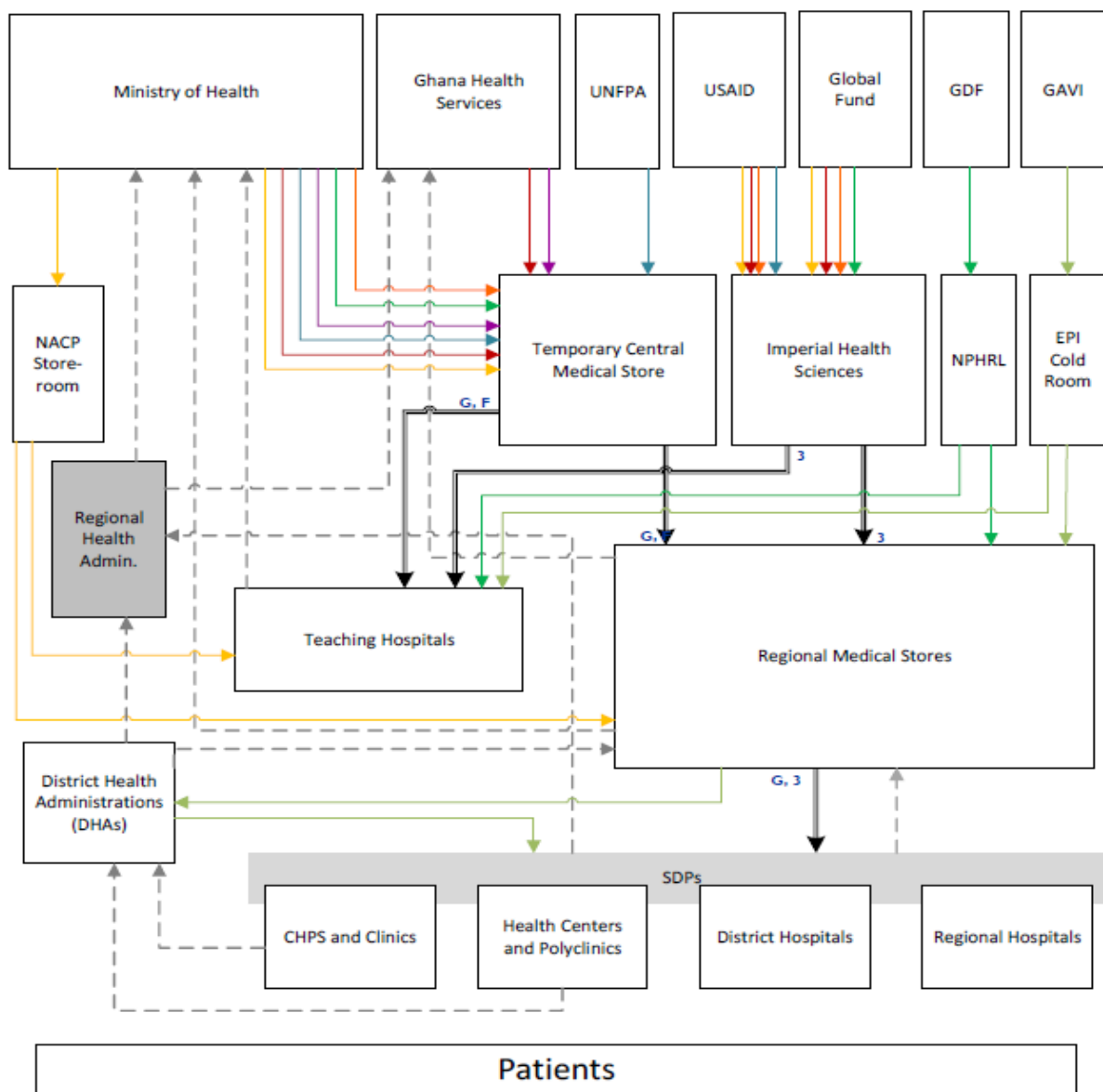


Exhibit II. Map of Information Flow



USAID GLOBAL HEALTH SUPPLY CHAIN PROGRAM
Procurement and Supply Management

Public Health Supply Chain System in Ghana
Flow of Information



Program- or facility-specific reporting

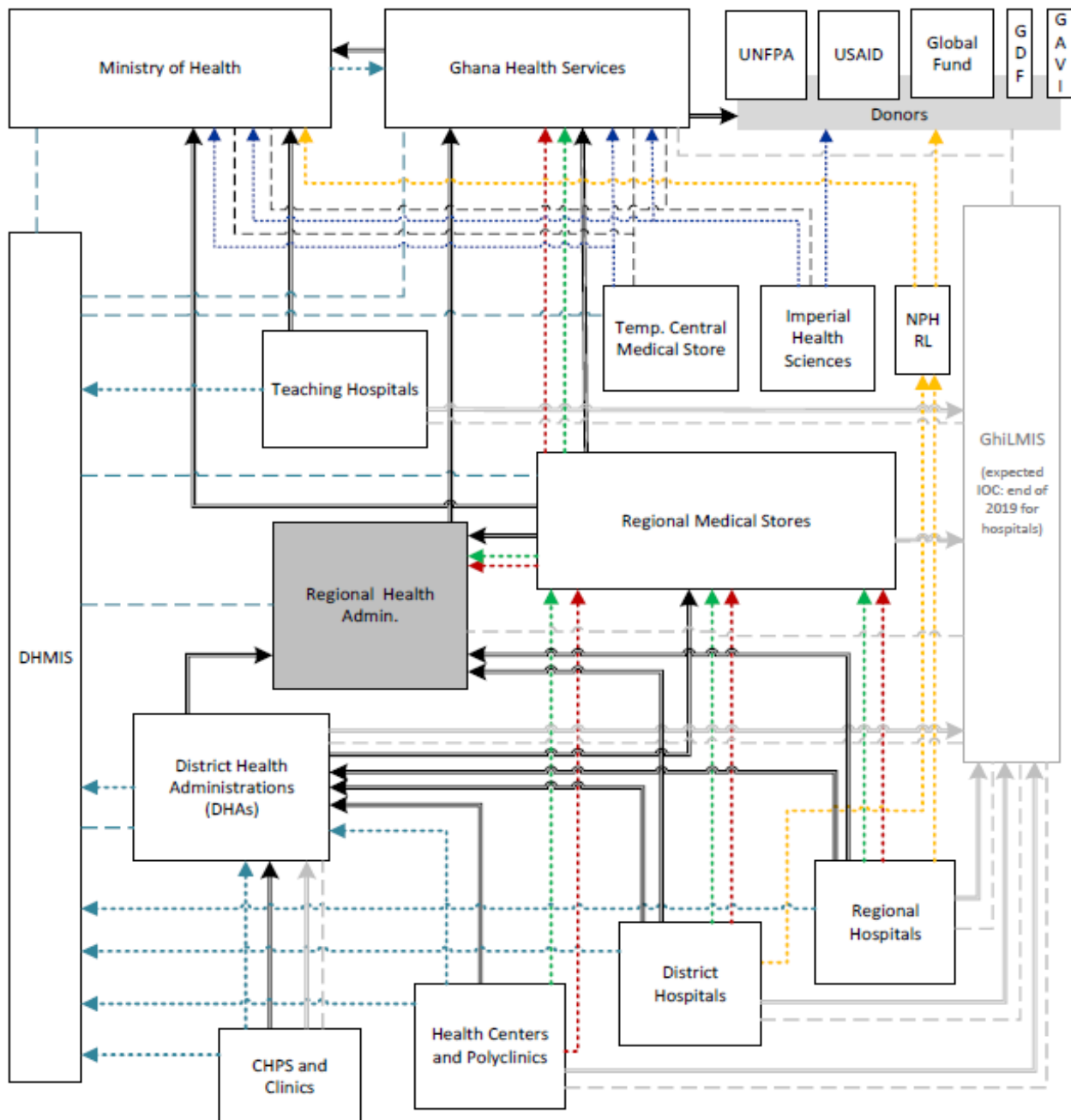
- > HIV/AIDS
- > FP/RH
- > Tuberculosis
- > HIV Lab
- > Warehouse stock data

Integrated reporting

- Current integrated reporting – MNCH, Malaria, & Essential Medicines
- GHiLMIS reporting (ongoing rollout) – All programs

--- Access to information

- Included in NSCA
- Not included in NSCA
- Still rolling out



These illustrations of commodity and information flows through the Ghanaian public health supply chain help to highlight several key facets and challenges of the current system:

- **Partial integration of the distribution system.** Commodity distribution becomes increasingly integrated as one moves down the supply chain system. Multiple entities procure health commodities for storage at five main central stores: the TCMS, IHS, National AIDS Control Program (NACP) Storeroom, National Public Health and Reference Laboratory, and Expanded Programme on Immunization Cold Room. Commodities are bundled at each storage site for distribution to RMSs and teaching hospitals. At the regional level, commodities are further integrated for collective distribution to SDPs. Exhibit 11 makes clear the exceptions to this path—HIV laboratory, TB, and vaccines commodities—and the opportunity for increased coordination at higher levels, especially between the TCMS and IHS.
- **Ad hoc modes of distribution.** Many modes of distribution are found between nodes of the supply chain—through government-owned vehicles, third-party logistics partners, and cases where downstream facilities travel to warehouses themselves to collect products. While multiple modes can reflect practical constraints and allow for the flexibility needed to operate in more challenging contexts, excessive reliance on ad hoc distribution modes also introduces complexity into the system, increasing administrative burdens and decreasing predictability. Further investigation into any differences in distribution performance through 3PL from the IHS versus government- or facility-managed distribution/collection from the TCMS might help inform recommendations and best practices for routinizing distribution modes across the system.
- **Large number of procurers.** Multiple entities—governmental and donor—are procuring health commodities for Ghana’s public health system, typically with multiple procurers per program area. While increasing the funds available for commodities, this also complicates coordination, as entities procure products on separate timelines.
- **Complex information landscape.** Exhibit 11 underscores the complexity of Ghana’s current logistics management information landscape. Reporting requirements are not currently integrated across all program areas, with TB, HIV, and FP/RH stock and logistics information flowing through different routes from lower-level facilities. The country is currently unrolling a new electronic LMIS system, GhiLMIS, that will integrate stock information across all program areas, reduce reporting burdens, and allow for more up-to-date and transparent access to data across levels of the system. In the current rollout phase, hospitals are being trained to use GhiLMIS; the intention is to then continue the rollout to lower-level facilities in later phases. Balancing thoughtful implementation, commensurate training, and efficient integration of the full public health system will be important throughout the transition period.
- **Central role of district and regional health officers.** Mapping information connections also calls attention to the central information role played by district and regional health officers in facilitating and managing information flows in the country’s public health supply chain. Currently, much of the logistics information and stock data from lower-level facilities flow through entities. Any future efforts to improve the availability, accuracy, and timeliness of lower-level data need to consider these actors and the opportunity for them to play catalytic roles for change if sufficiently engaged and supported.

Understanding the CMM Results

A review of the CMM results presented below must consider how the scoring was completed. The capability and processes were assessed based on a maturity model, adapted from private-sector best practices to fit the public health context. For more information on how international benchmarks were considered in designing the CMM modules, review the NSCA 2.0 toolkit. Within each functional module, each question (or item) assessed has one of four maturity levels assigned to it, ranging from basic to state of the art (SOA); the overall CMM score for this module is the sum of scores at each maturity level. Exhibit 13 provides an overview of each level of maturity, its definition, and its overall contribution to the functional area's overall CMM score.

This functional area overall CMM score is a composite derived from results of the questions across the maturity levels. Of a total possible 100 percent CMM score, **basic** items contribute 50 percent, **intermediate** items 30 percent, **advanced** items 15 percent, and **SOA** items 5 percent. The scores are not directly interpretable (e.g., a score of 50 percent does not indicate that all the basic items are in place in all facilities). However, the scores are comparable across the functional areas. The components that make up the basic level are scored separately from those associated with the intermediate level; the scoring is done this way to recognize that even within a function, maturity levels may be mixed. The overall score for a single function is a composite of all basic, intermediate, advanced, and SOA scores. An overall maturity score for intermediate, then, does not necessarily indicate that every aspect of that function has achieved that level of maturity.

Exhibit 12. Definitions of Level of Maturity and Contribution to the Overall CMM Score

Level of maturity	Definition	Maximum contribution to the CMM score
Basic	Must-have policies, structures, processes, procedures, tools, indicators, reports, and resources to operate a supply chain system (e.g., a stock card as a tool for inventory management).	50%
Intermediate	Not must-haves but intermediate -level policies, structures, processes, procedures, tools, indicators (e.g., Excel).	30%
Advanced	Nice-to-have policies, structures, processes, procedures, tools, indicators, reports, and resources to operate a supply chain system (e.g., Rx solution, a stock management electronic tool).	15%
State of the art	Nonessential, SOA policies, structures, processes, procedures, tools, indicators, reports, and resources for a supply chain system (e.g., an enterprise resource planning system for stock management and control).	5%

Benchmarks in the NSCA

NSCA methodology does not benchmark scores against a set of standards to denote a specific technical area having attained a specific level. As explained above, a mix of levels is expected in the final CMM score. To help provide some structure around the analysis, the report authors use an 80 percent benchmark around which to discuss CMM scores. This benchmark has also been used in previous NSCA reports.

The logic behind this 80 percent benchmark is simple; to achieve a such a score, you have to receive a majority of points in the basic and intermediate levels to mathematically reach 80 percent. If your supply chain has demonstrated capabilities across the basic and intermediate levels for a particular technical area, then most likely you do not need to prioritize this technical area for improvement in your next strategic planning process. Achieving 80 percent is certainly possible without completely filling basic and

intermediate capabilities. This gap becomes a recommendation to focus on for that technical area. Overall, this benchmark's main purposes is to help separate technical areas that are relatively more advanced than others and allow for pragmatic prioritization in improving the public health supply chain.

Capability Maturity Model: Summary Tables

Exhibits 13 to 19 present a summary of key data findings for capability maturity metrics across the 11 technical areas and seven facility sampling disaggregation types.

Exhibit 13. Noncentral-Level Capability Maturity Model (CMM) Scores, Average, and Ranges Presented by Level of Facility for Each Functional Module							
	CHPSs & clinics	Health centers (HCs) & polyclinics	DHAs	District hospitals	Regional hospitals	Teaching hospitals	RMSs
	n = 68	n = 67	n = 35	n = 50	n = 10	n = 4	n = 10
Strategic Planning and Management	-	-	-	-	30% (0–75%)	41% (0–71%)	36% (12–75%)
Policy and Governance	-	-	-	-	53% (6–100%)	35% (6–94%)	59% (0–80%)
Human Resources	48% (3–79%)	49% (23–78%)	-	63% (18–85%)	56% (20–77%)	51% (40–76%)	59% (39–72%)
Financial Sustainability	56% (0–82%)	64% (34–90%)	69% (49–90%)	69% (49–90%)	69% (58–76%)	70% (65–76%)	76% (67–86%)
Forecasting and Supply Planning	-	-	-	-	41% (29–61%)	43% (31–53%)	46% (35–55%)
Procurement and Customs Clearance	-	-	50% (16–69%)	60% (29–84%)	68% (53–79%)	73% (68–76%)	70% (58–82%)
Warehousing and Storage	26% (3–42%)	35% (18–58%)	-	50% (28–68%)	54% (39–66%)	55% (48–60%)	59% (50–68%)
Distribution	-	-	-	-	-	-	52% (33–83%)
Logistics Management	54% (0–75%)	56% (0–81%)	-	53% (3–79%)	52% (13–71%)	28% (8–88%)	22% (0–42%)
Information System	13% (0–76%)	14% (0–48%)	-	34% (0–93%)	36% (8–71%)	28% (8–88%)	22% (0–42%)
Quality and Pharmacovigilance	14% (0–41%)	20% (0–74%)	-	40% (3–84%)	47% (24–87%)	59% (52–70%)	58% (42–80%)
Waste Management							

Exhibit 14. Central-Level CMM Scores, Averages and Ranges for Each Functional Module

	MOH	GHS	TCMS	IHS
	n = 1	n = 1	n = 1	n = 1
Strategic Planning and Management	67%	51%	5%	88%
Policy and Governance	76%	67%	59%	73%
Human Resources	74%	69%	48%	55%
Financial Sustainability	79%	52%	33%	83%
Forecasting and Supply Planning	(see below)	-	-	52%
Procurement and Customs Clearance	67%	65%	-	75%
Warehousing and Storage	-	41%	39%	83%
Distribution	-	59%	18%	65%
Logistics Management Information System	-	65%	34%	58%
Quality and Pharmacovigilance	68%	-	60%	49%
Waste Management	-	66%	42%	70%

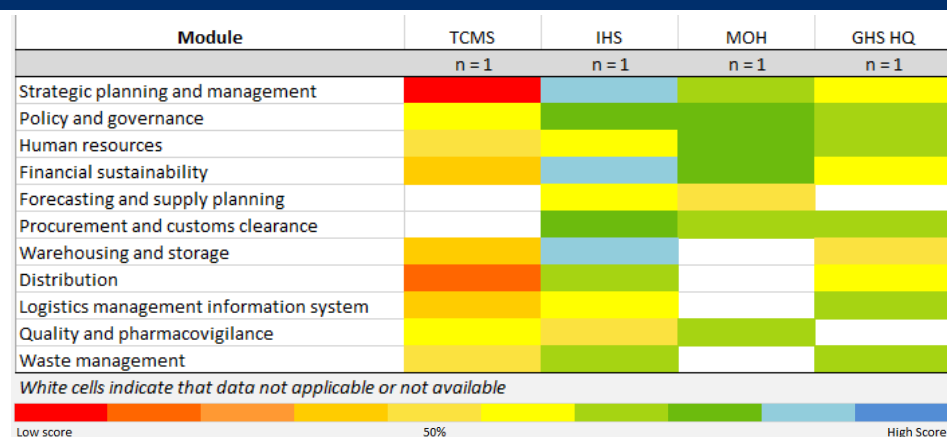
Exhibit 15. Central-Level FASP CMM Scores, Presented by National Health Program

	National HIV Program	National FP/RH Program	National Malaria Program	National Expanded Programme on Immunization (EPI)	National TB Program
	n = 1	n = 1	n = 1	n = 1	n = 1
Forecasting & Supply Planning	76%	68%	62%	61%	53%

Exhibit 16. Heat Map, Capability Maturity Model, Non-Central Facility Levels

Module	CHPS & Clinics n = 68	Health Centers & Polyclinics n = 67	District Hospitals n = 50	Regional Hospitals n = 10	Teaching Hospitals n = 4	DHA n = 35
Strategic planning and management						
Policy and governance						
Human resources						
Financial sustainability						
Forecasting and supply planning						
Procurement and customs clearance						
Warehousing and storage						
Distribution						
Logistics management information system						
Quality and pharmacovigilance						
Waste management						
White cells indicate that data not applicable or not available						
<div>Low score</div> <div>50%</div> <div>High Score</div>						

Exhibit 17. Heat Map, Capability Maturity Model, Central-Level Facilities



*Results indicated under IHS are assessed using a standardized questionnaire for public sector facilities; there was no tool adaption to suit a typical private sector entity like IHS. For further explanation, please see the limitations section.

Exhibit 18. FASP Heat Map, Capability Maturity Model, Vertical Programs

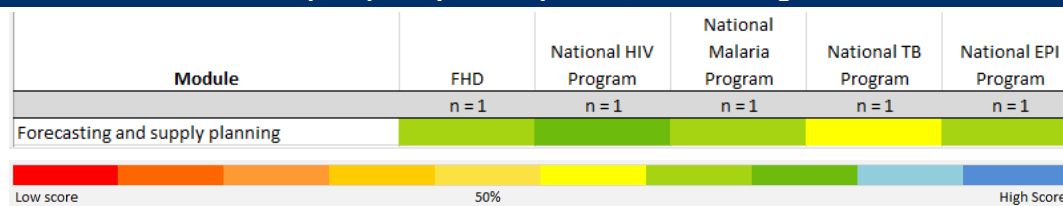
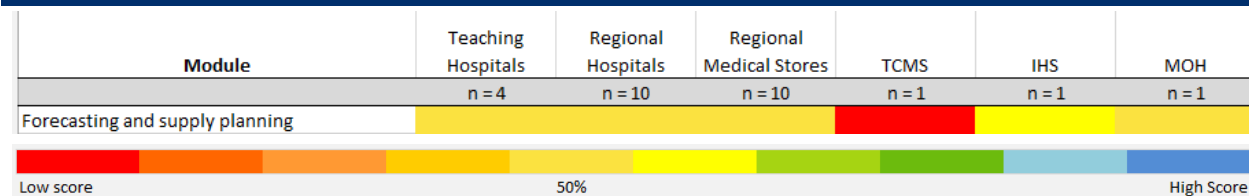


Exhibit 19. FASP Heat Map, Capability Maturity Model, by Facility Levels



Select KPIs: Summary Tables

Exhibit 20. Select Key Performance Indicators, Average and Ranges Presented by Level of Facility							
	CHPS & clinics n = 68	HCs & polyclinics n = 67	District hospitals n = 50	Regional hospitals n = 10	Teaching hospitals n = 4	RMSs n = 10	TCMS n = 1
Stocked according to plan (tracer commodities)	13%–100%	5%–82%	27%–53%	0%–19%	0%–50%	0%–37%	0%
Stock-out on day of assessment	41%	38%	17%	18%	13%	21%	50%
Average number of stock-out days for 181-day period*	12.6	17.7	10.9	14.7	3.7	10.8	0.4
Average number of days per month with stock-outs, given that there was a stock-out	6.4	8.6	5.3	6.2	4.5	4.8	2
Stock card accuracy: percentage of facilities at 100% accuracy	57%	62%	61%	48%	72%	35%	88%
Stock card accuracy: average deviation from 100% accuracy across facilities	43%–1,215%	22%–1,251%	27%–684%	12%–1,584%	3%–5,900%	7%–2,096%	1%
eLMIS record accuracy: percentage of facilities at 100% accuracy	--	--	50%	42%	33%	27%	75%
eLMIS record accuracy: average deviation from 100% accuracy across facilities	--	--	61%–4,547%	0%–4,571%	0%–478%	-424%–9,967%	157%
Wastage from damage, theft, and expiry: damaged, lost, and expired stock as a percentage of the total stock available	0%	1%	0%	1%	0%	0%	0%
Average number of supply chain positions	3.1	6.6	11.8	16.6	18.5	31.1	7
Percentage of positions vacant	10%	16%	9%	21%	1%	1%	0%
Staff turnover ratio	24%	31%	24%	7%	28%	23%	0%

* The first number in this table refers to the average number of days the commodity was out of stock on average across the facilities during the six months of December 2018 through May 2019. This period included 181 days. The number in parentheses is the percentage of days the commodity was out of stock, on average. Thus, $6.6/181 = 3.6$ percent.

Analysis, by Functional Module: Capability Maturity and KPI Results

This section systematically presents context, findings, and analysis across each of the 11 technical areas assessed in the NSCA.

Strategic Planning and Management

Strategic planning and management ensure that supply chain priorities are identified, roles and responsibilities clarified, goals and changes directed, and frameworks for monitoring progress and performance established. Strategic planning and management are the purview of the MOH and GHS, but all health system levels are responsible for understanding their role in the strategic plans. Major areas that were factored into the scoring for this CMM module are the existence of strategic plans; appropriate monitoring mechanisms, such as formal oversight committees that have broad stakeholder inclusions; and clear plans for private-sector engagement (see Exhibit 21).

Exhibit 21. Examples of Scored Strategic Planning and Management Capabilities

Basic	<ul style="list-style-type: none"> Presence of an approved supply chain strategic plan (an intermediate capability for RHs) Monitoring of supply chain implementation plan and presence of specific subsections Formal biannual assessment of supply chain risks
Intermediate	<ul style="list-style-type: none"> Strategic planning process that includes stakeholder mapping exercise Presence of a supply chain implementation plan Biannual updates to the supply chain strategic plan or implementation plan Actions to reform the supply chain system included in strategic plan or implementation plan Coordination or engagement with the private sector to improve supply chain within the last year
Advanced	<ul style="list-style-type: none"> Monthly meetings of stakeholder groups to review supply chain performance Presence of a risk management and mitigation/prevention plan Formal strategy for using public-private partnerships to improve supply chain performance
SOA	<ul style="list-style-type: none"> Formal and continuous assessment of supply chain risks

Note: These are illustrative examples of the types of capabilities scored in this module, not an exhaustive list. Each module contains many dozens of questions and capabilities. For a full list, please refer to the NSCA toolbox, available at www.ghsupplychain.org.

Ghana's 2016 Supply Chain Master Plan highlighted organization as a key thematic area in efficient supply chains and one that required strategic intervention to address outstanding problems and challenges. The SCMP diagnosed the strategic organization challenges of the supply chain system thus:

Currently, multiple organizations are involved in supply chain activities, with overlapping and duplicative offices, activities, and tasks. At the same time, a number of important supply chain issues are not being adequately addressed by any of these entities...

Over the last decade, the supply chain that supports public health facilities has been altered significantly due to decentralization, the creation of the Ghana Health Service, and the enactment of the Procurement Act 663 of 2003, yet roles and responsibilities for supply chain functions across the MOH and its agencies have not been adequately evaluated, updated or refined to reflect these changes. There is duplication across agencies, little clarity on roles and authority, limited formal coordination among the entities working on supply chain activities, and an apparent lack of trust across the key agencies.

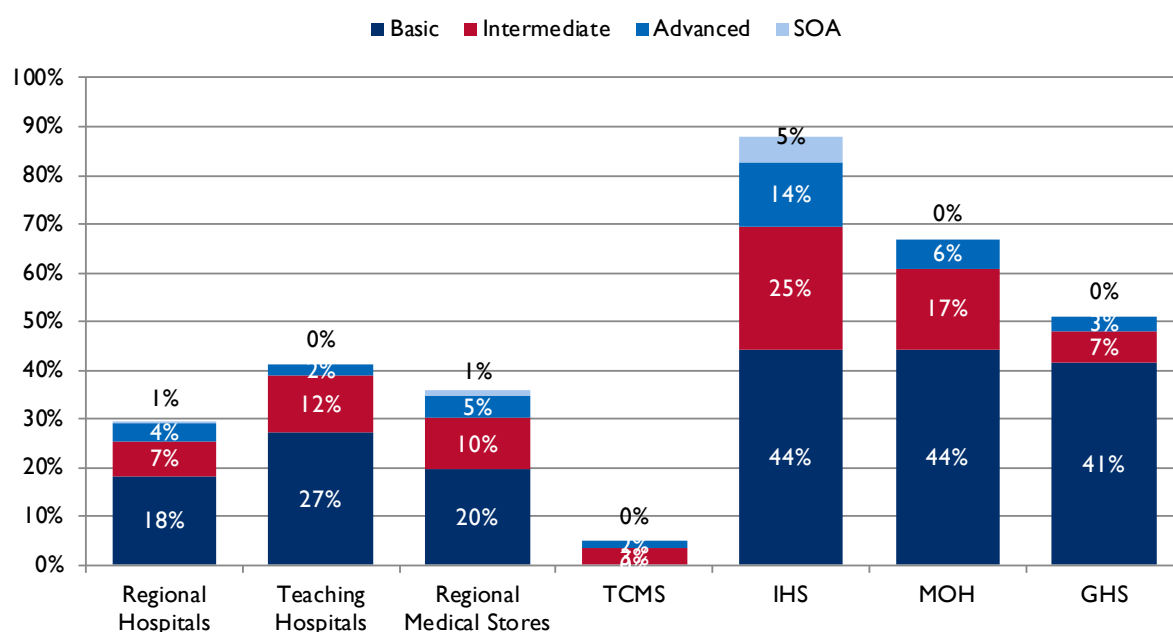
The Supply Chain Management Agency (SCMA) was envisioned to consolidate dispersed supply chain responsibilities. It was intended to be created by the end of 2016 and to direct subsequent implementation of reforms outlined in the SCMP; however, the body has yet to be established.

The NSCA assesses the strategic planning and management capabilities within existing supply chain structures within national systems. It does not assess the overall strategic logic of the system itself, except implicitly in the overarching picture constructed by assessing capability and performance indicators across all technical areas and facility levels. In the absence of the creation of the single SCMA, the NSCA assessed the strategic planning and management capabilities diffused throughout Ghana's current supply chain system across central and regional entities.

2019 NSCA Findings and Analysis

Strategic planning and management capabilities were assessed at four central-level facilities (MOH, GHS, TCMS, and Imperial Health Sciences (IHS)) and selected regional-level sites (regional hospitals, teaching hospitals, and the RMSs). The capability maturity scores and illustrative responses on select capability questions are presented in Exhibits 22 and 23. Generally, central-level entities reported greater strategic planning and management capabilities than regional facilities, with the notable exception of the TCMS.

Exhibit 22. Strategic Planning and Management Capability



Note on interpreting results: Recall that CMM scores are a composite of assessed basic (max 50 percent), intermediate (30 percent), advanced (15 percent) and “state of the art” (SOA) (5 percent) capabilities. Reported percentages are the scored results averaged across all assessed sites, for each capability level and facility type. For more information, please refer to the Understanding the CMM Results section above.

Exhibit 23. Strategic Planning and Management Capabilities Maturity Scores and Select Question Responses

	Regional hospitals	Teaching hospitals	RMSs	TCMS	IHS	MOH	GHS
n =	10	4	10	1	1	1	1
Overall maturity score (range)	30% (0–5%)	41% (0–71%)	36% (12–75%)	5%	88%	67%	51%
Percent of basic items in place	37% (0–97%)	54% (0–93%)	39% (9–89%)	0%	89%	89%	83%
Presence of an approved supply chain strategic plan	40%	75%	30%	No	✓	✓	✓
Stakeholder mapping exercise	20%	50%	20%	No	✓	No	No
Presence of a supply chain implementation plan (update timeframe)	30%	75%	40%	No	✓ (4 or 5 years)	✓ (4 or 5 years)	✓ (4 or 5 years)
Supply chain implementation plan is monitored (timeframe)	40%	75%	50%	No	✓ (Quarterly)	✓ (Quarterly)	✓ (Annually)
Supply chain reforms are being implemented	10%	50%	30%	No	✓	✓	✓
Formal structure exists to monitor supply chain performance at this level	20%	50%	40%	No	✓	✓	No
Existence of performance monitoring plan tracking supply chain performance	20%	50%	40%	No	✓	No	No
Existence of a risk management and mitigation/prevention plan	10%	0%	30%	No	✓	No	No
Coordination or engagement with private sector companies				Formal & informal	Formal	Formal	Informal

MOH and GHS: Complementary or redundant strategic planning capabilities? In the absence of the proposed SCMA, the MOH and GHS share strategic planning and management responsibilities within the Ghanaian supply chain system. Both entities report high percentages of basic strategic planning and management capabilities in place; however, individually, both fall short of the NSCA's recommended capability maturity score of at least 80 percent (scoring 67 percent and 51 percent, respectively). An unresolved challenge remains understanding the extent to which MOH and GHS scores are complementary and additive, or duplicative and potentially redundant. While this remains essentially a political decision, the NSCA helps to illustrate the extent to which both entities retain important yet individually insufficient capabilities to independently and fully execute strategic planning and management activities herein assessed. Creating a single, centralized supply chain entity is not the only option for ensuring a strategic, comprehensive, and effective approach to governing, managing and reforming the public health supply chain; nevertheless, an overarching priority remains ensuring that all necessary supply chain functions are fully covered; that extant entities are sufficiently empowered; and that the respective roles, responsibilities, and relationships among actors are clearly and universally understood.

Supply chain plans. A subsection of this technical area focuses on the presence, implementation, and monitoring of supply chain plans. At the central level, all entities except for the TCMS reported that supply chain strategic plans are updated every four or five years. MOH officials reported that the supply chain strategic plan includes significant reforms to the supply chain design and system, and respondents

from MOH, IHS, GHS all stated that these reforms are being implemented. However, few actors reported the presence of performance monitoring plans or monitoring frameworks for tracking supply chain performance. At lower levels of the system, most teaching hospitals reported some strategic planning and management capabilities, including three of four reporting that a strategic plan for the supply chain needs of the specific site existed. Fewer such capabilities were reported at the regional medical stores or regional hospitals, though the NSCA assumes that such capabilities are useful at regional- or referral-level entities to support efficient and effective public health supply chains.

IHS's outstanding capabilities. Overall, the privately managed IHS reported the greatest presence of strategic planning and management capabilities within the Ghanaian system. It is the only entity that reaches the NSCA's 80 percent capabilities goal in this technical area. IHS uniquely reported the presence of important supply chain strategic planning and management capabilities, including the presence of a formal performance monitoring plan and a risk management and mitigation plan; allocation of clear roles and responsibilities to external stakeholders for specific supply chain activities; and formal coordination with private-sector companies to improve the supply chain in the last year.

Public-private partnership. Public-private partnerships (PPPs) are considered a key feature to strategically engage and manage in robust public health supply chain systems. The optimal role for the private actors within Ghana's public supply chain system, however, remains uncertain. While MOH officials identified coordination or engagement with private-sector companies as a means of improving the supply chain, respondents stated that no such coordination had occurred within the past year. Current engagement appears to be an inconsistent mix of formal and informal arrangements (see Exhibit 23 above) across different supply chain functions (see Exhibit 24 below). The most visible candidate for a PPP is perhaps the IHS, a private entity working in support of Ghana's public supply chain system. To date, however, the relationship between the IHS and MOH/GHS cannot be strictly deemed a PPP. Rather than a mutual collaboration to finance, build, or operate a project or activity, the IHS is more accurately understood in conventional private-sector terms, as a private entity rendering a service for which it is paid. In the assessment, this translated to some disagreement as to the state of PPPs in the country. While IHS reported the broadest level of public-private partnership arrangements, respondents within the GHS reported no engagement at all with the private sector on any supply chain functions. More clarity on current PPPs is required, with the possibility that strategically increasing thoughtful engagement with the private sector might help improve the supply chain.

Exhibit 24. Supply chain functions of focus within the public/private partnership						
		RMS	TCMS	IHS	MOH	GHS
	n =	10	1	1	1	1
Distribution		50%	✓	✓	✓	
Warehousing and storage		30%		✓	✓	
Quality assurance		40%		✓		
Waste management		30%		✓		
None of these						✓

Supply Chain Risks. Finally, few assessed entities reported that supply chain risks were formally assessed (see Exhibit 24 above). Informally, Exhibit 25 presents perceptions of the top risks as reported by key informants interviewed at each site. The most commonly reported supply chain risks flagged were financial, human resource and operational.

Exhibit 25. Top Risks Experienced in the Supply Chain							
	Regional Hospitals	Teaching Hospitals	RMSs	TCMS	IHS	MOH	GHS
n =	10	4	10	1	1	1	1
Financial	80%	100%	90%		✓	✓	✓
Human resources	70%	50%	100%			✓	✓
Political	0%	25%	10%			✓	✓
Operational	50%	100%	90%	✓	✓		
Economic (e.g., exchange rate)	30%	25%	20%		✓		

Recommendations

Participants convened at the NSCA Supply Chain Mapping Workshop pointed especially to the 2020 Supply Chain Master Plan development process as an opportunity to critically re-examine all levels of the current supply chain system and build on growing interest among political leadership to support supply chain reform. To this end, the NSCA makes the following recommendations for increasing strategic planning and management capabilities within Ghana's current supply chain system:

- Continue to consider creating the SCMA, or a similar body, to consolidate, centralize, and simplify supply chain authority and responsibilities. Alternatively, use the 2020 Supply Chain Master Plan exercise to ensure and affirm that (1) all necessary supply chain functions are fully covered by a governing entity; (2) extant entities are sufficiently empowered; and (3) the division of roles and responsibilities (including strategic planning and management) among MOH, GHS, and other entities within the current supply chain system are clearly and universally understood.
- Increase practice of supply chain strategic planning and implementation monitoring at the central and regional levels. Consider using IHS as a model for institutionalizing this and other strategic management best practices at other entities within Ghana's public health supply chain, such as TCMS and lower-level entities as well.
- Clarify the appropriate role for the private sector within the public-sector supply chain. Subsequently, investigate opportunities to leverage and expand partnerships with the private sector to improve the country's supply chain.
- Formalize the practice of assessing supply chain risks at central and regional levels.

Supplemental Exhibit

Exhibit 26. SPM: Distribution of Questions and Assignment of Weight Across Capability and Facility Levels								
	BASIC (50%)		INTERMEDIATE (30%)		ADVANCED (15%)		SOA (5%)	
MODULE	# of Qs	WEIGHT	# of Qs	WEIGHT	# of Qs	WEIGHT	# of Qs	WEIGHT
Referral hospitals (14)	30	1.7%	18	1.7%	9	1.7%	2	2.5%
Warehouses (12)	36	1.4%	13	1.2%	6	2.5%	1	5.0%
MOH and GHS (2)	36	1.4%	21	1.4%	10	1.5%	1	5.0%

Note that interpretations of the scoring, and discussions of "differences" in the scores, need to be recognize that the number of assessed capabilities differs by facility type and module. Thus, positive responses to individual questions (i.e., reports of present capabilities) carry different weights, depending upon the technical area and facility type.

Note also that the number of questions and the question weighting for these modules vary because some conditionally scored questions are included. Figures presented here assume all conditions are met and all questions are included.

Policy and Governance

Clear policies, guidelines, and oversight are important to ensuring that public health systems are procuring essential medicines, practicing effective medicine, and revising policies to reflect changing best practices and onboard new technologies. For the supply chain, national policies and governance should inform the full system, from procurement to patient treatment, ensuring that all actors operate based on standardized guidance. Major areas that were factored into the policy and governance capabilities scoring in this assessment are outlined in Exhibit 27, including the existence of a national medicines policy with supply chain components, an active oversight committee with broad representation from all levels of government and civil society, drug registration lead times, and Standard Treatment Guidelines (STGs).

Exhibit 27. Examples of Scored Policy and Governance Capabilities

Basic	Existence of a national medicines policy that includes objectives for supply chain management Five-year updates of national policies related to supply chain management Existence of national STGs and a National Essential Medicines List (NEML) Existence of a process for registering new drugs, products, and technologies Publicly available list of registered drugs and products
Intermediate	Quarterly meetings by a supply chain oversight and governance body to discuss supply chain issues Adaptation of national STGs from universal clinical guidelines
Advanced	Existence of a formal, high-level body that provides oversight and governance for the supply chain
SOA	Civil society is a part of the formal supply chain oversight and governance body

Note: These are illustrative examples of the types of capabilities scored in this module, not an exhaustive list. Each module contains many dozens of questions and capabilities. For a full list, please refer to the NSCA toolbox, available at www.ghsupplychain.org.

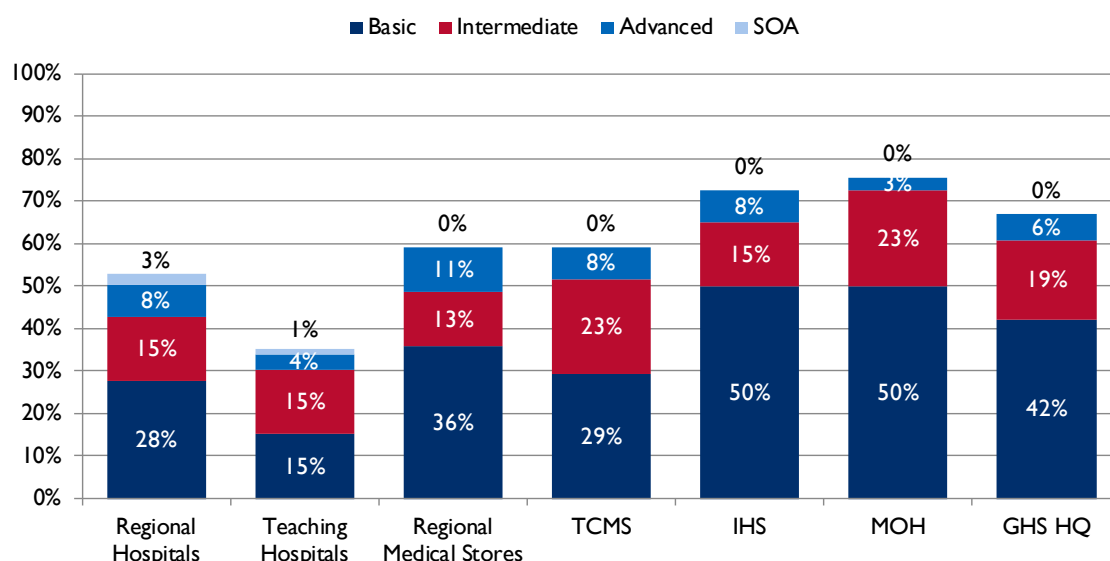
Within its discussion of quantification and product selection, the 2015 SCMP similarly emphasized the importance of the National Essential Medicines List (NEML) and STGs. The Plan proposed institutionalizing annual reviews of both policies to ensure their continued relevance and usefulness.

Beyond NEML and STGs, the 2015 SCMP focused extensively on procurement and quality assurance as key challenges and areas of important focus within the current policy, legal and regulatory environment. “[T]he current systems, mechanisms, and inspection resources,” the SCMP explained, “do not seem to be adequate to ensure that inferior medicines and medical devices and supplies do not enter the public sector system.” Proposed interventions included developing and implementing QA guidelines; working with the FDA on enforcement; ensuring adherence to the NEML, procurement guidelines, and the certificate of no-ability process; developing sanctioning guidelines for noncompliant procurers and vendors; and exploring use of regulatory mechanisms to manage prices for health commodities.

2019 NSCA Findings and Analysis

Exhibits 28–30 show the NSCA results assessing the policy and governance capabilities extant in Ghana’s public health supply chain. At the ministerial level, nearly all basic capabilities are in place for planning and governance (100 percent at MOH and 84 percent at GHS). The MOH exhibited overall higher capabilities than the GHS in this technical area and approached the NSCA goal threshold with a maturity score of 76 percent. Once again, the IHS reported significantly higher capabilities than the TCMS in this technical area—IHS reported all basic policy and governance capabilities in place and recorded an overall maturity of 73 percent, compared the TCMS’s 58 percent and 59 percent, respectively. Lower levels play a decreasing policy and governance role in Ghana, returning expected lower levels of capabilities.

Exhibit 28. Policy and Governance Capability



Note on interpreting results: Recall that CMM scores are a composite of assessed basic (max 50 percent), intermediate (30 percent), advanced (15 percent) and “state of the art” (SOA) (5 percent) capabilities. Reported percentages are the scored results averaged across all assessed sites, for each capability level and facility type. For more information, please refer to the Understanding the CMM Results section above.

Exhibit 29. Supply Chain System Guidelines and SOPs available

	Regional hospitals	Teaching hospitals	RMSs	TCMS	IHS	MOH	GHS HQ
n =	10	4	10	1	1	1	1
Overall maturity score (range)	53% (6–100%)	35% (6–94%)	59% (0–80%)	59%	73%	76%	67%
Percent of basic items in place	56% (11–100%)	31% (11–89%)	72% (0–100%)	58%	100%	100%	84%

Exhibit 30. Key Central-Level Policy and Governance Capabilities and Gaps

MOH establishment of a National Pharmaceutical Policy	✓
Formal body that provides oversight and governance for the supply chain	✓
Frequency of governance body meetings	Quarterly
Existence of national STGs	✓
Adaptation of STGs from the universal clinical guidelines	✓
Frequency of revision of national STGs	Every 2 years
Process for registering new drugs, products, and technologies	✓
Time it takes to register a new drug on average	3–6 months (MOH) or more than a year (GHS)
Public list of registered products	MOH: ✓ GHS: X

Existence of policies and guidelines. Ghana’s supply chain benefits from the existence of a broad range of formal policies important for a public health supply chain. The country has an NEML and STGs and both are reportedly updated regularly—every five years and two years, respectively—if less often

than proposed in the SCMP. Also, guidelines or SOPs exist for many key supply chain functions, as shown in Exhibit 31. They include some manner of policy guidance provided on procurement and quality assurance, areas of special focus in the SCMP.

Exhibit 31. Supply Chain System Guidelines and SOPs Available							
	Regional Hospitals	Teaching Hospitals	RMSs	TCMS	IHS	MOH	GHS
n =	10	4	10	1	1	1	1
Guidelines or SOPs for the supply chain system exist, covering:	50%	50%	80%	✓	✓	✓	✓
Storage	60%	25%	80%	✓	✓	✓	✓
Inventory management	60%	25%	80%	✓	✓	✓	✓
LMIS	60%	25%	70%	✓	✓	✓	✓
Quality assurance	60%	25%	70%	✓	✓	✓	✓
Forecasting and quantification	50%	25%	70%		✓	✓	✓
Supply planning	50%	25%	80%		✓	✓	✓
Waste management	40%	25%	80%	✓	✓	✓	✓
Procurement	40%	25%	70%		✓	✓	✓
Financing	40%	25%	70%		✓	✓	✓
Human resources	40%	25%	50%		✓	✓	✓
None of the above		50%					

Dissemination of policies. Dissemination of policies appears to be a challenge at lower levels of the public health system. Exhibit 32 above demonstrates that policies extant at the central level are not universally available at the regional level. This is true even for extant guidance created on quality assurance and procurement, technical areas that the SCMP highlighted as key interventions. A similar dynamic was found for the presence of the national STGs. Nearly all higher-level sites visited could produce a physical or electronic copy of the national policy; however, only 53 percent of CHPSs and clinics visited had a copy on hand (see Exhibit 32).

Exhibit 32. Availability of National STGs					
	CHPS & clinics	HCs & polyclinics	District hospitals	Regional hospitals	Teaching hospitals
n =	68	67	50	10	4
STGs available at site (physically verified)	53%	87%	96%	100%	75%

Caveat on implementation. One caveat to this section is important. This portion of the NSCA assessed policy and governance capabilities by determining the existence of fundamental building blocks—policies, laws, and regulations along with institutions and formal process to support them. This section of the assessment does not, however, attempt to measure the level of implementation nor effectiveness of these planning and governance policies, laws, and regulations in Ghana. As the above illuminates, the Ghanaian health system deserves credit for institutionalizing policies, bodies, and processes identified as important by the NSCA. However, existence cannot be automatically equated with effective implementation. As the below quality assurance and procurement sections of the report show, the presence of relevant policy and governance capabilities are not necessarily translating to their effective execution throughout the supply chain system.

Recommendations

As Ghana has in place many of the basic items for effective planning and governance, recommendations in this space focus on updating and expanding capabilities:

- Update NEML and STGs annually to ensure relevance and usefulness, as recommended by 2015 SCMP.
- Ensure awareness and availability of extant national policies at all levels. Perhaps include checks for physical copies of policies, guidelines, and SOPs in supportive supervision visits.

A broader recommendation is to ensure that existing policies are implemented, regulations monitored, and governance institutions fully authorized to act to correct abuses. To these points, several interventions proposed in 2015 remain relevant:

- Ensure adherence to NEML and STGs in procurement and prescribing practices
- Develop and implement guidelines for sanctioning procurers within the system and for noncompliant vendors, including adherence to the certificates of non-availability process
- Explore the use of regulatory mechanisms to manage prices for health commodities
- Ensure sustained enhancement of FDA's capacity (technical and financial) to test medicines
- Ensure all procurement entities monitor vendor performance as part of contract management
- Ensure that Procurement and Supply Directorate (MOH) and Supplies, Stores, and Drug Management (GHS), as well as entity tender committees, are fully empowered to monitor procurement practices at all levels of the supply chain

Improving such regulatory and governance implementation will require sustained prioritization and leadership from the MOH and would likely benefit from increased clarity as to specific agencies, departments, or units' respective roles, authority, and responsibility for creating and implementing supply chain policies.

Supplemental Exhibit

Exhibit 33. Policy and Governance, Distribution of Questions, and Assignment of Weight Across Capability and Facility Levels								
MODULE	BASIC (50%)		INTERMEDIATE (30%)		ADVANCED (15%)		SOA (5%)	
	# of Qs	WEIGHT	# of Qs	WEIGHT	# of Qs	WEIGHT	# of Qs	WEIGHT
Referral hospitals (14)	9	5.6%	1	30.0%	1	15.0%	1	5.0%
Warehouses (12)	12	4.2%	4	7.5%	2	7.5%	1	5.0%
MOH and GHS (2)	19	2.6%	8	3.8%	5	3.0%	1	5.0%

Note that interpretations of the scoring, and discussions of “differences” in the scores, need to recognize that the number of assessed capabilities differs by facility type and module. Thus, positive responses to individual questions (i.e., reports of present capabilities) carry different weights, depending on the technical area and facility type.

Note also that the number of questions and the question weighting for these modules vary because some conditionally scored questions are included. Figures presented here assume all conditions are met and all questions are included.

Human Resources

Effective supply chains require significant human resources across a wide range of technical areas, all levels of the health care system, and all geographic areas of the country to ensure that quality health commodities are distributed safely and promptly. The NSCA outlines core HR supply chain capabilities and performance metrics to assess the extent to which facilities have the needed resources, supply chain functions have formally allocated responsibilities, and staff have the necessary training, knowledge capacity, time, and scope to support supply chain operations. Major areas that were factored into the scoring for this CMM module are the presence of appropriate supply chain functions in job descriptions, regular capacity-building efforts for staff, and mechanisms for supportive supervision and performance improvement (see Exhibit 34).

Exhibit 34. Examples of Scored Human Resources Capabilities

Basic	At least two capacity-building sessions (e.g., LMIS, waste management, reporting) within the last year SOPs or training guides/materials
Intermediate	Human resource workforce plan that projects future needs for supply chain personnel Unified supply capacity-building plan Supportive supervision of supply chain functions within the last year Presence of appropriate supply chain functions in job descriptions
Advanced	Quarterly staff performance reviews Most (51–99 percent) staff have participated in capacity training in the last two years Database tracking of staff's attendance at capacity-building sessions in supply chain management Advanced supply chain–specific capacity-building programs available in country (e.g., e-learning, certificate, diploma programs)
SOA	Participation by all staff in supply chain capacity training within last two years Bachelor's degree or master's program in supply chain available in country

Note: These are illustrative examples of the types of capabilities scored in this module, not an exhaustive list. Each module contains many dozens of questions and capabilities. For a full list, please refer to the NSCA toolbox, available at www.ghsupplychain.org.

In 2015, an MOH report on human resources in the Ghanaian health sector concluded, “The health sector of Ghana has over the years been confronted with inadequate numbers and unbalanced skill mix of the required health workers.”²⁷ One study forecasted that only about 68 percent of the health workforce requirements are employed and available for service delivery.²⁸ The overall shortage is exacerbated by inequality in the geographic distribution of extant workers.²⁹

²⁷ MOH. (2015). *Staffing norms for the health sector*, vol. 1, *Clinical and support staff*, available at <http://www.moh.gov.gh/wp-content/uploads/2017/02/Health-Sector-staffing-Norm.pdf>.

²⁸ Asamani et al. (2018). Forecast of healthcare facilities and health workforce requirements for the public sector in Ghana, 2016–2026. *International Journal of Health Policy Management*, 7(11):1,040–1,052.

²⁹ The MOH continued, “Part of this problem has been inequitable distribution [of] health workers, which has led to gross understaffing in many facilities and overstaffing in some facilities.” In recent years, the Ghanaian government has instituted multiple initiatives—including increasing salaries and creating a vehicle hire purchase scheme in an effort to attract and retain health workers in rural areas—with mixed impact. Health professions leave rural regions for multiple reasons, including poor working conditions, limited career progression prospects, a lack of management and community support and the absence of proper equipment and infrastructure at the health facility level. See, for example, Amalba et al. (2018). Working among the rural communities in Ghana. *BMC Medical Education*, 18(133); Johnson et al. (2011). For money or service?

Within the broader context of insufficient and unequal human resources in Ghana's public health system, supply chain functions specifically are inadequately and often inappropriately staffed. In 2016, a Global Fund study found that this was partly because the "supply chain is not recognized as a valued profession" in Ghana.³⁰ Many key supply chain functions (e.g., stores management, transport, and dispensing activities) were being conducted by casual workers, national volunteers, or as ancillary tasks tacked onto heavy workloads of other health professionals. Insufficient numbers of logistics officers with professional supply chain training resulted in the frequent reliance on physicians, pharmacists, medical assistants, and nurses to perform supply chain tasks. While the study also documented a demonstrated general "legacy of professionalism" and the presence of "educated, knowledgeable and dedicated professionals" at all levels of Ghana's health care system, Global Fund concluded that system-level dysfunction resulted in frequent mismatching of skills and responsibilities, and a broad-based human resource crisis.

In the 2015 SCMP, HR is identified as one of 10 principles for guiding improvements to the country's public sector supply chain. The working group diagnosed the challenge thus:

While human resource needs are recognized by some of the various supply chain entities, skills and numbers of supply chain-related personnel are still limited due to unclear roles and a lack of investment. There is limited supply chain capacity at most levels, and no pre-service training in professional and/or technical schools related to logistics or supply chain.

Also, the plan noted that supportive supervision exercises rarely addressed management of commodities or performance on other supply chain functions. To address this, the SCMP set as a human resource objective that "the supply chain shall have adequate human capacity, in quantity and quality, and skills shall adequately reflect job requirements."

HR was also discussed in the "capacity building" that would need to accompany SCMA creation. An expectation throughout the SCMP was that the SCMA would create new systems and procedures for supply chain functions (e.g., distribution, LMIS, forecasting) that would in turn require retraining and capacity building for employees throughout the supply chain system. The SCMP outlined key interventions in capacity building on envisioned new systems, including:

- Training staff who will be involved in new eLMIS
- Creating a training curriculum and materials for trainers and trainees at all levels, based on the [soon-to-be] revised supply chain SOPs
- Developing a supportive supervision plan and continuing to implement supportive supervision at all levels (by MOH, GHS, and partners) to ensure that staff could complete required supply chain activities
- Identifying training institutions and schools for coursework for preservice training on supply chain functions, including creating new curricula and courses to support the new system

The SCMP intended for the proposed SCMA to lead these efforts.

Finally, concurrently, in 2015 the MOH released revised minimum staffing norms for the country's health sector to inform its efforts to address the inadequate number and unbalanced skill mix of health workers nationwide. Updated in 2017, Exhibit 35 isolates those positions that bear most directly on supply chain functions, consolidating the minimum number of personnel that the MOH deemed

³⁰ Global Fund, (2016). *Ghana public health supply chain: economic business case*.

necessary across staff categories and facility types (and subtypes, distinguished by outpatients per annum).³¹

Exhibit 35. Minimum Staffing Norms					
Staff Category	Health centers A & B	Polyclinics A & B	District hospitals A & D	Regional hospitals A & B	Teaching hospitals
<i>Assumed outpatients per annum (rounded) =</i>	>13,000; 14-28,000	<30,000; >31,500	<47,000; >105,000	<100,000; >110,000	“emerging”; “established”
Pharmacist		1 or 2	2 or 6	6 or 18	32 or 76
Pharmacy technicians and/or assistants		3 or 5	9 or 17	3 or 12	21 or 51
Procurement manager and/or officer		1	2 or 4	1	3 or 8
Storekeeper; supply officer or manager	1	2	2 or 3	2 or 4	12 or 30
Dispensing technicians and/or assistants	1 or 3	2 or 3	--	--	19 or 25
Finance and/or accounts personnel*	1 or 2	5 or 7	9 or 29	10 or 20	39 or 87
Human resource manager	--	--	1	1	4 or 10
Driver	1	1	2 or 4	6 or 8	6 or 10
<i>Minimum supply chain personnel</i>	4 or 7	15 or 21	27 or 64	29 or 64	137 or 297

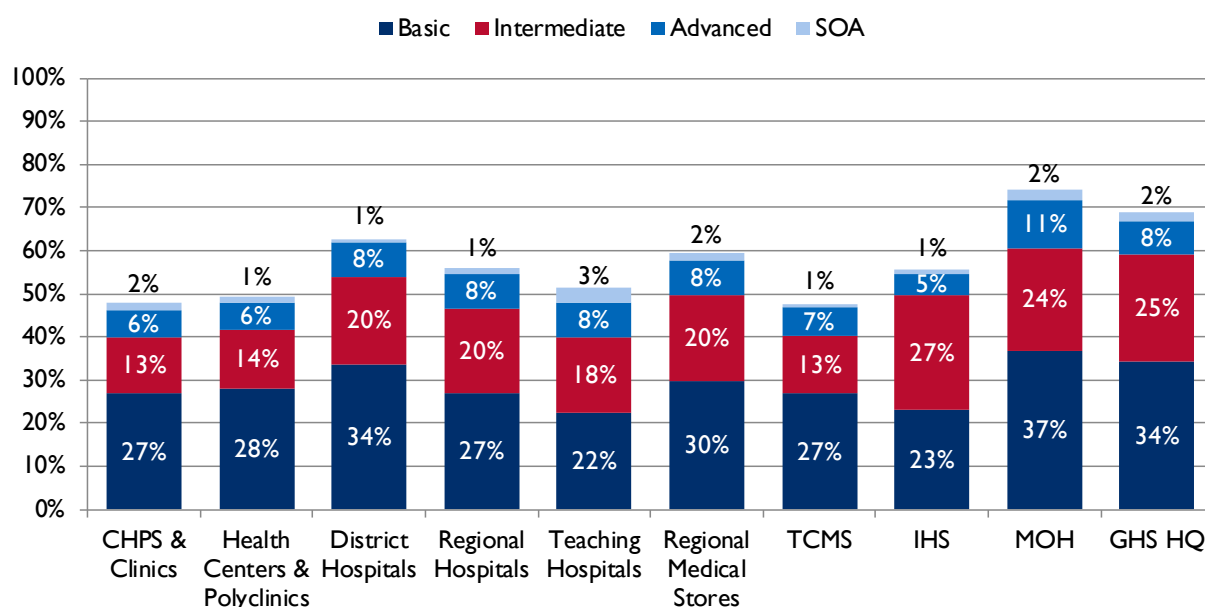
Listed staff categories for CHPS compounds included community health officers, nurses, midwives, field technicians, and security guards, but no supply chain-specific positions. In these cases, medical professionals must continue to perform supply chain functions. Conversely, listed staff categories for district health directorates included a minimum of at least one pharmacist, supply officer, procurement manager, finance officer, accountant, and human resource manager. It is conceivable, then, that DHAs assume some supply chain functions for lower-level facilities, though the exact relationship on supply chain responsibilities warrants clarification.

2019 NSCA Findings and Analysis

In Ghana, the NSCA finds that some progress has been made in expanding the number of supply chain-related personnel available throughout the system, but much work remains to institutionalize and support supply chain responsibilities. Exhibits 36 and 37 summarize findings in this technical area.

³¹ MOH. (2018). Staffing norms for the health sector in Ghana, technical report on Phase II.

Exhibit 36. Human Resources Capability Maturity Model Scores



Note on interpreting results: Recall that CMM scores are a composite of assessed basic (max 50 percent), intermediate (30 percent), advanced (15 percent), and “state of the art” (SOA) (5 percent) capabilities. Reported percentages are the scored results averaged across all assessed sites, for each capability level and facility type. For more information, please refer to the Understanding the CMM Results section above.

Exhibit 37. Human Resources KPIs, Maturity Score, and Basic Capabilities in Place

	CHPS & clinics	HCS & polyclinics	District hospitals	Regional hospitals	Teaching hospitals	RMSs	TCMS	IHS	GHS HQ	MOH
n =	68	67	50	10	4	35	1	1	1	1
Overall maturity score (range)	48% (3–79%)	49% (23–78%)	63% (18–85%)	56% (20–77%)	51% (40–76%)	59% (39–72%)	48%	55%	69%	74%
Percent of basic items in place (range)	54% (6–89%)	56% (22–94%)	67% (28–94%)	54% (29–75%)	45% (33–63%)	60% (38–69%)	54%	46%	68%	74%
Avg. no. of supply chain positions	3.1	6.6	11.8	16.6	18.5	31.1	7.0	23.0	27	26.5
Staff turnover ratio	10%	16%	9%	21%	1%	1%	0%	6%	0%	9%
Percent of positions vacant	24%	31%	24%	7%	28%	23%	0%	15%	44%	12%

Most capability maturity scores hovered around 60–70 percent with half of queried basic-level capabilities in place. Widespread reported use of best practices in general HR management—including regular staff performance reviews and government budgeting for human resources—was tempered by less-frequent reports of supply chain-specific human resource capabilities. The following subsections outline key takeaways. The distinction between “permanent” and “temporary” supply chain staff—ubiquitous in the Ghanaian system—was not made during this assessment. Both types of employment were jointly considered in the following.

Shortage of supply chain professionals. The performance indicators in Exhibit 38 above suggest a continued shortage of supply chain professionals in Ghana. The average number of supply chain positions remains well short of the minimum staffing norms set by the MOH (see Exhibit 39). The NSCA did not distinguish between temporary and permanent supply chain staff. Further, while facilities generally reported low turnover ratios for supply chain personnel, the percentage of supply chain positions vacant is alarmingly high. In the most extreme case, the GHS HQ reported no turnover of supply chain personnel in 2018 or 2019, but 44 percent of its positions were vacant. According to key informants interviewed, 12 of the 27 supply chain positions in the official organization chart have remained empty for the past six years.

MOH and GHS respondents reported that significant supply chain–specific training opportunities exist in Ghana, including:

- Ad hoc "classroom" training
- Mentorship or coaching
- Structured on the job training
- E-learning programs in supply chain
- Certificate programs in supply chain
- Diploma programs in supply chain
- Bachelor's/undergraduate degree program in supply chain
- Master's program in supply chain

Bachelor's and master's degree programs in supply chain management are considered state-of-the-art capabilities in the structure of the NSCA. In Ghana's public health supply chain, however, these human resource capabilities have yet to translate into positive performance in adequately and appropriately staffing supply chain functions throughout the health sector.

Dedicated supply chain staff. As Exhibit 39 demonstrates, the presence of dedicated and trained supply chain personnel remains centralized at higher levels within the Ghanaian public health system. Exhibits 38 and 39 show that there is also greater formal coverage of supply chain functions by personnel. Storage and inventory management, for example, is formally included in the job descriptions of at least one site staff member in 75 percent or more of hospitals and regional medical stores; however, only 6 percent of CHPS and clinics and 85 of health centers and polyclinics reported the same. Excluding supply chain functions from formal job descriptions risks them being deprioritized in daily operations and nonfactors in annual staff performance reviews.

Exhibit 38. Supply Chain Functions and Job Descriptions						
Supply chain functions are included in the job descriptions for at least one site personnel, including:	Percent of facilities reporting:					
	CHPS & clinics	HCS & polyclinics	District hospitals	Regional hospitals	Teaching hospitals	RMSs
Forecasting and quantification				80%	75%	80%
Procurement				70%	75%	70%
Storage and inventory management	6%	8%	78%	80%	75%	80%
LMIS	3%	5%	62%	80%	50%	80%
Waste management	3%	8%	48%	50%	75%	60%
Quality and/or pharmacovigilance	3%	6%	60%	60%	50%	50%

Exhibit 39. Supply Chain Functions and Job Descriptions

Supply chain functions are included in the job descriptions for at least one site personnel, including:	Percent of facilities reporting:			
	MOH	GHS	TCMS	IHS
Forecasting and quantification	✓	✓	✓	✓
Product selection	✓	✓		✓
Procurement	✓	✓		✓
Supply planning	✓	✓		✓
Warehousing and inventory management		✓	✓	✓
Distribution	✓	✓	✓	✓
LMIS	✓	✓		✓
Ordering and reporting	✓	✓	✓	✓
Waste management		✓		✓
Quality and pharmacovigilance		✓		✓

Supply chain capacity-building training. Recall that the 2015 SCMP focused at length on the capacity training function that the SCMA was to play in conjunction with its planned reform of supply chain processes and SOPs. Absent the creation of the SCMA, there appears to have been some—but certainly not universal—capacity training on key supply chain functions in the public health system. Warehousing and inventory management, ordering and reporting, and LMIS were the most frequently reported areas covered in capacity-building sessions over the previous year (Exhibit 40). Most sites, however, reported that less than half of its staff participated in these capacity-building sessions (Exhibit 41). About a quarter of CHPS, clinics, health centers and polyclinics reported that no supply chain capacity-building sessions occurred at all. Exhibit 42 presents the most frequently reported barriers to participating in these sessions: financial considerations, workload, and a lack of materials or skilled trainers. Only rarely was lack of interest reported as a barrier to participation.

Exhibit 40. Areas Covered in Capacity-Building Sessions in the Last Year

	Percent of facilities reporting:					
	CHPS & clinics	HCS & polyclinics	District hospitals	Regional hospitals	Teaching hospitals	RMSs
Warehousing and inventory management	67%	54%	84%	80%	50%	90%
Ordering and reporting	65%	58%	76%	60%	50%	90%
LMIS	53%	49%	80%	50%	50%	90%
Treatment guidelines	36%	40%	64%	70%	50%	70%
Waste management	33%	41%	46%	--	--	--
Medicine quality assurance	27%	30%	64%	70%	50%	60%
Forecasting and quantification	--	--	--	60%	75%	80%
Procurement	--	--	--	60%	50%	70%
Distribution	--	--	--	70%	50%	90%
None of the above	23%	26%	6%	0%	0%	0%

Exhibit 41. Proportion of staff participating in capacity building sessions in the last year

	Percent of facilities reporting:					
	CHPS & Clinics	HCs & Polyclinics	District Hospitals	Regional Hospitals	Teaching Hospitals	RMSs
None	22%	22%	0%	20%	25%	0%
Minimal (1 - 25%)	32%	30%	26%	30%	0%	20%
Some (26-50%)	17%	17%	26%	0%	25%	40%
Most (51 - 99%)	11%	17%	28%	30%	0%	10%
All (100%)	13%	8%	14%	20%	50%	30%

Exhibit 42. Critical Barriers to Supply Chain Management Capacity-building Programs

	Percent of facilities reporting:					
	CHPS & Clinics	HCs & Polyclinics	District Hospitals	Regional Hospitals	Teaching Hospitals	RMSs
Finances	78%	84%	86%	80%	100%	90%
Workload	49%	42%	52%	50%	50%	70%
Materials	40%	41%	36%	20%	0%	20%
Skilled trainers	22%	41%	30%	10%	0%	20%
Lack of interest	5%	17%	12%	10%	0%	10%

Supervision. Finally, supportive supervision appears to be a widely reported practice in Ghana's public health sector, including on supply chain matters. Eighty percent or more of facilities at all levels (except for teaching hospitals) reported receiving supportive supervision in the last year (Exhibit 43). The most commonly reported entity responsible for conducting these supportive supervision exercises is district-level government officials, namely, the DHAs.

Exhibit 43. Supportive supervision

	Percent of facilities reporting:					
	CHPS & Clinics	HCs & Polyclinics	District Hospitals	Regional Hospitals	Teaching Hospitals	RMS
Responsible for providing supportive supervision: Government staff	89%	95%	86%	90%	25%	90%
Supply chain staff received supportive supervision in last year	86%	92%	80%	80%	25%	80%
Staff received immediate feedback after supportive visits	82%	81%	78%	90%	25%	80%
Corrective actions are taken following supervision visits	84%	91%	84%	90%	25%	90%

Recommendations

Ghana has yet to achieve the 2015 SCMP human resource objective to ensure that the supply chain has “adequate human capacity, in terms of quantity and quality, and skills shall adequately reflect job requirements.” This is not a critique on the individuals employed in these roles—indeed, other studies have found a strong “legacy of professionalism” throughout Ghana’s public health supply chain, despite challenging contexts³²—but rather of the resources and attention devoted to systematically ensuring supply chain functions are adequately staffed and personnel sufficiently supported. To this end, the NSCA’s findings suggest several HR interventions:

- Incorporate supply chain functions into formal job descriptions at all levels, ensuring that responsibilities for all basic supply chain functions are designated to at least one site personnel. Simultaneously, ensure appropriate funding, capacity training, and performance measurement (within existing supportive supervision processes) are allocated to empower designated personnel to assume and execute supply chain roles.
- Harmonize supportive supervision exercises with revised supply chain job description roles and responsibilities, ensuring staff are evaluated on supply chain functions and supported with training and monitoring feedback.
- Prioritize addressing the personnel shortage of public health supply chain personnel as related but distinct from the broader public health professional shortage. Consider enhancing the supply chain skills of health workers (Pharmacist, Nurses, Lab technicians) involved in health commodity management. A supply chain professional with a medical or technical health background is advantageous—especially when medicines are being managed in the warehouse—but it may not necessarily be required. Simultaneously, work to recognize and elevate the value of supply chain functions in the system, to encourage recruitment into the field.
- Revisit staffing norms, checking quantitative assumptions and considering reasonableness in the current funding and human resource context, to ensure relevance and usefulness as a guide.
- Continue to experiment with national policies that address geographic disparities in recruitment and retention of public health and supply chain professionals.

Supplemental Exhibit

Exhibit 44. Human Resources: Distribution of Questions and Assignment of Weight Across Capability and Facility Levels								
MODULE	BASIC (50%)		INTERMEDIATE (30%)		ADVANCED (15%)		SOA (5%)	
	# of Qs	WEIGHT	# of Qs	WEIGHT	# of Qs	WEIGHT	# of Qs	WEIGHT
CHPS and clinics (n=68)	18	2.8%	14	2.1%	7	2.1%	3	1.7%
Health centers and polyclinics (67)	18	2.8%	14	2.1%	7	2.1%	3	1.7%
District hospitals (50)	18	2.8%	14	2.1%	7	2.1%	3	1.7%

³² Global Fund. (2016). *Ghana public health supply chain, economic business case, final report*, 2016.

Referral hospitals (14)	21	2.4%	17	1.8%	8	1.9%	3	1.7%
Warehouses (12)	23	2.2%	27	1.1%	10	1.5%	6	0.8%
MOH and GHS (2)	16	3.1%	24	1.3%	9	1.7%	6	0.8%

Note that interpretations of the scoring, and discussions of “differences” in the scores, need to recognize that the number of assessed capabilities differs by facility type and module. Thus, positive responses to individual questions (i.e., reports of present capabilities) carry different weights, depending on the technical area and facility type.

Note also that the number of questions and the question weighting for these modules vary because some conditionally scored questions are included. Figures presented here assume all conditions are met and all questions are included.

Financial Sustainability

Effective supply chains require sufficient and predictable funding streams, supported by sound financial management practices. The NSCA assesses financial sustainability across all levels of the health system to ensure that supply chain operations are sufficiently funded, that facilities practice good financial management techniques, and that any financing gaps are identified. The CMM module places greater emphasis and scoring value on using prudent financial management and understanding operating costs rather than the self-sufficiency of the entity to finance itself. While it is difficult to get a high score without having some degree of self-sufficiency, the intent of the module is to understand how facilities manage the funds they receive.

Exhibit 45. Examples of Scored Financial Sustainability Capabilities

Basic	<ul style="list-style-type: none"> Supply chain costs (e.g., products, warehousing, distribution, personnel, overhead, service delivery) are recorded and records maintained Government or facility revenue/costs contribute minimally to total supply chain operations budget/health commodities (less than 25 percent) Budgets are prepared annually MOH financial unit regularly prepares and submits financial reports/profit and loss statements MOH financial unit regularly measures liabilities/cash cycle or cash flow/depreciation/conducts audits/inventories capital assets yearly Process exists for submitting unbudgeted requests
Intermediate	<ul style="list-style-type: none"> Facility’s funding strategy explicitly includes supply chain costs Government/facility revenue is a source of funding for supply chain operations Government or facility revenue/costs contribute some to total supply chain operations budget/health commodities (between 25 percent and 50 percent) Donor support is routinely tracked by MOH Budget includes lines for miscellaneous funds
Advanced	<ul style="list-style-type: none"> Government or facility revenue/costs contribute most of supply chain operations budget/health commodities (51–99 percent) No commodity budget shortfall in the past year Funding can be reallocated at the management level
SOA	<ul style="list-style-type: none"> Government or facility revenue/costs contribute all of supply chain operations budget/health commodities (100 percent)

Note: These are illustrative examples of the types of capabilities scored in this module, not an exhaustive list. Each module contains many dozens of questions and capabilities. For a full list, please refer to the NSCA toolbox, available at www.ghsupplychain.org.

Many financial factors were highlighted throughout the 2015 SCMP as contributing to supply chain weakness and a perceived decline in the health system’s overall performance, including “unintended consequences resulting from procurement decentralization, local efforts to increase the involvement of the private pharmaceutical sector, and persistent underfunding and delays.” The financial sustainability of the country’s insurance scheme, the National Health Insurance Scheme (NHIS), was emphasized as “a

serious threat for the health system” and, relatedly, the “inefficient and fragmented procurement process.” The Plan explains,

The supply chain is marred by payment delays and long-standing indebtedness: from the NHIA [National Health Insurance Authority, implementing body of the NHIS] to facilities, from facilities to the RMSs, from the RMS to the CMS; these delays and debts have a significant negative impact [on] the ability of the CMS and RMSs to complete future procurements. There is little direct relationship between the theoretical price and the reimbursement price. Prices for consumers and insurers are up to three times higher than international reference prices.

While the NHIA has significantly expanded access to the health care system—covering more than a third of the population, reducing the out-of-pocket expenditures of insured individuals, and increasing national use of health services—it has simultaneously imperiled the financial solvency of the overall system and, as a downstream effect, the functioning of the supply chain and availability of health commodities.

A 2016 Global Fund report presents a similarly stark picture of the financial situation of the country’s public health supply chain and the relationship between governmental funding, NHIA reimbursements, procurement practices, and supply chain performance:

There is a crisis in the public health supply system... Funding is at the heart of the challenge and systemic change is urgently needed....

The notion of a supply chain in PH has broken down. The public sector supply chain has become more of a ‘trading network.’ Each store or facility in the supply chain arranging supply ‘deals’ and fighting for their own survival...

Product shortages and rationing at CMS and RMS are caused by systemic failing in the funding for GHS. Rationing of medicines supply to GHS health facilities is now commonplace, leading to stock-outs and impacting health-seeking behaviors of the population.

The 2015 SCMP summarized the key financing challenges as (1) outstanding debts between levels of the system and partners within the system and (2) pricing and reimbursement guidelines that do not reflect actual costs incurred. The Plan proposed four financing interventions, intended to be led by the new SCMA:

1. Outstanding debts will be settled/negotiated/written off, and future payment deadlines and mechanisms will be established and enforced by the MOH.
2. Pricing and reimbursement policies and guidelines will be rationalized, and these policies will directly relate to the actual costs of the services being provided (to be led by MOH).
3. The financial sustainability of the NHIA and the viability of revolving funds at all levels will be supported by formal and continuous coordination among MOH, GHS, NHIA, partners, and other stakeholders (MOH designated lead coordinator).
4. As an agency of the MOH, SCMA will develop an annual budget according to the regular governmental cycle.

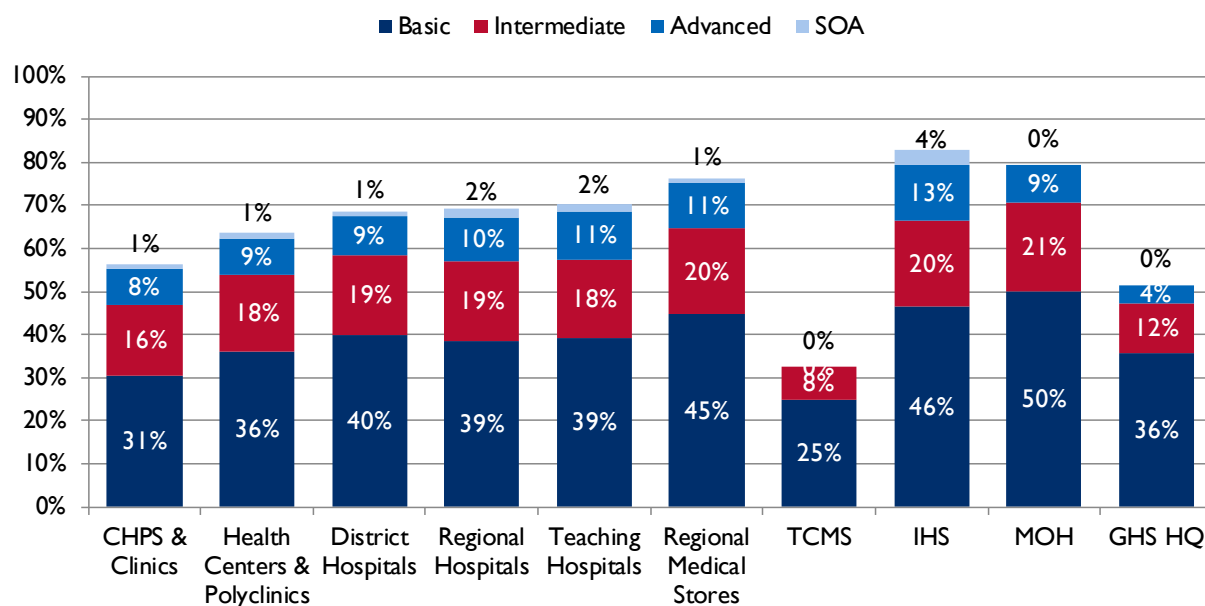
The SCMA was ultimately not created; however, this financial sustainability module of the NSCA helps determine the current levels of financial management capabilities and performance in the Ghanaian health system and, indirectly, on progress made on these proposals in the absence of a central body. Matters of procurement are more directly addressed in a distinct procurement assessment module, presented in a later section.

2019 NSCA Findings and Analysis

Financial sustainability results for maturity model scores and the percentage of facilities reporting key capabilities are displayed in Exhibits 46–48. With a capability maturity score of 79 percent, the MOH approached the NSCA’s recommended goal of 80 percent. The reported presence of capabilities to financially manage the public health supply chain decreased at lower-level facilities. On average, all facility types had most basic items in place, although the assessment found significant variation in available financial capabilities within facility types. For example, CHPS and clinics averaged 61 percent of basic financial capabilities in place, but the assessed range spanned from all basic capabilities in place at some sites to none at others. To some extent, the higher capability scores recorded by DHAs can be understood as a complement to those lower-level health facilities. District health officers support—and some perform—many of the financial responsibilities of sites within their jurisdictions, though the level and type of support provided also vary considerably among DHAs.

Before highlighting key findings, it is important to reiterate that the capability maturity scores in this assessment mostly reflect the presence of financial management tools and best practices with a focus on supply chain activities. It is not, again, a measure of the fiscal health or solvency of the public health supply chain at large. The high percentage of facilities across all levels of the public health system that reported budget shortfalls for health commodities and/or delays in reimbursements from insurance suggest rather that financial solvency remains a significant challenge of Ghana’s public health supply chain system, independent of the simultaneous presence of key financial management capabilities.

Exhibit 46. Financial Sustainability Capability Maturity Model Scores



Note on interpreting results: Recall that CMM scores are a composite of assessed basic (max 50 percent), intermediate (30 percent), advanced (15 percent) and “state of the art” (SOA) (5 percent) capabilities. Reported percentages are the scored results averaged across all assessed sites, for each capability level and facility type. For more information, please refer to the Understanding the CMM Results section above.

Exhibit 47. Central-Level Financial Sustainability KPIs, Maturity Score, and Percentage of Facilities with Key Capabilities Related to Supply Chain Management in Place

	MOH	GHS HQ	TCMS	IHS
n =	1	1	1	1
Overall maturity score	79%	52%	33%	83%
Percent of basic items in place	100%	71%	50%	93%
Budgets are prepared or updated annually	✓	No / less often	Respondent did not know	✓
Budgets include miscellaneous funds for unexpected issues	No	No	No	✓
Supply chain costs explicitly are recorded and records maintained	✓	✓	No	✓
Funding strategy that explicitly includes supply chain costs exists	No	No	No	✓
Source of funds for supply chain operations	Government; donors; facility revenue	Government; donors; facility revenue	Government; donors	Facility revenue
Government and/or facility contribution towards supply chain operations budget	“Some” (~25-50%)	“Minimal” (<25%)	Respondent did not know	“All” (100%)
Source of funds for health commodities	Govt; Donors; Facility revenue	Government; Donors	Government; Donors	Donors; Facility revenue
Government and/or facility contribution towards health commodities	“Most” (~50-99%)	Respondent did not know	Respondent did not know	“All” (100%)

Exhibit 48. Non-Central Level Financial Sustainability KPIs, Maturity Score, and Percentage of Facilities with Key Capabilities in Place

	CHPS Clinics	& HCs Polyclinics	& DHAs	District Hospitals	Regional Hospitals	Teaching Hospitals	RMS
n =	68	67	35	50	10	4	10
Overall maturity score (range)	56% (0-82%)	64% (34-90%)	69% (49-90%)	69% (49-90%)	69% (58-76%)	70% (65-76%)	76% (67-86%)
Percent of basic items in place (range)	61% (0-100%)	72% (29-100%)	80% (57-100%)	80% (57-100%)	77% (57-86%)	79% (71-86%)	89% (71-100%)
Percentage of sites reporting that budgets are prepared or updated annually	67%	87%	100%	100%	90%	100%	100%
Percentage of sites reporting that budgets include miscellaneous funds for unexpected issues	48%	49%	58%	70%	70%	50%	90%
Percentage of sites reporting that supply chain costs are recorded and records maintained	48%	49%	58%	70%	70%	50%	90%

Presence of financial management best practices. Exhibit 49 shows the MOH—and to a lesser extent the GHS—has several key capabilities understood by the NSCA as key for financial sustainability, including all basic items. Budgets are prepared and updated annually, supply chain costs are explicitly recorded, and the government contributes to supply chain and health commodity costs.³³ The table also points out places where the GOG might adopt best practices for supply chain financial management, including budgeting miscellaneous funds for unexpected issues and explicitly incorporating supply chain costs into the broader funding strategy. There is more opportunity for improving fiscal management within the GHS and at the TCMS, where several basic capabilities were reported missing.

Exhibit 49 also demonstrates that significant financial management capabilities exist lower in the supply chain, especially among the regional medical stores and hospitals. Given the central procurement role played by RMSs in Ghana’s public health system, it is important and valuable that the RMSs averaged high capability maturing scores and mostly confirmed the presence of key financial capabilities—including, annual budgets (100 percent), miscellaneous budget lines (90 percent), and explicit recording of supply chain costs (90 percent). Similarly, nearly all hospitals reported annual budget preparations, and many reported allocating funds for unexpected issues and explicitly recording supply chain costs.

Lower-level service delivery points (CHPS, clinics, health centers, and polyclinics) reported diminishing financial capabilities and higher variability within groups. This was ameliorated partially by the high capabilities reported at DHAs, which are responsible for supporting health facilities in their area with financial management. Anecdotally, enumerators confirmed that financial responsibilities were indeed often shifted to DHAs; however, several sites mentioned frustration with fiscal processes that lacked transparency, that failed to fully capture or inform actual cash flows, or instances where budget data were laboriously provided but without subsequent feedback, which “has contributed [to] apathy in subsequent preparations.” Financial management processes at lower facility levels would likely benefit from greater clarity on, and standardization of, the division of fiscal roles and responsibilities with the DHAs, as well as investment in ensuring that supporting supervision in fiscal matters is cooperative, informative, and transparent.

Sources of funding and funding shortfalls. Exhibits 50 and 51 display the information on the source of facility funds for supply chain operations and health commodities, respectively. High proportions of facilities across all levels reported that government and/or facility revenue and cost recovery contributed to their sources of funds in these two areas (the question allowed for the selection of multiple sources). The NSCA credits supply chains where the government or facility revenue contributes substantially to supply chain operational and health commodity costs (without differentiating relative contribution values). In Ghana, most sites reported that most or all of the budget in these areas was sourced from government contributions or facility revenue. That said, a substantial percentage of sites also reported a budget shortfall for health commodities in the previous year, including more than a third of lower-level SDPs, 40 percent of regional hospitals, 70 percent of regional medical stores, and 75 percent of teaching hospitals. The ramifications are manifest in the high stock-out rates observed throughout the system (see Exhibits 70 and 71 in Warehousing and Storage section, under “stock availability”). Thus, while standard fiscal operations assume self-sufficiency in fiscal

³³ The government pays primarily for staff salaries of supply chain professionals and for some health commodities, but, again, essential medicines are procured by RMSs and by SDPs (using the drug revolving fund), and most program-specific commodities (e.g., HIV, TB, FP, and to some extent malaria) are funded by donors. For more explanation, please see Ghana’s Public Health Supply Chain section above.

matters, these numbers suggest that solvency remains a challenge in the Ghanaian public health supply chain, especially as relates to procuring health commodities.

Exhibit 49. Noncentral-Level Sources of Funding for Supply Chain Operations							
	CHPS & clinics	HCs & polyclinics	DHAs	District hospitals	Regional hospitals	Teaching hospitals	RMSs
n =	68	67	35	50	10	4	10
Government budget (central or decentralized level)	85%	89%	74%	52%	70%	50%	80%
Facility revenue/cost recovery	62%	75%	91%	96%	90%	100%	80%
Donor/Implementing Partners	17%	17%	40%	14%	0%	0%	30%
Percentage of sites reporting government and/or facility revenue contributing most or all of supply chain budget last year	79%	82%	91%	84%	80%	100%	80%

Exhibit 50. Noncentral-Level Sources of Funding for Health Commodities							
	CHPS & clinics	HCs & polyclinics	DHAs	District hospitals	Regional hospitals	Teaching hospitals	RMSs
n =	68	67	35	50	10	4	10
Government budget (central or decentralized level)	79%	81%	49%	48%	70%	50%	60%
Facility revenue/cost recovery	70%	76%	94%	98%	90%	100%	90%
Donor/implementing partners	22%	20%	47%	14%	20%	25%	60%
Percentage of sites reporting government and/or facility revenue contributing most or all of health commodities last year	82%	92%	90%	88%	90%	100%	90%
Percentage of sites reporting a budget shortfall for health commodities last year	38%	41%	33%	24%	40%	75%	70%

Insurance. The NSCA confirmed that health insurance is widely used in Ghana's public health system, but NHIA reimbursements are often delayed and insufficient. As Exhibit 51 presents, a minority of sites across most levels reported that insurance reimbursement adequately covers costs for health commodities. Meanwhile, significant proportions of assessed sites reported that reimbursements are rarely or never on time, include a plurality of all hospitals. Indeed, only one facility of the 234 SDPs assessed, a district hospital, reported receiving timely reimbursements from NHIA "all of the time."

Exhibit 51. Noncentral-Level Sources of Funding for Health Commodities						
	CHPS & clinics	HCs & polyclinics	DHAs	District hospitals	Regional hospitals	Teaching hospitals
n =	68	67	35	50	10	4
Site accepts health insurance	84%	100%	67%	100%	100%	100%

Insurance reimbursements adequately cover costs for health commodities	44%	54%	26%	46%	10%	25%
Insurance reimbursements are rarely or never timely	27%	44%	39%	52%	70%	75%

Data collectors recorded anecdotal evidence at many assessed sites that underscores the fiscal challenges created by delayed or insufficient NHIS reimbursement. Sites at all levels reported opaque reimbursement processes, year-long delays in reimbursement, costs that exceed reimbursement rates, and the impact of heavy debt on regional medical stores. Several sites reported that losses were finally absorbed by the facilities themselves. Overall, the NSCA finds that unpredictable and insufficient reimbursements continue to undermine the financial solvency of Ghana's public health supply chain system.

Recommendations

This assessment suggests that many best practices in the financial management of public health supply chains are currently in place, including widespread budgeting and record keeping, insurance and primary reliance on government budgets, and facility revenue to fund costs. However, a lack of financial solvency throughout the system is undermining trust in the financial institutions with corrosive effects on supply chain functions and ultimately the availability of health commodities. Addressing funding shortages is thus the primary recommendation, echoing those financial interventions proposed by the 2015 SCMP:

- Prioritize a national effort whereby outstanding debts will be settled/negotiated/written off, and future payment deadlines and mechanisms will be established and enforced by the MOH,
- Ensure the financial sustainability of the NHIA and the viability of revolving funds at all levels... by formal and continuous coordination among MOH, GHS, NHIA, partners and other stakeholders (with the MOH designated as the lead coordinator).

The NSCA also points to some additional interventions that may help improve the financial activities in support of the supply chain. These are of a second-order importance, but perhaps more easily implementable:

- Standardize fiscal support provided by DHAs to SDPs, including transparent fiscal accounting practices so that SDPs have confidence in budgeting exercises and in reimbursement processes. Provide any necessary training to DHA staff to improve supportive supervision practices in these areas.
- Ensure that basic financial management best practices—annual budgets and standard inclusion of miscellaneous funds for unexpected expenses—are universally used and that supply chain costs are explicitly included there, to ensure adequate consideration and funding and facilitate financial tracking and monitoring of these activities.

Supplemental Exhibit

Exhibit 52. Financial Sustainability: Distribution of Questions and Assignment of Weight Across Capability and Facility Levels								
	BASIC (50%)		INTERMED. (30%)		ADVANCED (15%)		SOA (5%)	
MODULE	# of Qs	WEIGHT	# of Qs	WEIGHT	# of Qs	WEIGHT	# of Qs	WEIGHT
CHPS and clinics (n=68)	7	7.1%	11	2.7%	6	2.5%	4	1.3%

Health centers and polyclinics (67)	7	7.1%	11	2.7%	7	2.1%	4	1.3%
DHAs (35)	7	7.1%	11	2.7%	6	2.5%	4	1.3%
District hospitals (50)	7	7.1%	11	2.7%	7	2.1%	4	1.3%
Referral hospitals (14)	7	7.1%	11	2.7%	7	2.1%	4	1.3%
Warehouses (12)	14	3.6%	11	2.7%	7	2.1%	4	1.3%
MOH and GHS HQ (2)	7	7.1%	12	2.5%	7	2.1%	4	1.3%

Note that interpretations of the scoring, and discussions of “differences” in the scores need to recognize that the number of assessed capabilities differs by facility type and module. Thus, positive responses to individual questions (i.e. reports of present capabilities) carry different weights, depending on the technical area and facility type.

Note also that the number of questions and the question weighting for these modules vary because some conditionally scored questions are included. Figures presented here assume all conditions are met and all questions are included.

Forecasting and Supply Planning

The FASP section seeks to ensure forecasts are being created using quality data and sound methodologies, monitored frequently and, ultimately, used to inform procurement decisions. Areas of focus that factored into the scoring for this CMM module include forecasting involving multiple stakeholders for multiyear periods, well-established SOPs involving data from multiple sources, active supply plan monitoring, and sharing of supply plans among partners (see Exhibit 54).

Exhibit 53. Examples of Scored Forecasting and Supply Planning Capabilities

Basic	A dedicated unit within the MOH responsible for forecasting and supply planning of health commodities Forecasts are used to mobilize funding from government and donor sources
Intermediate	Data assumptions documented as part of the supply plan Data quality assessed for consumption data before use in forecasting
Advanced	Performance standards or benchmarks against which forecast accuracy is assessed Forecasting SOPs updated annually or more often
SOA	Use of specialized forecasting software that uses machine learning or advanced algorithms to determine future need Continuous or daily monitoring and updating of the supply plan

Note: These are illustrative examples of the types of capabilities scored in this module, not an exhaustive list. Each module contains many dozens of questions and capabilities. For a full list, please refer to the NSCA toolbox, available at www.ghsupplychain.org.

The SCMP acknowledged that in 2015, the forecasting system was “somewhat random... if oversight and action are provided to quantification, it is most often by one of the various programme departments of the GHS, with varying degrees of effectiveness and little coordination or information sharing.” They also noted that “national guidelines describing when, how, and by whom quantifications shall be conducted are not available.”

To address this issue, SCMP laid out a clear vision for the yet-to-be-formed SCMA as the lead agency for “the forecasting process for all of the products it is expected to manage.” The SCMA was intended to “develop and implement a consistent process for quantification of all other commodities, together with other members of the national quantification team.” This vision then broke down into key discrete activities:

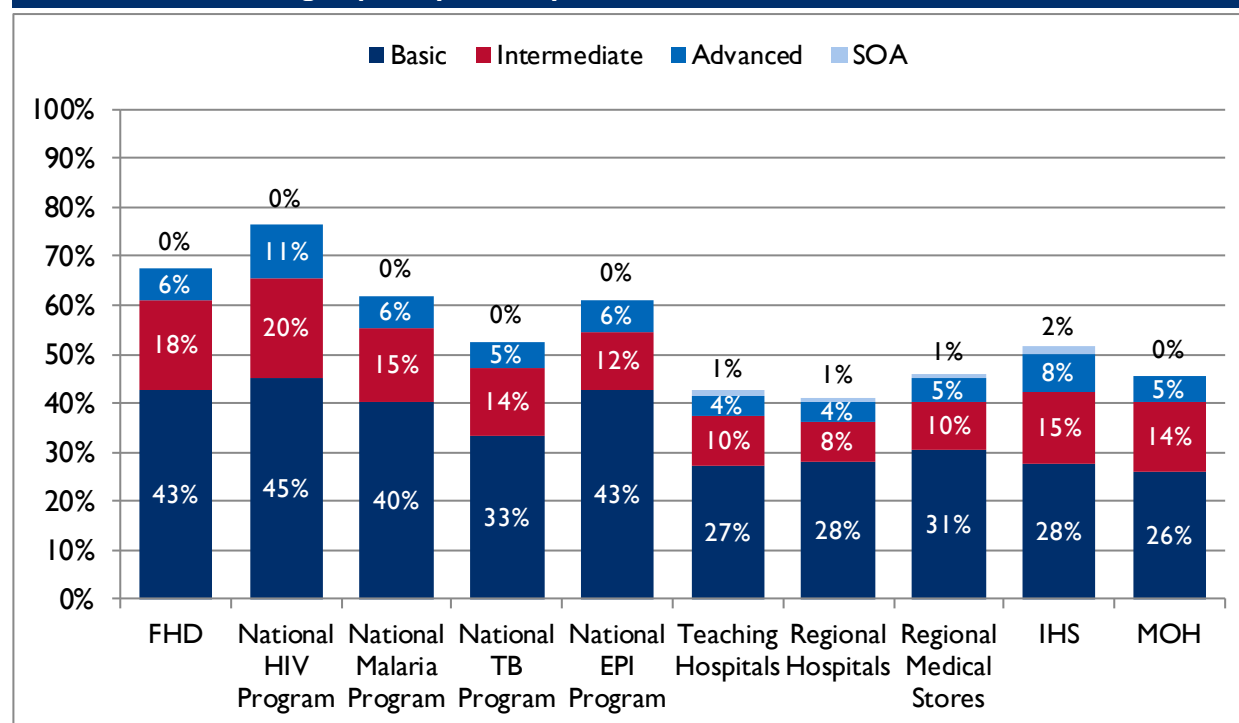
- “Implement the approved quantification guidelines that describe how, when, how often, and by whom quantifications and forecast reviews will be conducted. Current forecasting tools will be reviewed and revised if appropriate.”
- “An annual quantification exercise will be conducted for all health commodities: SCMA or others specifically designated will produce annual commodity forecasts and supply plans, review procurement plans regularly, and update and revise as needed.”

2019 NSCA Findings and Analysis

The NSCA typically assumes and assesses FASP capabilities at a unified “central” level as well as among regional medical stores and referral hospitals. In the absence of the proposed SCMA, central-level FASP activities in Ghana continue to be decentralized, siloed within vertical program or disease areas. Thus, in addition to FASP capabilities within the Ministry of Health itself, the NSCA also assessed the relative capabilities of key program streams, including national family health, HIV/AIDS, malaria, tuberculosis, and vaccine programs.

The NSCA found a mixture of capabilities across the various entities within MOH and GHS that are conducting forecasting. Generally, vertical disease programs scored higher than other health structures lower down in the system. However, there was still great variation amongst the different national disease programs. Exhibits 54–55 detail the capability maturity scores across the Ghanaian health system.

Exhibit 54. Forecasting Capability Maturity Scores



Note on interpreting results: Recall that CMM scores are a composite of assessed basic (max 50 percent), intermediate (30 percent), advanced (15 percent) and “state of the art” (SOA) (5 percent) capabilities. Reported percentages are the scored results averaged across all assessed sites, for each capability level and facility type. For more information, please refer to the Understanding the CMM Results section above.

Exhibit 55. Forecasting & Supply Planning Maturity Score, and Basic Capabilities in Place											
	Regional Hospitals	Teaching Hospitals	Regional Medical Stores	MOH	FHD	NACP	NMCP	NTP	EPI	FASP, Avg. of GOG Central Entities	IHS
n =	10	4	10	1		1	1	1	1	5	1
Overall maturity score (range)	41% (29%-61%)	43% (31%-53%)	46% (23%-55%)	48%	68%	76%	62%	53%	61%	60%	52%
Percent of basic items in place (range)	56%	55%	61%	57%	90%	95%	86%	71%	86%	77%	55%

Noncentral FASP capabilities. Examining lower-level entities first, the NSCA found low forecasting and supply planning capabilities at teaching hospitals, regional hospitals, and regional medical stores. All facilities reported forecasting health commodities, but few entities reported only making forecasts for one year or less into the future; documenting their methodology, data sources or assumptions; or assessing forecast accuracy (see Exhibit 56).

Exhibit 56. Noncentral FASP Key Capabilities in Place			
	Percentage of facilities reporting		
	Regional hospitals	Teaching hospitals	Regional medical stores
n =	10	4	10
Facilities forecast health commodities	100%	100%	100%
Time horizon of forecasts developed	1 year or less	1 year or less	1 year or less
Methodologies used during forecasting:			
Morbidity-based	50%	40%	50%
Consumption-based	100%	90%	100%
Demographic projections	25%	20%	60%
Service statistics	50%	70%	60%
Methodology, data sources, and assumptions documented	50%	50%	50%
FASP SOPs are available	25%	0%	50%
Forecast accuracy is assessed annually	50%	20%	0%
Supply planning for commodity procurement	25%	20%	50%

These facilities varied significantly in executing their FASP activities. Facilities reported many different data sources employed during the forecasting process, with the only common thread being the use of consumption data. More than 90 percent of teaching hospitals, and all regional hospitals and regional medical stores, reported using consumption data in their forecasts. Few facilities could produce SOPs to guide those forecasting processes—only 25 percent of teaching hospitals, 0 percent of regional hospitals, and 50 percent of regional medical stores could produce a copy of the SOPs used in that process. Supply planning is also inconsistently employed, with only 25 percent of teaching hospitals, 20

percent of regional hospitals, and 50 percent of regional medical stores conducting supply planning for health commodity procurements.

Variation across disease programs. Central-level entities generally reported higher presence of FASP resources and practices, but there remains high variability in the capabilities, performance, and methodologies employed. Exhibits 57 and 58 display the forecast and supply plan accuracy for the various tracer commodities. A perfect forecast or supply plan would be marked as 100 percent. As values decrease below 100 percent, that means that forecasts stray away from exact. The deviation away only tells you the magnitude, not the bias. The same principle applies to supply plans for planned quantities versus actual consumption. To help increase interpretation, forecast & supply plan error (with bias) have been included with notes below the table to assist in interpretation. Overall, the National AIDS Control Program scored the highest capability score and also has some of the strongest performance for forecast and supply plan accuracy. The MOH, which leads forecasting for essential medicines and FP/RH products, scored the lowest capability score. The National Malaria Control Program scored second highest in capability scores but performed the worst in accuracy of their forecast.

Exhibit 57. 2018 Forecast Accuracy and Supply Plan Accuracy for Selected Commodities					
Commodity	Program Responsible	Forecast Accuracy	Forecast Error (with bias)	Supply Plan Accuracy	Supply Plan Error (with bias)
2 RHZE + 4RH (Category I*3) kits	NTP	-23%	-123%	100%	0%
Artemether lumefantrine (AL) 6x4	NMCP	30%	-44%	78%	-25%
Malaria rapid diagnostic test (RDT)	NMCP	12%	-82%	-408%	-152%
Efavirenz/lamivudine/tenofovir 600/300/300	NACP	48%	-52%	96%	4%
Lamivudine/zidovudine 30/60	NACP	69%	-31%	100%	0%
First Response HIV rapid test kit (RTK)	NACP	93%	-7%	100%	0%
Depot medroxyprogesterone acetate (IM), 150mg/ml	Family Health Division	83%	-17%	100%	0%
Levonorgestrel I-rod implant (Implanon)	Family Health Division	98%	-2%	100%	0%
Pentavalent vaccine	EPI	91%	9%	95%	5%
Amoxicillin, 250mg capsule	MOH	*	*	*	*
Paracetamol, 500mg tablet	MOH	*	*	*	*
ORS, 250mg sachet	MOH	*	*	*	*

*The MOH does not calculate individual commodity accuracy rates for FASP. Rather, they calculate one overall figure for all commodities included. For the above commodities marked under MOH, we have not included a figure. Rather, the MOH reported this figure as 75 percent for both forecasting and supply planning. This figure was not empirically verified during the NSCA.

Interpreting Results: **Forecast Accuracy and Supply Plan Accuracy measure the deviance from the exact projection. A perfect forecast or supply plan would be marked as 100 percent. As values decrease below 100 percent, it means that forecasts were less accurate. The distance away from 100% does not consider whether the figure was over or under forecasted, but rather just the magnitude away from exact. **Forecast Error and Supply Plan Error (both with bias)** examines the deviance from a different perspective. In this case, a perfect forecast or supply plan would be marked as 0 percent. Any positive deviation from zero indicates that consumption (or orders) are higher than the forecasted amount. A negative deviation from zero indicates that the forecasted amount was higher than the consumption (or orders).

Variable performance likely reflects significant procedural differences across programs and collectively underscores the lack of standardization in the country's health system. MOH and GHS have a National Quantification Guideline, but it appears that various supply chain actors are unaware of it or not using it. Exhibit 59 compares and contrasts the various methodological approaches employed by each national disease program. Further focused efforts are needed to align the forecasting and supply planning procedures across the government.

Exhibit 58. Comparison of Vertical Disease Program Forecasting Processes

	Central-Level Vertical Programs					
	Malaria	HIV/AIDS	TB	Vaccines	FP/RH	Essential medicines
CMM score earned for FASP	62%	76%	53%	61%	68%	45%
Percent of basic items in place	81%	90%	67%	86%	86%	52%
Leader of forecasting process	NMCP	NACP	NTP	EPI	FHD	MOH
Time horizon of forecasts developed	3 years or more	2 years	2 years	1 year	1 year or less	1 year or less
Methodologies used during forecasting:						
Morbidity-based	✓	✓	✓	X	X	X
Consumption-based	X	X	X	✓	✓	X
Demographic projections	✓	✓	X	✓	✓	X
Service statistics	✓	✓	X	X	✓	X
Forecasts used to mobilize funding/inform health commodity procurement	✓	✓	✓	✓	✓	✓
FASP SOPs are available	✓	✓	✓	✓	✓	X
Forecast accuracy is assessed annually	X	X	X	X	✓	X
Supply planning for commodity procurement	✓	✓	✓	✓	✓	✓
Potential supply interruptions/delays are communicated to facilities	Yes	Yes	Yes	Yes	Yes	Yes
Entity responsible for funding FASP activities	Donors	Donors	Donors	Donors	Donors	Donors

Recommendations

In light of the 2015 SCMP's proposed interventions and the current state of FASP capabilities and performance across the supply chain, the following recommendations are suggested:

- Standardize policies and procedures for forecasting and supply planning, across programmatic areas and facility levels. Even though National Quantification guidelines exist, supply chain actors are not aware of its presence. MOH and GHS need to disseminate guidance to all facilities conducting FASP activities to ensure consistency, quality, and comparability across forecasts. This will further contribute to the overall stability in the supply chain.
- Consider again the 2015 vision of a singular entity that provides standardized guidance across all health programs. Low-cost, high-value improvements can be reaped by using high-capability,

high-performance entities as a standard across the government to strengthen a key component of the logistics cycle.

- Institutionalize annual measurement of forecast accuracy and supply planning accuracy and ensure that feedback is incorporated into subsequent activities. This should be incorporated into MOH and GHS efforts to standardize FASP practices, policies, and procedures across the health system.
- Increase GOG annual funding for FASP activities to ensure long-term sustainability.

Supplemental Exhibit

Exhibit 59. FASP, Distribution of Questions, and Assignment of Weight Across Capability and Facility Levels

MODULE	BASIC (50%)		INTERMEDIATE (30%)		ADVANCED (15%)		SOA (5%)	
	# of Qs	WEIGHT	# of Qs	WEIGHT	# of Qs	WEIGHT	# of Qs	WEIGHT
Referral hospitals (14)	22	2.3%	26	1.2%	12	1.3%	3	1.7%
Warehouses (12)	20	2.5%	7	4.3%	14	1.1%	3	1.7%
MOH and GHS (2)	21	2.4%	27	1.1%	14	1.1%	3	1.7%
National programs (5)	21	2.4%	27	1.1%	14	1.1%	3	1.7%

Note that interpretations of the scoring, and discussions of “differences” in the scores, need to recognize that the number of assessed capabilities differs by facility type and module. Thus, positive responses to individual questions (i.e., reports of present capabilities) carry different weights, depending upon the technical area and facility type.

Note also that the number of questions and the question weighting for these modules vary because some conditionally scored questions were included. Figures presented here assume all conditions are met and all questions are included.

Procurement and Customs Clearance

The procurement and customs clearance section seeks to determine that procurements are done transparently and in accordance with best practices. Major areas factored into the scoring for this CMM module are transparent, auditable procurement systems governed by policies and procedure; active management of vendor performance; and well-functioning customs clearance processes. This module was designed with public-sector procurement systems in mind. Exhibit 60 displays various examples of procurement capabilities at the different levels.

Exhibit 60. Examples of Scored Procurement and Customs Clearance Capabilities

Basic	Existence of an approved vendor list All tenders include terms and conditions A documented process is in place for identifying and qualifying vendors A contract management or an order and delivery management system is in place
Intermediate	Procurements are approved by authorized personnel/stakeholders Vendor performance results are communicated to the vendors Entity benchmarks or compares its purchase prices against market indices
Advanced	A procurement ethics or anticorruption program is in place Annual external audits of the procurement system Procurement appeal decisions are made publicly available

SOA	Data in the contract management system are updated in real time or daily An electronic procurement (e-procurement) process is used
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Note: These are illustrative examples of the types of capabilities scored in this module, not an exhaustive list. Each module contains many dozens of questions and capabilities. For a full list, please refer to the NSCA toolbox, available at www.ghsupplychain.org.

As we explained in the introduction, procurement is a fragmented process with responsibilities distributed throughout the system. Central procurement is limited to a few products, while lower-level facilities—the regional medical stores, teaching hospitals, and downstream facilities—purchase and procure an estimated 80 percent of pharmaceuticals dispensed in public facilities directly from private distributors.³⁴ Funding shortages and stock-outs at higher levels of the supply chain have resulted in increasing issues of “certificates of nonavailability” that allow nodes down the chain to buy directly from the private sector.³⁵ The fragmented procurement process makes quality control and price regulation challenging and results in redundant administrative burdens throughout the system.

The 2015, SCMP identified procurement as one of seven key supply chain thematic areas requiring attention and reform. According to the author’s assessment, the country’s “thriving private pharmaceutical sectors plays a primary role in supply commodities to public sector facilities... while the CMS currently has a secondary role.” However, the private sector is highly fragmented with many small entities competing for business, which has “contributed to inefficient processes, high prices, and unintended outcomes and risks for commodity availability and commodity quality.” At the national level, the Plan explains, “The role of procuring commodities used in public health facilities is splintered across too many entities (MOH, CMS, RMS, GHS, regional and district administrations, teaching hospitals, and almost all health facilities), making coordination and control challenging and fragmentation a significant problem.”

Beyond fragmentation at all levels in the procurement process, the Master Plan identified several additional procurement problems and challenges, including:

- The absence of framework contracting (or other bulk procurement mechanisms) to lower prices and control quality
- Procurement delays, due to “highly bureaucratic procedures, political interference, and delays in the release of funds”
- Failure to follow standard PPA procurement requirements
- “Unnecessary duplication” of supply chain roles across the MOH and agencies; the GHS and MOH have distinct procurement units/directorates
- A general lack of transparency, in part due to the lack of systems to track, monitor, and evaluate lower-level procurement tenders

The Plan outlined many strategic interventions to address observed procurement challenges, with roles for the proposed Supply Chain Management Agency, the MOH, the PPA and downstream actors.

Recommendations include:

- Develop and use centralized framework contracts and other procurement mechanisms to lower prices, ensure quality, and provide flexibility for responding to fluctuations in demand (SCMA).
- Revise procurement regulations and guidelines to reflect distinct dynamics of health commodities, with specific procurement guidelines for each level of the health system (MOH and PPA).

³⁴ Wang, H., Otoo, N., & Dsane-Selby, L. (2017). Ghana National Health Insurance Scheme: improving financial sustainability based on expenditure review, World Bank.

³⁵ Global Fund. (2016). *Ghana public health supply chain, economic business case, final report*.

- Create and install information systems to track procurement processes and results and make them transparent for all stakeholders.
- Develop, implement, and monitor national-level procurement plans.

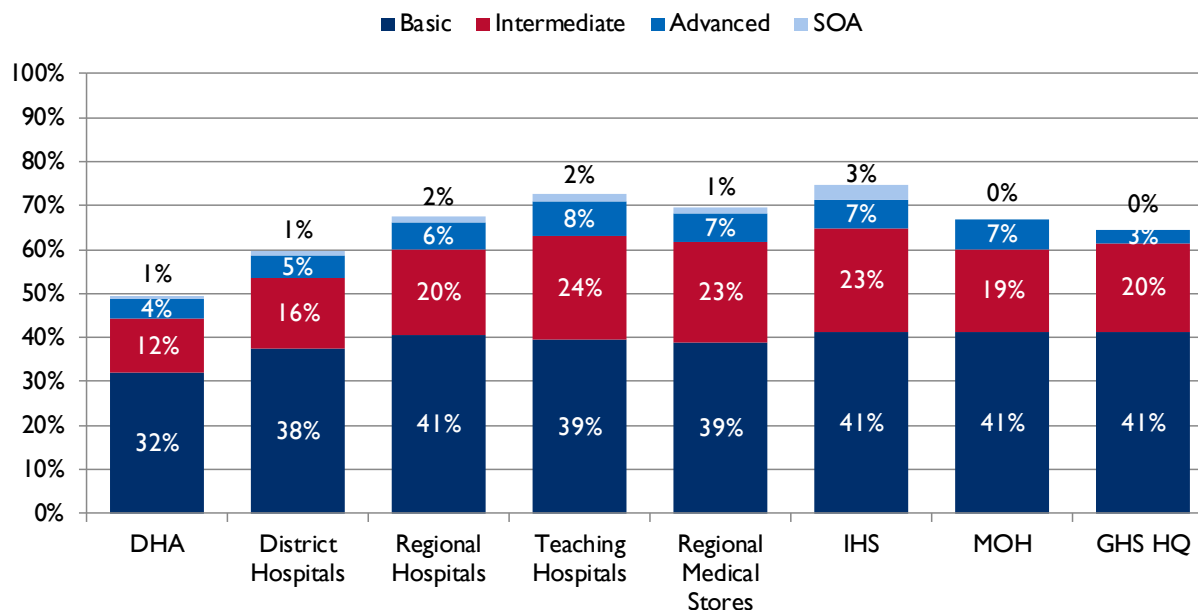
The overarching objectives were to minimize the number of entities involved in public-sector procurement; optimize prices; and ensure availability and quality of health commodities at all levels in the system.

2019 NSCA Findings and Analysis

Exhibits 61 and 62 display capability maturity scores for procurement and customs clearance. As noted in the SCMP, procurement practices are currently distributed throughout the system. Normally, the NSCA does not assess procurement practices below the subnational level but it was important to get an understanding of procurement practices across the public health landscape. Procurement capabilities were assessed at all regional medical stores, teaching hospitals, and regional hospitals. District hospitals and DHAs were randomly sampled (as part of the sampling approach detailed in this report). DHAs responded to the procurement questions on behalf of the facilities they oversee that engage in procurement activities. For a DHA to respond to this module, they had to affirm that entities within their oversight engaged in procurement activities. Only 19 of 35 DHAs sampled responded affirmatively. Therefore, the maximum sampling error rate is actually ± 18 percent for DHA response in procurement, specifically (as opposed to ± 10 percent for the overall survey). This is all detailed in the Sampling and Limitation sections of this report.

Overall, procurement maturity is fairly strong across the Ghanaian public health supply chain with most entities scoring in the mid-60s or higher. No entity, however, scored high enough to receive the NSCA's recommended benchmark score of 80 percent. DHAs did not respond to the procurement module for their own facility but rather on behalf of any entity within their district that they supervise that engages in procurement activity, even if infrequently. Further, no procurement information was collected at the TCMS. Despite the title of Temporary Central Medical Store, this facility does not conduct any expected budgeting, forecasting, or procurement activities; its focus is narrowed instead to receiving, storing, and distributing commodities procured by other units within the MOH.

Exhibit 61. Procurement and Customs Capability Maturity Scores



Note on interpreting results: Recall that CMM scores are a composite of assessed basic (max 50 percent), intermediate (30 percent), advanced (15 percent), and “state of the art” (SOA) (5 percent) capabilities. Reported percentages are the scored results averaged across all assessed sites, for each capability level and facility type. For more information, please refer to the Understanding the CMM Results section above.

Exhibit 62. Procurement and Customs Clearance Maturity Score, and Basic Capabilities in Place									
	DHA	District hospitals	Regional hospitals	Teaching hospitals	RMS	TCMS	GHS HQ	MOH	IHS
n =	35	50	10	4	10	1	1	1	1
Proportion of assessed facilities reporting that site procures some pharmaceuticals directly	54%	100%	100%	100%	100%	X	✓	✓	✓
Overall maturity score (range)	50% (19–69%)	60 (29–84%)	68% (53–79%)	73% (68–76%)	70% (58–82%)	--	65%	67%	75%
Percent of basic items in place (range)	64% (30–85%)	75 (40–90%)	81% (60–95%)	79% (75–85%)	78% (60–95%)	--	83%	83%	83%

Governance and Strategy: The procurement landscape in Ghana continues to be fragmented, distributed, and uncoordinated. The MOH and GHS HQ still have their own procurement units, even though this was an “unnecessary duplication” specifically highlighted by the SCMP. Furthermore, neither entity has scored well enough to surpass the NSCA 80 percent benchmark individually, but this could likely be achieved if efforts were combined. The envisioned SCMA never materialized, and TCMS does not play any centralizing role that one would expect of a national CMS entity. Furthermore, lower-level facilities are still regularly procuring—all assessed hospitals and half of DHAs (see Exhibit 63). And, as the following sections highlight, this has a negative impact on key performance indicators and, as later sections show (see Warehousing section and stock-out rates table), on the availability of commodities at sites.

- All of the facilities named in the SCMP still procure: MOH, CMS, RMS, GHS, regional and district administrations, teaching hospitals, and almost all health facilities
- The envisioned SCMA was not created and TCMS does not play a centralizing role that one would expect of a national CMS entity

Procurement Processes. Looking closer at procurement processes, we see many of the important best practices in place throughout the supply chain (see Exhibit 64). Most sites reported that procurements are approved by authorized stakeholders or personnel, though this practice was less consistently practiced at lower-level facility types. Another widespread best practice is the existence of procurement ethics or anticorruption programs. A similar pattern emerged with the presence of procurement guidelines, manuals, or SOPs. While national procurement guidelines exist, only 50 percent of assessed DHAs and 62 percent of district hospitals could produce them on the day of the assessment, compared to all teaching hospitals and RMSs. According to MOH and GHS HQ respondents, these guidelines are updated only every four years or less. The SCMP had a proposal to “revise procurement regulations and guidelines to reflect distinct dynamics of health commodities, with specific procurement guidelines for each level of the health system (MOH and PPA).” With inconsistent presence of SOPs for procurement at lower-level facilities, this reinforces this need highlighted in the SCMP, which has not been conducted as of the writing of this report.

External audits of the procurement system take place annually or more often in many reporting facilities. During sourcing and procurement, almost all facilities responded that they review forecasts, user department specifications, medical and lab supplies lists, and national essential medicines lists. Documented processes are in place for identifying and qualifying vendors and developing an approved vendors list, and vendor information is maintained in a database. However, the presence of these databases decreases in lower levels of the system (see Exhibit 64). An integrated electronic procurement system that all facilities use could help to address this challenge.

While the PPA has a website that is accessible to external stakeholders to view upcoming procurements, it was not identified by the respondent at the central level. The use of this website should be more broadly encouraged. The SCMP did note a lack of transparency in the procurement system and this is certainly an important area to correct. Another noticeable absence is the lack of an electronic procurement system. While this is a more advanced capability, an electronic system would help significantly increase transparency and accountability in the system. It would also help improve access to information for decision makers on how to improve procurement processes. This should be examined as a procurement reform priority in the next SCMP.

Exhibit 63. Key Procurement Capabilities (Resources, Practices, and Items) and Percentage of Facilities Reporting								
	DHA	District hospitals	Regional hospitals	Teaching hospitals	RMS	GHS HQ	MOH	IHS
n =	35	50	10	4	10	1	1	1
Procurements approved by authorized stakeholders	70%	78%	90%	100%	100%	✓	✓	✓
Internal control systems**	Value thresholds; tender committee	Value thresholds; tender committee	Value thresholds; tender committee	Value thresholds; tender committee; contract mgt	Value thresholds; tender committee; contract mgt	Value threshold; protocols; tender com; contract mgt; separation	Value threshold; protocols; tender comm; contract mgt	Value threshold; protocols; contract mgt; separation of roles

						of roles; legal review		
Annual external audits of procurement system	83%	62%	80%	100%	100%	✓	X	✓
Procurement ethics or anticorruption program in place	73%	86%	90%	100%	100%	✓	✓	✓
Procurement guidelines, manuals, or SOPs available (and on site)	50%	62%	80%	100%	100%	✓	✓	✓
Documented process for identifying and qualifying vendors	25%	70%	70%	100%	90%	✓	✓	✓
Approved vendor list exists	66%	90%	100%	100%	100%	✓	✓	✓
Vendor information is maintained in a database	50%	72%	70%	100%	100%	✓	✓	✓
Most common system for maintaining procurements information	Manual (84%); electronic (35%)	Manual (94%); electronic (38%)	Manual (80%); electronic (100%)	Manual (75%); electronic (50%)	Manual (80%); electronic (70%)	Manual; electronic	Electronic procure- ment software	ERP program
** >75% of facilities reporting DHAs and district hospitals; All for regional and teaching hospitals and RMSs.								

Prices Paid. A major issue raised in the SCMP is the cost of medicines in the Ghanaian system. The Master Plan noted that “prices for consumers and insurers (mainly NHIA) are up three times higher than international reference prices.” Typically, NSCA methodology examines only procurement prices at the central level but because of the diffused procurement activity across many facilities in Ghana, the review of procurement was expanded down to the district hospital level. As medicine prices were of concern, a subset of the assessment’s tracer commodities was used to track pricing for procurements at various levels in the system. Exhibit 65 displays the percentage of international reference price paid for six different commodities. These commodities are a subset of tracer commodities from the overall NSCA. They represent important health products that are not vertical disease program products and are commodities that GOG is procuring itself.

Consistent with the concerns listed in the SCMP, prices for the essential medicines listed in the table are much higher across the board. For all hospitals included in the table, these are prices paid on the open market when an RMS could not fill a requisition for that facility. The GOG Framework contract prices for 2018 are competitive with international reference prices. For nonprogram tracer commodities included in this NSCA, two were included in the GOG Framework contract. When compared to an international reference price, these prices were the same or lower. This suggests that GOG is capable in securing a competitive price for their medicines. However, given that hospitals placed thousands of orders in 2018 outside of the RMS system, GOG still has significant room for growth in ensuring sufficient quantities of these medicines are available at the prices that they negotiated. While a medicines pricing committee exists within the GOG, it is unclear how this committee can influence the pricing of medicines in the country or for the public health system.

A major takeaway for consideration here is that while the RMSs are generally getting better prices than hospitals (when they go to the private sector), the RMSs are receiving poorer quality of service for vendor on-time delivery (OTD), vendor on time in full (OTIF), and order fill rate. Further investigation is required but it is possible that delayed service and diminished delivery quantity are pushing the cycle

of hospitals being forced to go to the private sector for faster, more reliable service albeit at twice the cost. However, considering the financial insolvency that many facilities are facing, this has a direct impact on availability of nonprogram commodities at facilities (see Exhibits 70 and 71 in Warehousing and Storage section, under “stock availability”).

Exhibit 64. Procurement and Customs Clearance: Percentage of International Reference Price Paid							
		Amoxicillin capsules, 250mg	Magnesium sulfate injection	Paracetamol 500mg	Oxytocin	Oral rehydration salts	Examination gloves
Framework contract price as percent of international reference price		N/A	N/A	102%	N/A	68%	N/A
District hospital	Number of orders reviewed	31	69	53	69	44	76
	Percent of international reference price paid	157%	233%	124%	228%	159%	172%
Regional hospital	Number of orders	5	5	3	23	5	29
	Percent of international reference price paid	331%	210%	168%	250%	102%	150%
Teaching hospital	Number of orders	--	13	5	1	6	5
	Percent of international reference price paid	--	153%	92%	238%	113%	139%
RMS	Number of orders	18	3	14	6	14	3
	Percent of international reference price paid	194%	171%	92%	193%	79%	197%

Source of Funds for Procurement. Another important component of Ghana’s procurement environment is the sources of funding for those procurements. Exhibit 65 details the source of funds for procurements for Ghanaian public health programs. Ghana continues to rely heavily on donor funding for procurements of commodities, particularly for HIV, malaria, and tuberculosis. Encouragingly, we find that GOG provides most funding for essential medicines. The next SCMP should include activities to investigate how GOG can become more self-reliant on funding in procuring commodities for all national vertical disease programs.

Exhibit 65. Source of Funds for Procurement							
National Health Program	Global Fund	USG	World Bank	UNFPA	GOG	GAVI	West African Health Organization
NTP	90.5%				9.5%		
NMCP	47.5%	43.0%			9.5%		
NACP	63.7%	3.1%			33.2%		
MOH (Essential Medicines)			19.9%		80.1%		
FHD		67%		22%			12%
EPI					18.5%	81.5%	

Private-Sector Vendor Performance. Exhibit 66 details the vendor performance for select commodities that were ordered in 2018. Across the board, vendor OTD is strong, never going below 94 percent for hospitals. Vendor fill rates are also strong, never dipping below 91 percent for hospitals. For the period assessed, OTD rates or order fill rates for RMS distributions to hospitals have never outperformed OTD or order fill rates from the private sector (see the Distribution section of the report for more details). The RMSs receive the poorest-quality service from the four facility types assessed for vendor performance. However, this may be related to the pricing of the medicines discussed below.

Exhibit 66. Procurement and Customs Clearance: Vendor OTD, OTIF, and fill rates				
	Number of orders reviewed	Vendor OTD	Vendor OTIF	Vendor fill rate
District hospitals	302	97%	68%	94%
Regional hospitals	99	94%	52%	91%
Teaching hospitals	33	100%	76%	99%
Regional medical stores	22	86%	59%	81%

Customs Clearance. In Ghana, customs clearance is handled through an approved contract. There is a procedure that guides customs clearance specifically for health products and there is a specific entity in charge of handling health commodities as well. Health commodities are also fully exempt of customs duties, and a formal procedure is in place to secure that exemption.

When looking at customs clearance time, MOH and GHS HQ reported in the CMM module that it typically takes three days to one week to clear a consignment from customs (for air and sea shipments). Curiously, when KPI data were collected during the MOH visit, the official reported figure was 38.4 days on average.

Exhibit 67. Customs Clearance Time

Average time taken to clear commodities through customs.

An average of 20 randomly selected international consignments procured by the MOH within the last year

38.4 days

Special Note. This section details important technical, operational, and financial information as it relates to procurement practices and policies. However, uncovering substantive discrepancies in policy, operations, or financial performance will not elucidate the much larger problem that the system is grappling with, namely, governance of the procurement system. This needs to be addressed urgently and directly. The duplication of central-level procurement units and the lack of transparency and visibility into the procurement actions being taken all the way down to the service delivery level pose the greatest threat to system stability and maturity.

Recommendations

The Ghanaian public health procurement landscape has a significant number of actors operating in a space that does not allow for any data visibility and a limited amount of transparency in the system. Coupling this with overarching governance issues lends to some critically needed improvements in the system:

- Resolve discrepancies in procurement governance. The duplication of procurement authority continues to exist between MOH and GHS. With the SCMA never materializing, the symptoms of dysfunction that exist from duplication are ever-present in the supply chain.
- Ensure that SOPs are fully disseminated to all entities that are allowed to procure. Standardized guidance should be ubiquitous throughout the distributed procurement system.
- Roll out an integrated electronic procurement system. There continues to be a lack of transparency in procurement processes across the system. Collecting information to draw insights on vendor performance, private market pricing, and other factors is currently only possible through a manual process that does not allow for any systemic improvements or thoughtful policy enhancements.
- Clarify path for procurement oversight—either within PPA or MOH—with clear roles and responsibilities at all levels. Simultaneously, clarify penalties for failure to comply with procurement policies and procedures, empowering oversight actors to enforce them.
- The MOH in collaboration with the PPA must issue guidelines that prohibit facilities and other entities from procuring beyond prices quoted through framework contracting to address the high degree of price variability across the system

Supplemental Annex

Exhibit 68. Procurement & Customs Clearance: Distribution of Questions and Assignment of Weight across Capability and Facility Levels

MODULE	BASIC (50%)		INTERMED. (30%)		ADVANCED (15%)		SOA (5%)	
	# of Qs	WEIGHT	# of Qs	WEIGHT	# of Qs	WEIGHT	# of Qs	WEIGHT
DHA	20	2.5%	33	1.1%	16	1.0%	4	1.2%
Regional hospitals	20	2.5%	33	1.1%	16	1.0%	4	1.2%
Teaching hospitals	20	2.5%	33	1.1%	16	1.0%	4	1.2%
Regional medical stores	23	2.2%	41	1.4%	18	1.2%	6	0.8%
GHS HQ	23	2.2%	41	1.4%	18	1.2%	6	0.8%
MOH	23	2.2%	41	1.4%	18	1.2%	6	0.8%
IHS	23	2.2%	41	1.4%	18	1.2%	6	0.8%

Note that interpretations of the scoring, and discussions of “difference” in the scores, need to recognize that the number of assessed capabilities differs by facility type and module. Thus, positive responses to individual questions (i.e., reports of present capabilities) carry different weights, depending on the technical area and facility type.

Note also that the number of questions and the question weighting for these modules vary because some conditionally scored questions are included. Figures presented here assume all conditions are met and all questions are included.

Warehousing and Storage

The Warehousing and Storage section seeks to ensure pharmaceuticals are stored using the most appropriate method to confirm their quality for patient use. Major areas that were factored into the scoring for this CMM module are existence of, and adherence to, SOPs for storage and inventory management, adequate physical infrastructure and safety equipment for storage of commodities, and appropriate security and accountability mechanisms in place (see Exhibit 69). Exhibits 70 and 71 show warehousing and storage results.

Exhibit 69. Examples of Warehousing and Storage Capabilities

Basic	Inbound shipments are checked for quantity, carton/pallet count, and documentation Stock cards are used to track and manage inventory A repair and maintenance plan is in place for all equipment and utilities
Intermediate	Facilities receive distribution schedule in advance from the issuing warehouse or supplier Different batches of quarantined product are segregated in the quarantine area
Advanced	Temperature is electronically monitored and linked to audible alarms when temperature is outside established range Warehousing and storage data and information are backed up off site
SOA	Proof of deliveries are maintained through an automated system (such as barcodes scanned) Advanced Warehouse Management System (WMS) is used to track and manage inventory

Note: These are illustrative examples of the types of capabilities scored in this module, not an exhaustive list. Each module contains many dozens of questions and capabilities. For a full list, please refer to the NSCA toolbox, available at www.ghsupplychain.org.

In 2015, the SCMP identified key issues as they relate to warehousing and storage that needed to be addressed over the coming five-year period. The Master Plan noted that “storage conditions and stores management procedures throughout the supply chain and at lower levels (facilities) are highly variable and not up to modern standards. Inventory management is generally weak.” To address these issues, the SCMP identified several key interventions to be implemented:

- Develop and implement standard tools and systems for inventory management
- Ensure that facilities have appropriate storage space and sufficient resources to ensure commodity safety and quality, and for waste disposal needs
- Ensure that the physical capacity of the TCMS and RMSs aligns with commodity groups that they are expected to support (e.g., temperature monitoring and sufficient warehouse space)
- Establish max/min commodity levels for all facilities and ensure that ordering and logistics parameters at each level of the supply chain align

Importantly, the SCMP envisioned that the proposed Supply Chain Management Agency would lead implementation of many of these interventions.

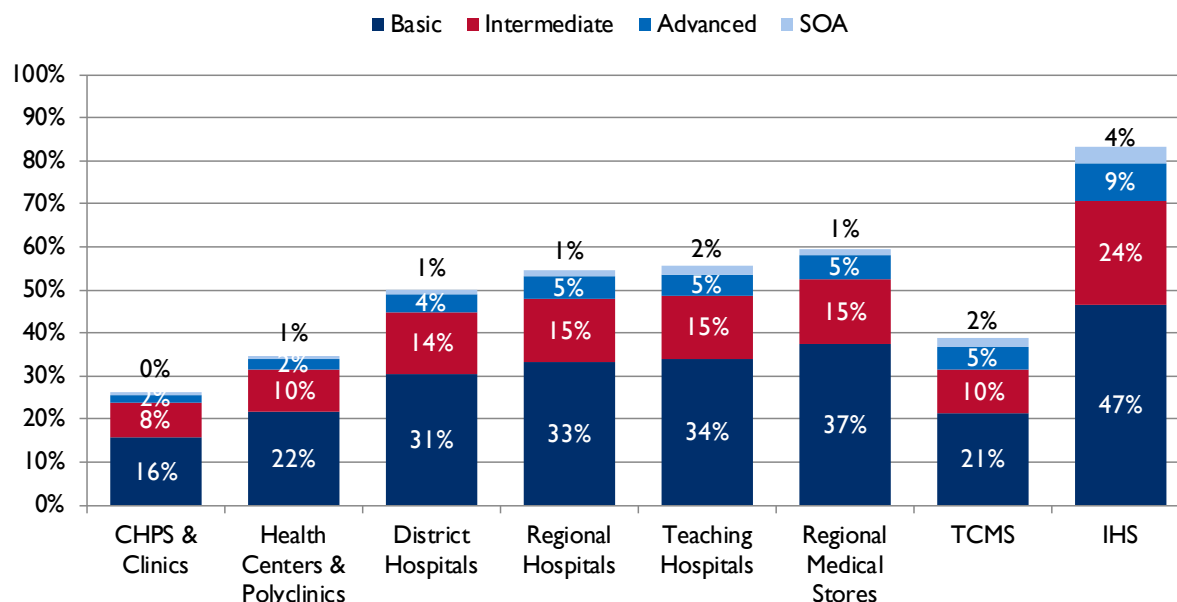
2019 NSCA Findings and Analysis

Overall, warehousing and storage capabilities are well below optimal levels across the system. As is expected, capabilities increase as you move away from last mile facilities such as CHPS or clinics. With a score of 59 percent, the RMS scored higher than any other entity owned by the GOG (the private sector IHS warehouse scored highest overall); however, this score is still well below the NSCA’s recommended benchmark of 80 percent. Exhibits 71 and 72 display the capability maturity scores for warehousing and storage, by facility type. Results will be examined in several sections, including storage practices, stock card usage, storage conditions, and stock availability.

Exhibit 71. Warehousing and Storage Maturity Score, and Basic Capabilities in Place								
	CHPS / clinics	Health centers/ polyclinics	District hospitals	Regional hospitals	Teaching hospitals	Regional medical stores	TCMS	IHS
n =	69	67	50	10	4	10	1	1
Overall maturity score (range)	26%	35%	50%	54%	55%	59%	39%	83%
Percent of basic items in place (range)	31%	43%	61%	66%	68%	75%	43%	93%

Percentage of facilities with all stock cards up to date on the day of the visit 62% 63% 90% 94% 77% 92% 38% --

Exhibit 72. Warehousing and Storage Capability Maturity Scores



Note on interpreting results: Recall that CMM scores are a composite of assessed basic (max 50 percent), intermediate (30 percent), advanced (15 percent), and “state of the art” (SOA) (5 percent) capabilities. Reported percentages are the scored results averaged across all assessed sites, for each capability level and facility type. For more information, please refer to the Understanding the CMM Results section above.

Temporary Central Medical Stores Versus Imperial Health Sciences Warehouse. Currently, the GOG is operating a TCMS as it prepares to build a new CMS building. While GOG is finalizing plans for this structure, USAID and the Global Fund have employed a private sector vendor, Imperial Health Science (IHS), to handle donated commodities for priority health areas. As seen in Exhibit 72, there is a significant disparity in the performance of the two warehouses. The purpose of this NSCA is not to recommend how or where GOG should build the new CMS, but the assessment does document impacts from the continued delay. In the absence of a permanent CMS, many higher-order supply chain functions have been outsourced to the IHS (which is donor-funded and privately operated, thus limiting the GOG’s control over the country’s health commodities) or decentralized to regional medical stores (which duplicates effort, introduces variability, and again reduces central-level control over commodities). The current lack of a singular CMS that is empowered as the top of the commodity health supply chain is negatively influencing the performance of the rest of the system. GOG must act as soon as possible to remediate this issue so that the focus can return to reforming other parts of the supply chain.

Storage and Inventory Management Practices. A major priority of the SCMP was to develop, disseminate, and ensure standardized inventory management practices. Such practices are usually supported by consistent training and ubiquitous presence of manuals, job aids, and SOPs in facilities. While national standard SOPs for warehousing and storage do exist, only 6 percent of CHPS and 19 percent of health centers could produce a copy (paper or electronic). This improves at district and regional hospitals (58 percent and 60 percent, respectively) yet remains well below optimal levels.

Ensuring consistency of storage practices starts with ensuring that extant guidance is fully disseminated to staff tasked with warehousing and storage responsibilities.

Similarly, while maximum and minimum stock levels have been set for service delivery points throughout Ghana, their acknowledgement and application across the system are inconsistent. When asked whether their inventory management system employs max/mins levels, 36 percent of CHPS and 24 percent of health centers replied no. However, when asked how reorder quantities are calculated, 71 percent of CHPS and 70 percent of health centers identified using the min/max process for guidance on quantities. The disconnect evident in this dynamic suggests that there is not a uniform understanding of what these terms and processes are and how to apply them. This is further compounded by the lack of SOP manuals mentioned above.

Encouragingly, the min/max process for reordering was commonplace with at least 80 percent of all district, regional, and teaching hospitals employing it. There is other evidence of good inventory management practices throughout the system. For example, almost all facilities of all types checked inbound shipments for quantity and remaining shelf life. Equally commonplace was maintaining proof of delivery records for all products received.

Stock Card Use and Inventory Tracking. The use of stock cards for inventory management is a near universal capability in the system. Overall, 90 percent or more of every facility type assessed reported using stock cards. Some CHPS reported that stock cards were not used or unavailable, but this generally reflected a lack of human resources to complete the task rather than a lack of understanding its importance.

Currently, eLMIS or even MS Excel-based tracking of inventory remain scarce, even among more advanced facility sites. Only 20 percent of regional hospitals and 6 percent of district hospitals reported using any kind of electronic system to manage their inventories. That said, the country is in the midst of transitioning to more advanced inventory tracking systems at the hospital levels. By the end of 2019, all hospitals are expected to have electronic LMIS systems in place.

While the use of stock cards was commonplace, this has not translated in strong performance for the accurate logging of inventory movement on those stock cards. Exhibit 73 displays the percentage of facilities, by tracer commodity, that were found to have perfectly accurate stock cards on the day of the visit. Many facilities have significant room for improvement, regardless of whether the commodity was supported by a vertical disease program or was an essential medicine.

Exhibit 73. Percentage of Facilities With 100 Percent Accurate Stock Card, by Tracer Commodity

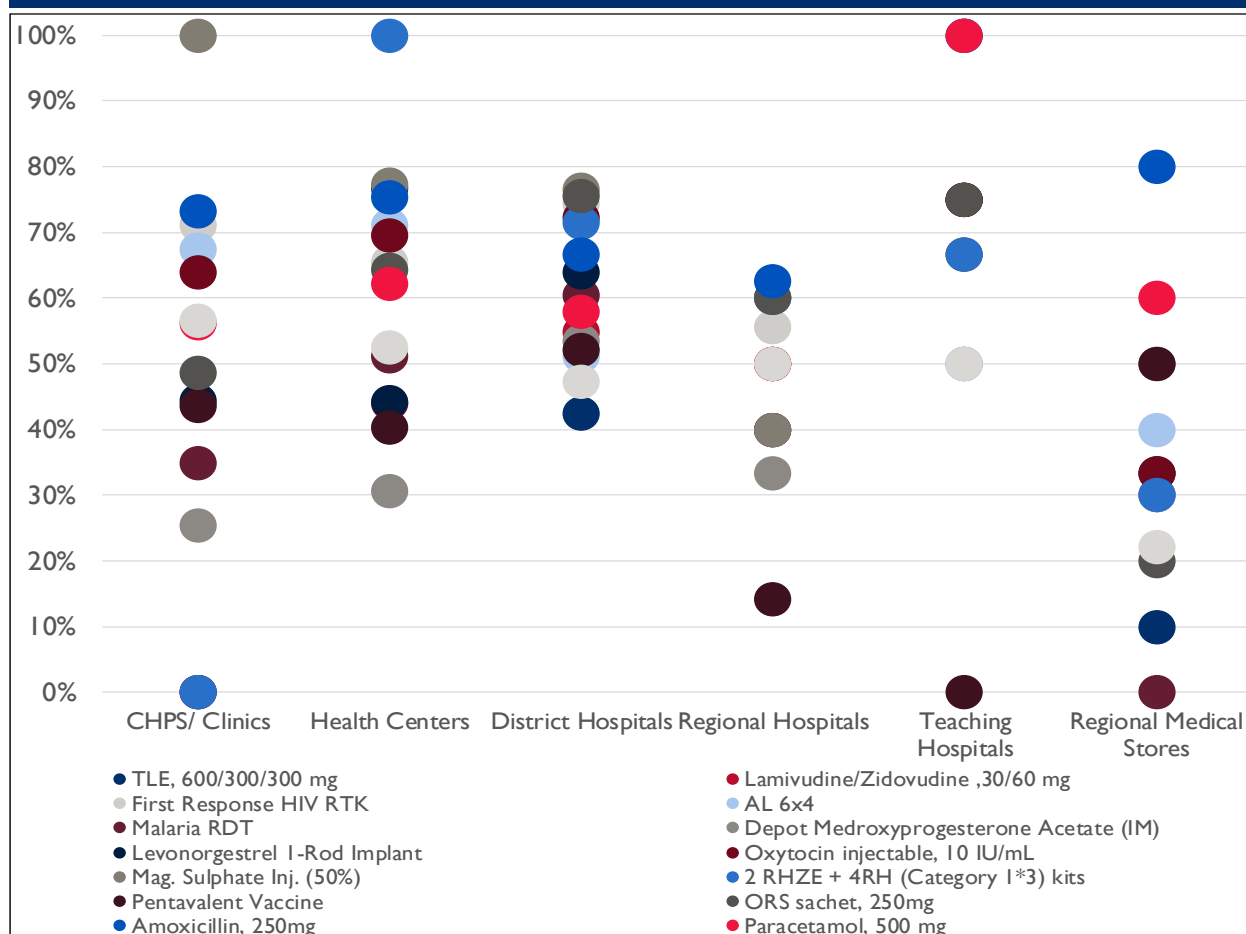


Exhibit 74. Percentage of facilities with 100% accurate stock card, by tracer commodity							
	CHPS / clinics	Health centers/ polyclinics	District hospitals	Regional hospitals	Teaching hospitals	Regional medical stores	TCMS
n =	69	67	50	10	4	10	1
TLE, 600/300/300 mg	--	77%	43%	60%	50%	10%	0%
Lamivudine/zidovudine, 30/60 mg	--	44%	55%	50%	75%	30%	--
First Response HIV RTK	71%	66%	74%	56%	50%	30%	100%
AL 6x4	67%	71%	51%	60%	50%	40%	100%
Malaria RDT	35%	51%	60%	50%	67%	0%	100%
Depot medroxyprogesterone acetate (IM)	25%	31%	54%	33%	75%	30%	100%
Levonorgestrel I-rod implant	44%	44%	64%	40%	75%	33%	100%
Oxytocin injectable, 10 IU/mL	64%	70%	72%	40%	75%	33%	--
Mag. sulphate inj. (50%)	100%	77%	77%	40%	100%	50%	--
2 RHZE + 4RH (Category 1*3) kits	--	100%	71%	60%	67%	30%	--
Pentavalent Vaccine	44%	40%	52%	14%	--	50%	--
ORS sachet, 250mg	49%	64%	76%	60%	75%	20%	100%
Amoxicillin, 250mg	73%	75%	67%	63%	100%	80%	--
Paracetamol, 500 mg	56%	62%	58%	50%	100%	60%	--
Examination gloves, medium,	56%	53%	47%	50%	50%	22%	100%
Average	57%	62%	61%	48%	72%	35%	88%

Storage Conditions. For infrastructure, many of the basic components are in place across the system. Permanent, leak-free roofing in facilities is ubiquitous across the country, except for CHPS, which have it in place in 67 percent of facilities. Similar dynamics exist for adequate ventilation and nonporous flooring, with CHPS having this in place in 68 percent and 61 percent of facilities, respectively. Also, electric lighting is found to be in place throughout facilities in the country, with CHPS being the exception (72 percent of CHPS facilities have electrical lighting).

The notable infrastructure components that are lacking across the system are designated areas for cold chain storage, quarantined products, hazardous substances, and controlled substances. Exhibit 74 details the lack of these items across different types of SDPs.

Exhibit 75. Specialized Storage Capabilities at Service Delivery Points

	CHPS/ clinics	Health centers/ polyclinics	District hospitals	Regional hospitals	Teaching hospitals	IHS	TCMS
Percentage of facilities that have cold chain storage	29%	61%	84%	90%	100%	✓	x
Percentage of facilities that have designated quarantine area	7%	19%	48%	40%	50%	✓	✓
Percentage of facilities that have designated storage for hazardous substances	3%	7%	62%	60%	75%	✓	x
Percentage of facilities that have designated storage for controlled substances	0%	1%	66%	60%	75%	✓	x

Stock Availability. The availability of commodities at SDPs is the top priority of any well-functioning pharmaceutical supply chain. The NSCA found that stock-outs were prevalent throughout the system, with no specific commodity or facility type being singled out. Exhibits 75 and 76 detail stock-outs of the day of the assessment across the supply chain.

Exhibit 76. Percentage of Facilities With Stock-out on Day of Assessment

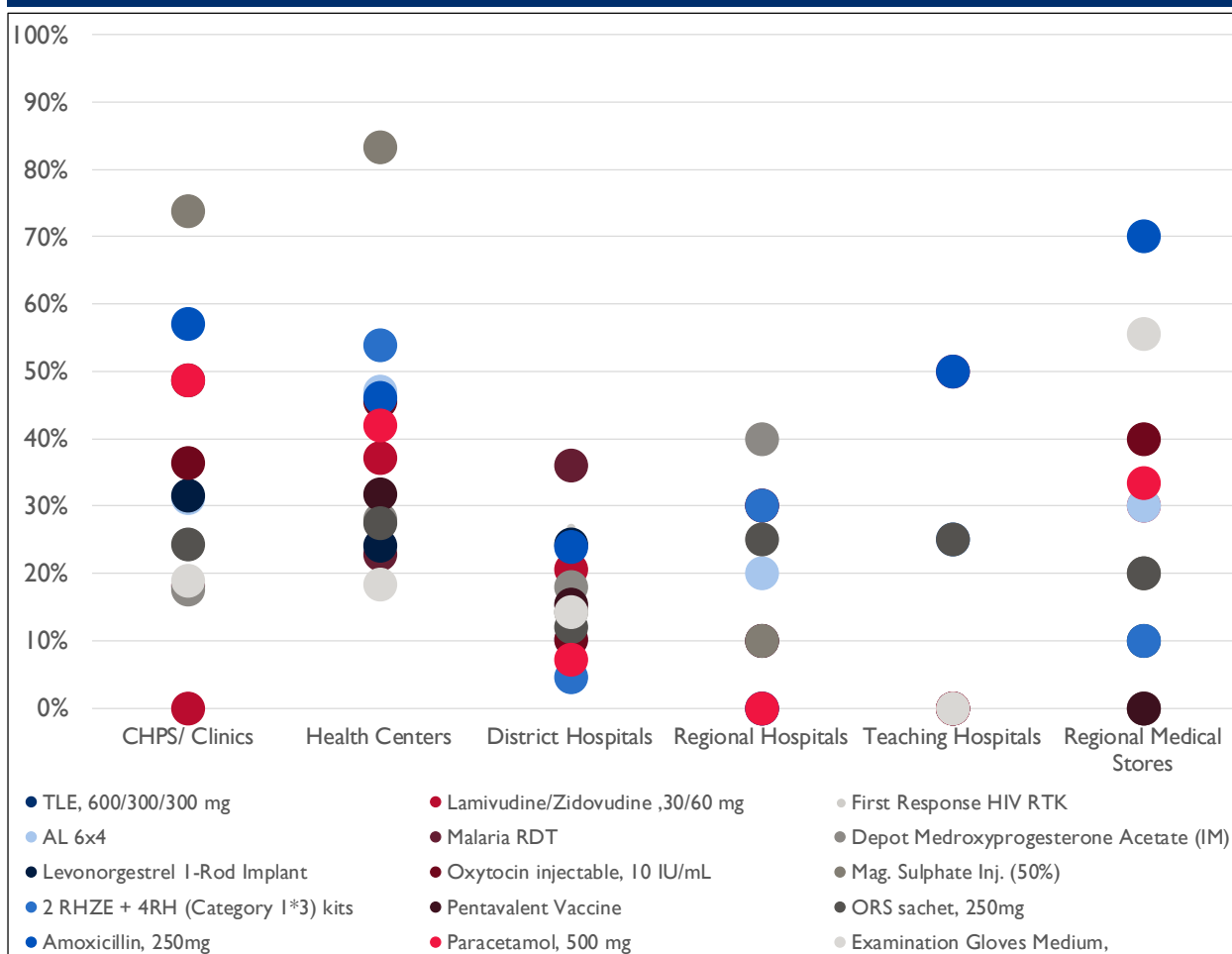
	CHPS/ clinics	Health centers/ polyclinics	District hospitals	Regional hospitals	Teaching hospitals	Regional medical stores	TCMS	IHS
n =	69	67	50	10	4	10	1	1
TLE, 600/300/300 mg**	*	28%	21%	30%	50%	0%	0%	0%
Lamivudine/zidovudine, 30/60 mg**	*	37%	21%	30%	50%	30%	--	100%
First Response HIV RTK	34%	33%	27%	20%	0%	0%	100%	0%
AL 6x4	31%	47%	10%	20%	0%	30%	100%	0%
Malaria RDT	18%	23%	36%	30%	0%	0%	100%	0%
Depot medroxyprogesterone acetate (IM)	18%	28%	18%	40%	0%	0%	0%	0%
Levonorgestrel I-Rod Implant	32%	24%	24%	10%	0%	10%	0%	0%
Oxytocin injectable, 10 IU/mL	36%	45%	10%	10%	0%	40%	--	--
Mag. sulphate Inj. (50%)	74%	83%	14%	10%	0%	20%	--	--
2 RHZE + 4RH (Category I*3) kits	--	54%	5%	30%	25%	10%	--	0%
Pentavalent vaccine	49%	32%	15%	0%	0%	0%	--	--
ORS sachet, 250mg	24%	27%	12%	25%	25%	20%	100%	--
Amoxicillin, 250mg	57%	46%	24%	0%	50%	70%	--	--
Paracetamol, 500 mg	49%	42%	7%	0%	0%	33%	--	--

Examination gloves, medium,	19%	18%	14%		0%	56%	0%	0%
Average	37%	23%	32%	44%				20%

*ARVs are not offered at CHPS facilities, so no data were collected for these sites.

**Since the data collection period, PEPFAR has decided to support ART sites specifically in Western Region, while the results here within show stockout rates nationally.

Exhibit 77. Percentage of Facilities Stock-out of a Tracer Commodity on the Day of the Assessment



The NSCA also examined stock levels over the previous six months before the assessment by reviewing historical stock records. Exhibit 77 displays the stocked according to plan rates, defined as the number of observations of stock levels that were within min/max levels, over the defined period. Most tracer commodities, across all facility types, were not stocked according to plan over the six months preceding the NSCA. Particularly concerning is how low the stocked according to plan rates are at the RMS level. No facility has performed well on this metric, but generally, lower-level facilities were more likely to be stocked according to plan than higher-level facilities. This is the reverse of what is usually expected in such a supply chain.

Exhibit 78. Stocked According to Plan Rates for All Tracer Products, by Level in the Supply Chain

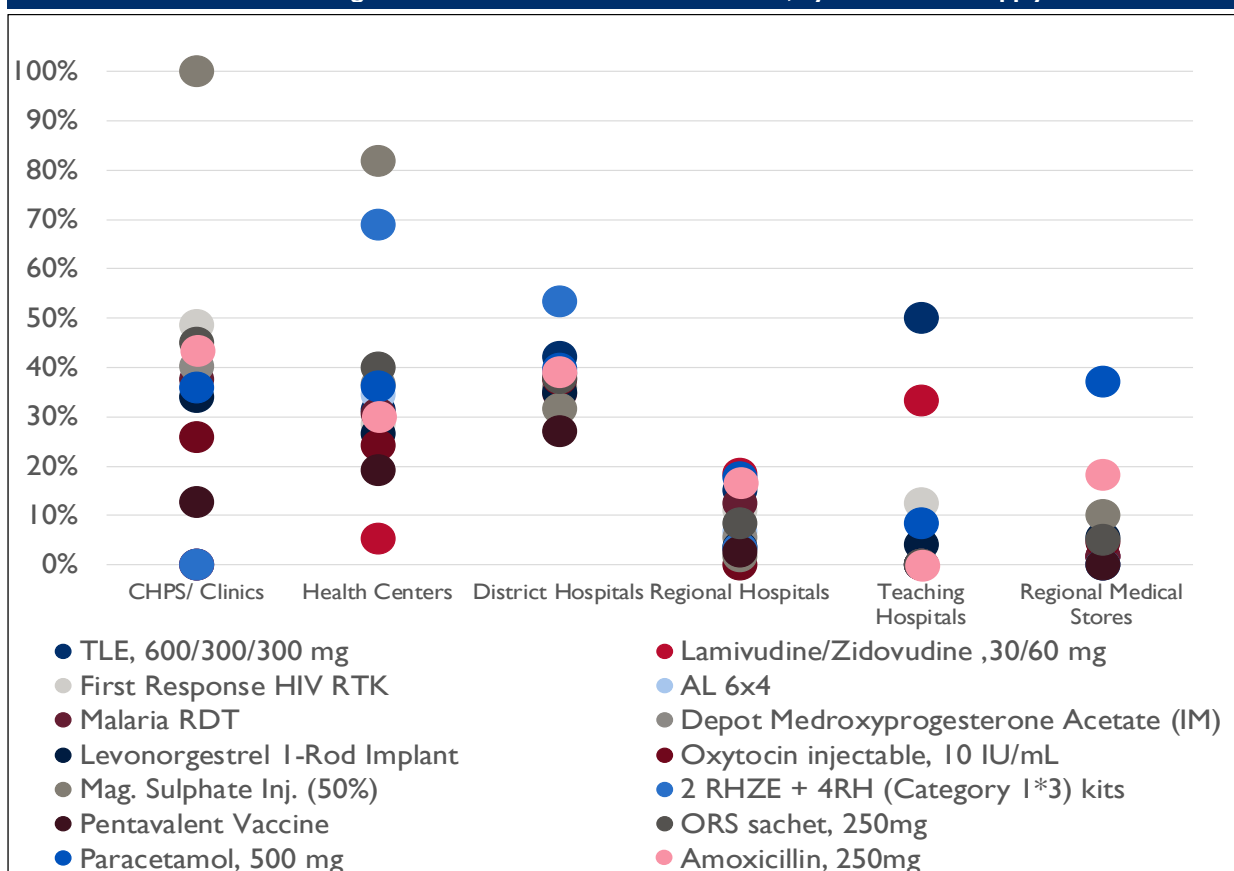


Exhibit 79. Stocked According to Plan Rates for All Tracer Products, by Level in the Supply Chain

	CHPS/ clinics	Health centers/ polyclinics	District hospitals	Regional hospitals	Teaching hospitals	RMSs
n =	69	67	50	10	4	10
TLE, 600/300/300 mg		31%	42%	15%	50%	2%
Lamivudine/zidovudine, 30/60 mg		5%	39%	19%	33%	2%
First response HIV RTK	49%	28%	39%	11%	13%	0%
AL 6x4	34%	35%	39%	7%	0%	0%
Malaria RDT	38%	31%	35%	13%	0%	2%
Depot medroxyprogesterone acetate (IM)	40%	37%	36%	6%	0%	0%
Levonorgestrel I-rod implant	34%	26%	35%	4%	4%	6%
Oxytocin injectable, 10 IU/mL	26%	24%	38%	0%	0%	5%
Mag. sulphate inj. (50%)	100%	82%	32%	2%	0%	10%

2 RHZE + 4RH (category I*3) kits		69%	53%	3%	0%	0%
Pentavalent vaccine	13%	19%	27%	3%		0%
ORS sachet, 250mg	45%	40%	38%	8%	0%	5%
Amoxicillin, 250mg	43%	30%	39%	17%	0%	18%
Paracetamol, 500 mg	36%	36%	40%	18%	8%	37%
Range	13%–100%	5%–82%	27%–53%	0%–19%	0%–50%	0%–37%

Regional Medical Stores. The RMSs, having received the highest CMM score for warehousing and storage for any GOG entity, represent the best capabilities currently deployed in the Ghanaian public health supply chain. All RMSs have permanent and leak-free roofing, 90 percent have adequate ventilation, and all have cold chain storage. The RMSs have strong security protocols in place with 100 percent of the stores having locks, controlled vehicle entrance, and security. Also, 80 percent have restricted access to a quarantined area. This represents a strong capability for infrastructure and keeping products well-secured.

The RMS facilities did, however, score only 59 percent as a capability score, which is below the optimal benchmark of 80 percent. With 75 percent of basic items in place, some important, low-cost, high-opportunity gaps need to be addressed. For example, only 50 percent of RMSs were found to have products stored on pallets and away from the walls. Furthermore, 40 percent of RMSs did not have a pallet truck or pallet jack to load trucks or move products around in the warehouse. Also, 30 percent of RMSs were lacking receiving and dispatch storage areas, and of those, 70 percent that did have them, most conducted receiving and dispatch on the same docks. For maintenance and backups, only 30 percent of RMSs had a repair and maintenance plan in place for all equipment and utilities. Also, 20 percent of RMSs did not have a backup option in place to ensure consistent electrical power at the facility. There are opportunities to strengthen these processes and practices to bring the RMSs up to the optimal capability level for their critical function of ensuring consistent supply at SDPs in their regions.

Recommendations

The warehousing and storage module identified an important baseline of warehousing capabilities across the country, as well as opportunities for investing in additional resources and improving stock management performance. NSCA findings suggest the following warehousing and storage recommendations:

- Expedite decision making for finalizing plans for the new central medical stores. Without this key institution in place, the rest of the system cannot function optimally.
- Address outstanding gaps in warehousing capabilities and performance at the regional medical stores. The regional medical stores represent some of the strongest capabilities in warehousing and storage; however, some key capability components were missing (e.g., pallets, receiving/dispatch areas, backup electrical power). Also, inventory management performance (e.g., stock card accuracy) lags behind expectations given greater resources. Targeted technical assistance should be provided at these facilities to ensure that they address the highlighted capability gaps and have ample supply of commodities at the necessary times.

- Ensure full dissemination and consistent application of inventory management practices. Inventory management SOPs need to be distributed to all facilities in the country and paired with refresher trainings to ensure that all staff, at all levels understand what the best practices are they should be employing in their daily work.
- Ensure adequate specialized storage for cold chain, quarantine, hazardous, and controlled substances in facilities across Ghana. Efforts should be undertaken to remediate this issue as best as current infrastructure allows. Procurement and installation of cold chain equipment at last-mile facilities should also be prioritized.

Importantly, this section also documented the widespread challenge of commodity stock-outs throughout Ghana's public health system. Improvements to warehouse management and inventory record keeping will certainly contribute to ensuring that extant commodities are safe, and their quantities accurately recorded; however, the overall challenge of stock-outs extends beyond warehousing and storage activities. Indeed, ensuring that public health commodities reach patients when and where needed, and in sufficient quantities, requires targeted improvement across technical areas, especially financial solvency, procurement practices, and LMIS.

Supplemental Exhibit

Exhibit 80. Warehousing and Storage: Distribution of Questions and Assignment of Weight Across Capability and Facility Levels								
MODULE	BASIC (50%)		INTERMED. (30%)		ADVANCED (15%)		SOA (5%)	
	# of Qs	WEIGHT	# of Qs	WEIGHT	# of Qs	WEIGHT	# of Qs	WEIGHT
CHPS and clinics (n=68)	48	1.0%	29	1.0%	13	1.1%	7	0.7%
Health centers and polyclinics (67)	48	1.0%	29	1.0%	13	1.1%	7	0.7%
District hospitals (50)	48	1.0%	29	1.0%	13	1.1%	7	0.7%
Regional hospitals (10)	53.3	0.9%	30	1.0%	13	1.2%	6	0.8%
Teaching hospitals (4)	53.3	0.9%	30	1.0%	13	1.2%	6	0.8%
Regional medical stores (10)	74.7	0.7%	37	0.8%	14	1.1%	5	1.0%
TCMS (1)	74.7	0.7%	37	0.8%	14	1.1%	5	1.0%
IHS (1)	74.7	0.7%	37	0.8%	14	1.1%	5	1.0%

Note that interpretations of the scoring, and discussions of “differences” in the scores, need to recognize that the number of assessed capabilities differs by facility type and module. Thus, positive responses to individual questions (i.e., reports of present capabilities) carry different weights, depending on the technical area and facility type.

Note also that the number of questions and the question weighting for these modules vary because some conditionally scored questions are included. Figures presented here assume all conditions are met and all questions are included.

Distribution

The safe and efficient distribution of pharmaceuticals and medical products is a fundamental function of public health supply chains. In this technical area, the NSCA seeks to ensure that distribution plans are structured, implemented, and monitored so that they regularly achieve on-time distribution of commodities to service delivery points. Major areas that were factored into the scoring for this module included the existence of a distribution plan, consideration of appropriate factors for optimizing distributions, best practice policies and procedures, active recording and monitoring of cost and transit data, and appropriate mechanisms to ensure safety and quality of products during transit (see Exhibit 81).

Exhibit 81. Examples of Scored Distribution Capabilities

Basic	<ul style="list-style-type: none"> Existence of an approved distribution plan that defines when products will be delivered to clients Existence of a data management system that captures distribution plans and operations Existence of manual systems for capturing and maintaining transportation data Temperature monitoring devices used to track temperature excursions during transportation Security management measures: unannounced inspections/security guards Process for recording loss incidents Manual tracking of ownership of commodities throughout the system POD records maintained manually
Intermediate	<ul style="list-style-type: none"> Distribution routes are preplanned/included in the communication to health facilities/reviewed annually Existence of policies that cover the distribution and transportation of commodities/aspects of fleet management (list of policies areas/key aspects) Documented SOPs for managing transportation assets available at site Existence of electronic systems for capturing and maintaining transportation data Collection of distribution cost data/using Excel
Advanced	<ul style="list-style-type: none"> Products from different programs and partners distributed in an integrated manner wherever product characteristics allow (most products = an intermediate capability) Daily or real-time capture of transportation data Temperatures recorded in transit Security management measures: video surveillance/two-way radio/barcode scanning
SOA	<ul style="list-style-type: none"> Government budget or facility revenue covers 100% of recurring distribution costs Security management measures: RFID tags

Note: These are illustrative examples of the types of capabilities scored in this module, not an exhaustive list. Each module contains many dozens of questions and capabilities. For a full list, please refer to the NSCA toolbox, available at www.ghsupplychain.org.

The 2015 SCMP was keen to acknowledge the challenges of commodity distribution at the time of the writing of the report. They noted that “With regard to the transport (delivery) of commodities from the RMS to facilities, the system is haphazard, as few RMSs provide direct delivery of commodities, while others require the facilities to collect the products they purchase from CMS or the RHAs/RMS. This is one reason why facilities have been buying more and more commodities from private sector suppliers, as these suppliers deliver directly (and fairly quickly).”

Understanding the critical nature that efficient and reliable distribution plays in any supply chain, there was a clear desire expressed to reform distribution and consolidate its operations under the yet-to-be-formed SCMA. Also, key interventions for the SCMP were identified:

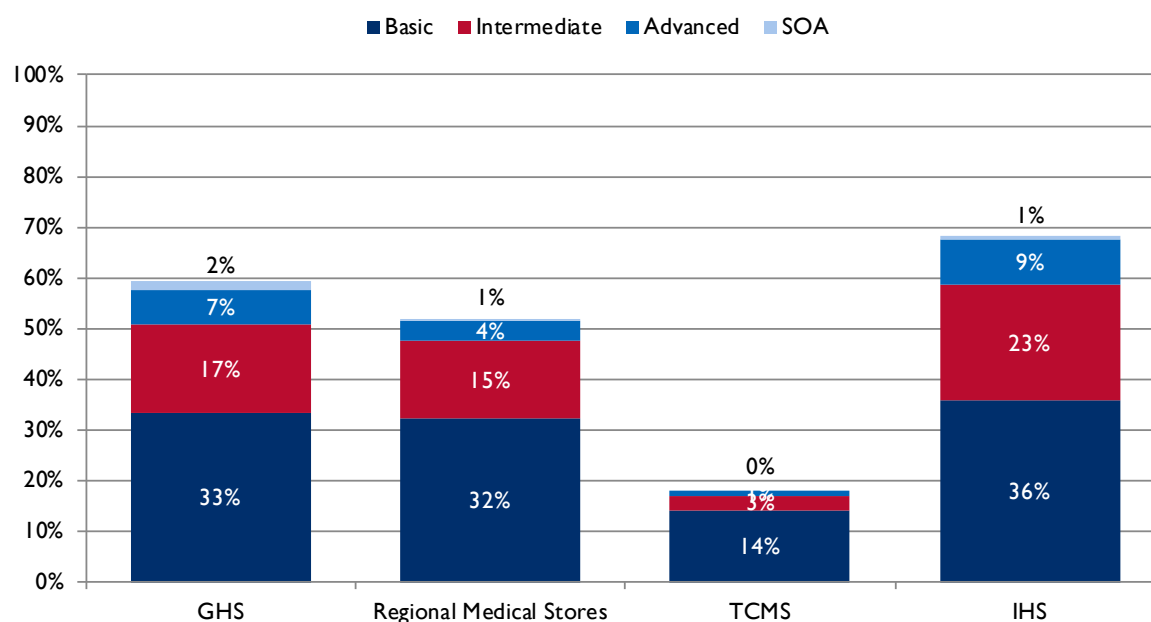
- “The SCMA will undertake direct delivery on a national scale efficiently and cost-effectively (reliable movement of commodities in the public sector supply chain: from CMS to RMS and from RMS to facilities).”
- “The SCMA will consider and evaluate outsourcing (and/or vendor-managed inventory systems) as short-term or long-term interventions for various components of the supply chain.”

2019 NSCA Findings and Analysis

Distribution is currently being handled as direct delivery from regional medical stores to service delivery points throughout Ghana. Though the system receives significant donor support, there was no significant and systematic direct delivery of health commodities at the time of the SCMP publishing. GOG uses a mix of its own fleet and 3PL services to conduct the direct delivery. This distribution system was examined from the perspectives of overall capability, delivery performance, data use, cost, and other factors. The NSCA found a range of capability scores across the system. Exhibits 82 and 83 display the distribution capability score, by system level.

As the SCMA never materialized, there is still no formal relationship between the Temporary Central Medical Stores and the RMS. With most distribution operations focused on the RMS level, it is understandable that higher levels of capability exist at the RMS level than at TCMS. With the future of the new CMS still undetermined, the RMSs have filled this critical role. However, GOG must consider how TCMS will engage with the RMSs for distribution in the next iteration of the SCMP.

Exhibit 82. Distribution Maturity Scores



Note on interpreting results: Recall that CMM scores are a composite of assessed basic (max 50%), intermediate (30%), advanced (15%) and “state of the art” (SOA) (5%) capabilities. Reported percentages are the scored results averaged across all assessed sites, for each capability level and facility type. For more information, please refer to the Understanding the CMM Results section above.

Exhibit 83. Distribution Maturity Score, and Basic Capabilities in Place

	GHS HQ	Regional Medical Stores	TCMS	IHS	Avg. of CMS
n =	1	10	1	1	2
Overall maturity score (range)	59%	52% (33%-83%)	18%	68%	43%
Percent of basic items in place (range)	67%	64% (43-100%)	29%	71%	50%

Examining the RMS level more closely, many examples are found of important distribution capabilities in place. 100 percent of RMS have approved distribution plans, pre-planned distribution routes, and distribution schedules that are communicated to recipients ahead of time. Also, 80 percent of RMS indicate they conduct integrated distribution and the remaining 20 percent integrate distribution for most products they handle. A total 90 percent of RMS maintain POD for outbound products and 80 percent of RMS use those PODs to reconcile delivery quantities. Cold chain infrastructure is in place at 100 percent of RMS with using cooler boxes during transport.

However, the current system is lacking important capabilities. First, only 50 percent of RMS reported awareness of policies that specifically cover distribution and transportation for commodities. This is an easy and essential issue to address. Looking deeper, only 40 percent of RMS have any type of system for capturing and maintaining transportation data and only 20 percent of RMS monitoring transportation related KPI data. While there is tracking of outbound shipments, it is done all manually. There is a big opportunity to systematize the collection of data around delivery and use that to drive performance. Looking more closely at performance, the NSCA found on-time delivery rates ranging from 59 percent to 88 percent, depending on the facility type. Exhibit 84 provides a summary of upstream first-hand verified order and delivery data that was collected during the assessment. There still exists room for improvement regarding on-time delivery. Tracking those related KPIs more carefully within each RMS can help identify issues for correction.

Exhibit 84. Upstream Order Key Performance Indicators (February–July 2019)					
	CHPS/ clinics	Health centers/ polyclinics	District hospitals	Regional hospitals	Teaching hospitals
n =	69	67	50	10	4
Total number of orders reviewed	117	203	180	63	19
Number of orders included that had all relevant data available	48	65	128	38	8
Percentage of orders that are planned	96%	98%	91%	89%	100%
On-time delivery (as reported by receiving facility)	59%	71%	70%	69%	88%
Turnaround time (as reported by receiving facility)	21.1 days	26.1 days	17.5 days	16.2 days	8.5 days

Exhibit 85. Downstream Order Key Performance Indicators (February–July 2019)	
	Regional medical stores
n =	10
Total number of orders reviewed	98
Order turnaround time	19.9 days
Percentage of orders adjusted	86%
Percentage of orders delivered in-full	30%
Average deviance from requested order amount	27%

Exhibit 84 provides a summary of downstream order data collected at the RMS. The distributions from RMS are consistently not delivering full orders, usually delivering about a quarter less than was requested by the ordering facility. This is a concerning metric that needs to be investigated to understand why RMS are unable to fulfill their received requisitions.

Looking at distribution costs, the RMS distribution operation is not actively collecting or using cost data; just 20 percent of RMS report collecting cost data at all. Looking closer at use, only 20 percent of RMS use total cost data to minimize operating costs and only 30 percent have implemented specific interventions aimed at reducing transport costs. Exhibit 86 details the cost of distribution as a percentage of value of commodities delivered at the RMS level. These metrics were not readily available and are further evidence that RMS need to track and manage to their cost data more closely to ensure sustainability of operations.

Exhibit 86. Cost of Distribution Operation as Percentage of Commodity Value Delivered	
Regional Medical Store	Percentage
Ashanti RMS	1.2%
Brong Ahafo RMS	2.0%
Central RMS	**
Eastern RMS	0.2%
Greater Accra RMS	**
Northern RMS	**
Upper East RMS	0.6%
Upper West RMS	3.8%
Volta RMS	0.4%
Western RMS	**

Note: A * denotes an RMS that was unable to produce a data point necessary for calculating this indicator even after additional time was provided to collect the data.

Recommendations

- High levels of debt across the system are causing the RMS to be unable to stock adequately. The RMSs are adjusting almost nine of every 10 orders they receive with only 30 percent of orders delivered in full, as guided by their policy of how to supply SDPs that are indebted for commodities. Stronger coordination is needed between the RMSs and those monitoring supply plans to ensure that the RMSs have timely and sufficient supply of commodities to fulfill requisitions from SDPs.
- Also, high-level supply chain actors and NHIA should coordinate more closely to ensure prompt reimbursements to SDPs and subsequently prompt reimbursement to RMSs by SDPs. Prolonged delays in reimbursement across tiers will result in sustained stock-outs at the RMSs and SDPs with resulting dire consequences for health care delivery in the country.
- The SCMP has been very focused on cost and optimization. There needs to be a systematic effort to collect and use distribution cost data to improve upon the direct delivery system that is in place now.
- Once cost data is systematically capture, cost-related KPIs must be used to shape RMS distribution strategies moving forward to ensure their sustainability.

Supplemental Exhibit

Exhibit 87. LMIS, Distribution of Questions and Assignment of Weight Across Capability and Facility Levels

MODULE	BASIC (50%)		INTERMEDIATE (30%)		ADVANCED (15%)		SOA (5%)	
	# of Qs	WEIGHT	# of Qs	WEIGHT	# of Qs	WEIGHT	# of Qs	WEIGHT
Warehouses (12)	21	2.4%	43	0.7%	17	0.9%	7	0.7%
GHS (1)	12	4.2%	38	0.8%	13	1.2%	6	0.8%

Note that interpretations of the scoring, and discussions of ‘differences’ in the scores, need to recognize that the number of assessed capabilities differs by facility type and module. Thus, positive responses to individual questions (i.e., reports of present capabilities) carry different weights, depending on the technical area and facility type.

Note also that the number of questions and the question weighting for these modules vary because some conditionally scored questions are included. Figures presented here assume all conditions are met and all questions are included.

Logistics Management Information Systems

Accurate and timely data are critical for effective decision making throughout the public health system. The logistics management information systems is the system of records and reports—paper-based or electronic—that are used to aggregate, analyze, validate, and display data to inform logistics decisions and manage the supply chain. Major areas that were factored into the assessment of LMIS capabilities and performance in the NSCA included evidence that standardized LMIS tools and practices are used consistently throughout the system, harmonized reporting practices, regular reporting intervals, performance monitoring on quality of reporting, and ultimately, performance in data accuracy, completeness, and timeliness (see Exhibit 88).

Exhibit 88. Examples of Scored Quality Assurance and Pharmacovigilance Capabilities

Basic	Paper-based LMIS tools Quarterly reporting frequency Internal DQAs
Intermediate	Standardized tools across the supply chain— geographic regions, health programs, and system levels Electronic LMIS tools Monthly reporting frequency Standard process to review LMIS data Reliable internet
Advanced	Weekly reporting frequency Virus protection for eLMIS computers
SOA	Real time/daily LMIS reporting frequency

Note: These are illustrative examples of the types of capabilities scored in this module, not an exhaustive list. Each module contains many dozens of questions and capabilities. For a full list, please refer to the NSCA toolbox, available at www.ghsupplychain.org.

The 2015 SCMP identified improving information systems and processes, specifically through LMIS design, as one of seven key supply chain thematic areas of focus. The Master Plan explained, “Modern automated information systems for the management of health commodities are limited throughout the supply chain. Data collection and sharing are extremely poor, and data visibility for managers outside of their own site is lacking. National-level logistics data are unavailable, and data reporting is noticeably inhibited by organizational boundaries.” At the time, multiple LMIS designs existed for specific public sector commodities (e.g., FHD for FP, NACP for HIV), but these were not integrated into a national system and, the Plan’s analysis concluded, “do not function adequately.”

Beyond fragmentation, a lack of integration and insufficient coordination, additional information and LMIS-specific challenges identified included:

- Minimal sharing of data across program streams;

- Failure to connect in real-time inventory data for CMS and RMSs, so transfers and active stock management are uncommon;
- Lack of incentives for reporting, across the supply chain; and,
- Failure to use data to inform integrated distribution decisions, rather decisions made by program or commodity streams.

To rectify this situation, the SCMP identified a key goal to achieve, the SCMP proposed the design and implementation of an integrated LMIS (including facilities, RMS, CMS, GHS central and programs, and MOH) to “ensure that relevant data for decision-making and performance monitoring are collected[,] reported on an established schedule... [and] widely available to and used by all levels.” The SCMP recommended that management for the LMIS system “should, ideally, converge under one entity,” namely the proposed SCMA.

The SCMP outlined a set of specific strategic interventions, including:

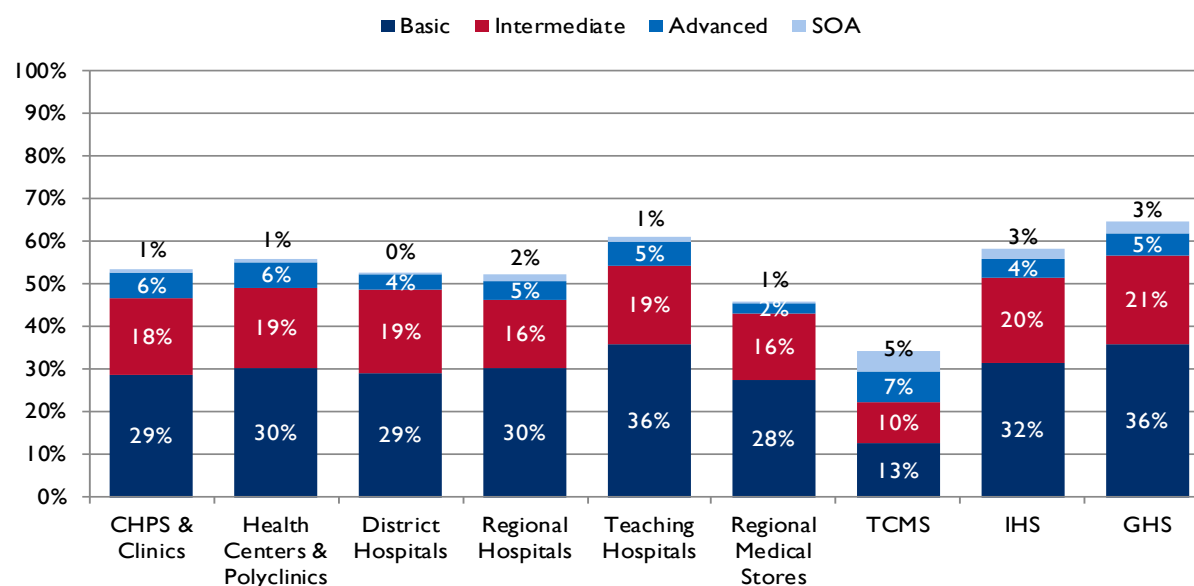
- Assess data needs, information project plans, designs and capabilities to inform design of national integrated LMIS
- Implement a national integrated LMIS, including developing a comprehensive rollout plan and defining data requirements, information-sharing policies, procedures, processes, and service levels (intended to be led by SCMA);
- Create regional logistics coordinating committees tasked to regularly review and analyze national and regional data, address challenges, and ensure transparency;
- Unroll LMIS systems and tools for commodity management to facility level, “with emphasis on consistent and reliable reporting, ordering, and inventory management”; and,
- Develop key performance indicators and information requirements for monitoring interventions.

Since the 2015 SCMP, the GOG expanded its ambitions in this technical area with the development and implemented of an integrated electronic logistics management information system. LMIS represents a key area of growth for the Ghanaian public health supply chain and is an area of heavy investment and focus in the SCMP and beyond. GOG has been working with technical assistance partners to design and roll out the GhiLMIS. The system is currently in the rollout phase with cascading trainings taking place throughout the country and facilities slowly coming on-line through a phased approach.

2019 NSCA Findings and Analysis

LMIS capability and performance results from the 2019 NSCA are presented in Exhibits 89 and 90. Overall, capability scores were consistently above 50 percent across most assessed facility types, reflecting a baseline presence of best practices—including near-universal use of LMIS (paper and/or electronic), monthly reporting rates, and extant policies and guidelines—but also wide variation in capabilities across sites. Performance on key LMIS metrics lags behind capabilities, and paper and electronic records had pervasive inaccuracies. This is to some extent to be expected, given the ongoing transitions within the system.

Exhibit 89. Logistics Management Information System Capability Maturity Scores



Note on interpreting results: Recall that CMM scores are a composite of assessed basic (max 50 percent), intermediate (30 percent), advanced (15 percent) and “state of the art” (SOA) (5 percent) capabilities. Reported percentages are the scored results averaged across all assessed sites, for each capability level and facility type. For more information, please refer to the Understanding the CMM Results section above.

Exhibit 90. LMIS Maturity Score, and Basic Capabilities in Place

	CHPS/clinics	Health centers/polyclinics	District hospitals	Regional hospitals	Teaching hospitals	Regional medical stores	TCMS	IHS	GHS HQ
n =	69	67	50	10	4	10	1	1	1
Overall maturity score (range)	54% (0%–75%)	56% (0%–81%)	53% (3%–79%)	52% (13%–71%)	61% (47%–79%)	46% (36%–60%)	34%	58%	65%
Percent of basic item in place (range)	57% (0%–83%)	61% (0%–100%)	58% (0%–92%)	61% (10%–87%)	72% (55%–85%)	55% (35%–78%)	25%	63%	72%

Period of transition. As it stands today, an integrated paper LMIS is current being employed in Ghana. It includes the following programs HIV/AIDS, TB, FP/RH, MNCH, malaria, essential medicines and medical supplies. Notably, vaccines was an option not selected. The extent to which this is reflected downstream is not clear. Outside of this integrated paper LMIS, various facility types have additional reporting requirements. In 2017, plans for an integrated eLMIS system were first rolled out. The phased approach for implementation involved stakeholder requirements analysis and validation, solution configuration, testing, change management and knowledge transfer, training, onboarding, and system Go-Live. The rollout completion timeframe was set for December 2020. The rollout of eLMIS was designed to be a phased approach, first rolling out to a targeted 278 sites in 2019 to include two central warehouses, four teaching hospitals, 10 regional medical stores and 262 health facilities, followed by an estimated 4,073 lower-level facilities in 2020 comprising health centers and functional CHPS.

Below are two exhibits to help illustrate the ongoing nature of the transition—that multiple tools are still being used; multiple reporting responsibilities are still reported.

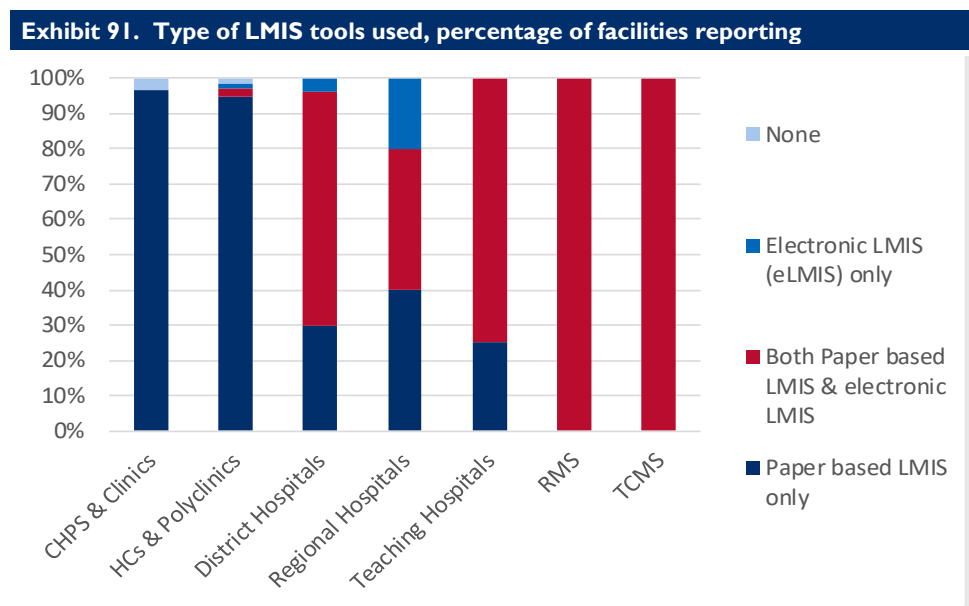


Exhibit 92. Number of Separate Supply Chain and Commodity Reports per Facility per Cycle								
	Percentage of facilities reporting							
	CHPS/ clinics	HCs/ polyclinics	District hospitals	Regional hospitals	Teaching hospitals	RMS	TCMS	GHS HQ
n =	69	67	50	10	4	10	1	1
1 to 3 reports per cycle	56%	51%	40%	30%	50%	30%	✓	✓
4 or more reports	21%	22%	40%	40%	50%	60%		

Paper LMIS. The paper system is ubiquitous in Ghana, particularly at the lower levels of the system. However, systemic performance issues are found in accuracy, timeliness, and completeness. As Exhibit 93 shows, key LMIS capabilities, resources, and best practices are inconsistently found in the system. While GHS HQ respondents report that policies and SOPs for the paper-based LMIS exist, they have not been fully disseminated—only 8 percent of CHPS, 17 percent of health centers, and 44 percent of district hospitals could produce a copy on the day of the visit. According to the GHS HQ, paper LMIS SOPs had not been updated in at least four years. More than half of CHPS and health centers were stocked out of stock cards in the last year. This stock-out of tools is the number one problem cited by supply chain staff when asked about their LMIS challenges.

Assessment teams collected data on key performance LMIS indicators at each site. Exhibit 94 shows the reporting rates, by national program. Reporting rates are actually high, though the scope of the reported data is limited. GOG should use their success in this highly compliant but limited scope reporting as a model to ensure all facilities report complete and timely data. Exhibits 95 and 96 also present the average performance of the paper LMIS system in average stock card accuracy and average deviation

away from the actual stock on hand. Results suggest that even though the paper LMIS has been active for some time, systemic challenges still persist in tracking stock data accurately. When considered in conjunction with the sparse presence of LMIS SOPs and the limited implementation of standard processes to review LMIS data, it is less surprising. It is critical that SOPs and a universal understanding of operating principles are reinforced across the entire public health supply chain, as their absence is likely inhibiting performance. This is further reinforced further down in Exhibit 97, which details the most frequently cited challenges associated with paper LMIS.

Exhibit 93. Key Performance Indicators and Key Capabilities in Place, Paper LMIS						
	CHPS/ clinics	HCS/ polyclinics	District hospitals	Regional hospitals	Teaching hospitals	RMS
n =	69	67	50	10	4	10
Percentage of facilities that use paper LMIS (exclusively or with eLMIS*)	97%	95%	96%	80%	25%	100%
Percentage of facilities reporting presence of SOPs on LMIS	8%	17%	44%	25%	50%	60%
Percentage of facilities reporting the existence of a standard process to review LMIS data and reports	53%	57%	48%	40%	50%	30%
Percentage of facilities reporting the site conducts internal DQA	5%	6%	30%	30%	25%	0%
Percentage of facilities reporting stockout of stock cards in the last year	59%	52%	19%	0%	25%	20%
Stock card accuracy: percentage of facilities with 100% accurate stock card, average across tracers	57%	62%	61%	48%	72%	35%
Stock card accuracy: percentage points deviation from 100% accuracy (range across tracer commodity)	43%– 1,215%	22%– 1,251%	27%–684%	12%– 1,584%	3%– 5,900%	7%– 2,096%
Stock card up to date: Average of average—facilities reporting up-to-date x tracer commodities	62%	63%	90%	94%	77%	92%

Exhibit 94. On-Time and Complete LMIS Reporting Rates by National Program (Feb to July 2019)						
	Service Delivery Points		Regional Hospitals		Regional Medical Stores	
	Complete	On-Time	Complete	On-Time	Complete	On-Time
National AIDS Control Program	98% (417)	98% (417)	100% (10)	100% (10)	100% (10)	100% (10)
National Malaria Control Program			73% (10)	83% (10)	100% (10)	100% (10)
National TB Program	95% (315)	95% (315)	100% (10)	100% (10)	100% (10)	100% (10)
Expanded Programme on Immunization	--		--		100% (10)	100% (10)

Note: Value in parentheses is the denominator for that percentage

Exhibit 95. Percentage of Facilities With 100 Percent Accurate Stock Card, by Tracer Commodity

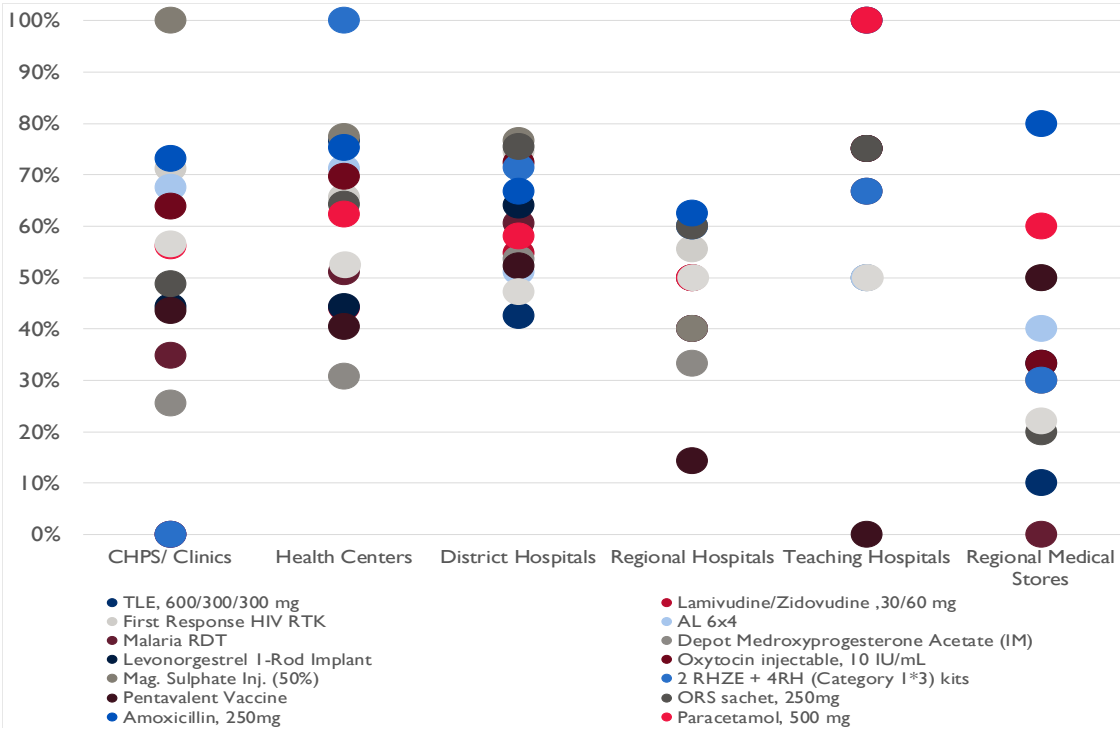
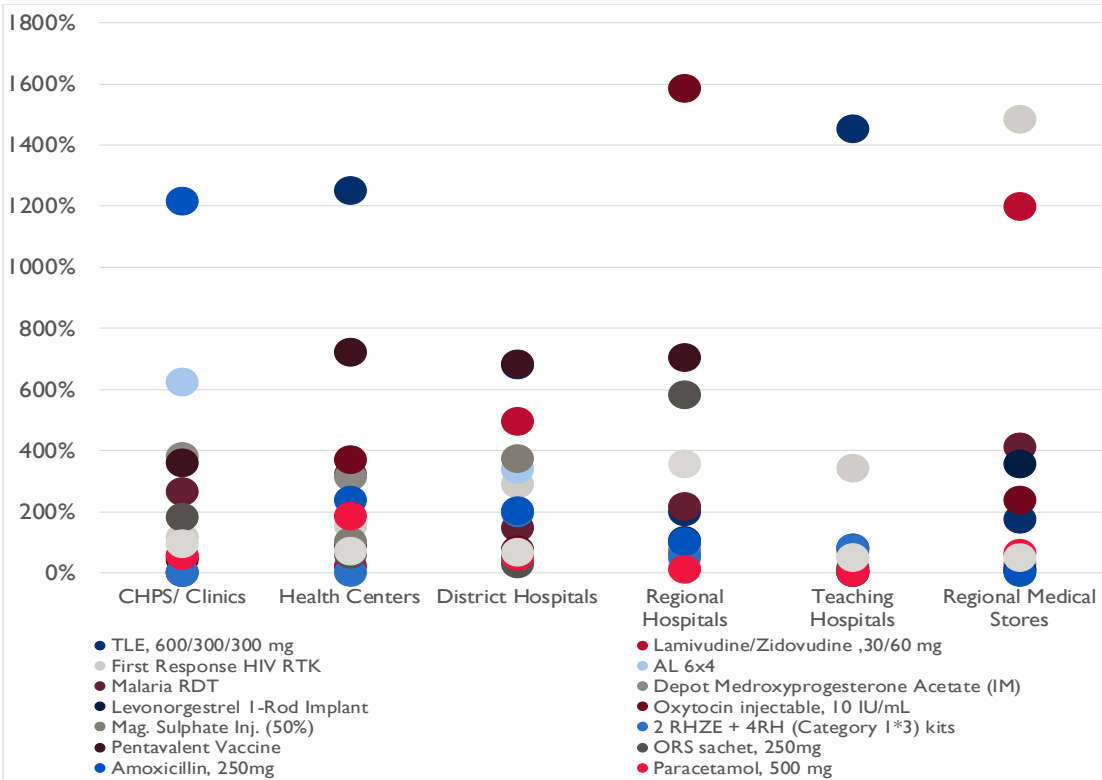


Exhibit 96. Average Stock Card Deviation From 100 Percent Accuracy, by Tracer Commodity



Electronic LMIS. The GHiLMIS electronic system is still taking hold in Ghana as sites are phased in. The complete deployment of this system represents a significant opportunity to transform the use of data for decision making within the Ghanaian public health supply chain. Concerningly, only 34 percent of district hospitals that identified using eLMIS had a copy of eLMIS SOPs (see Exhibit 96). Also of note, only about two-thirds of facilities reported access to reliable internet connectivity at the facility. As the national electronic system is in its infancy, it is critical that all facilities have basic resources—including SOPs and internet connectivity—available. It is also critical that staff are adequately trained in the new systems—to date, 80 percent of district hospitals but only half of regional and teaching hospitals reported that capacity trainings on LMIS were provided in the last year.

Exhibits 94 and 95 also present the average performance of the eLMIS system in eLMIS record accuracy and average deviation away from the actual stock on hand. Results suggest pervasive inaccuracies across all products in the eLMIS that are agnostic of the program they support or commodity type. Also, the RMS performed the worst of any facility type. Given the nascent stage of the eLMIS rollout, these indicators can be thought of as a baseline against which to track future eLMIS gains. Simultaneously, upfront investment in capabilities (e.g., SOPs, Internet access, capacity trainings) will likely result in improved performance. This need is reinforced by the challenges identified in this space. Exhibit 96 details the most frequently cited challenges with eLMIS.

Exhibit 97. Key Performance Indicators and Capabilities in Place—eLMIS

	District Hospitals	Regional Hospitals	Teaching Hospitals	Regional Medical Stores
n =	50	10	4	10
Percentage of facilities that use eLMIS (exclusively or with paper LMIS system)	70%	60%	75%	100%
Percentage of facilities reporting presence of manuals or SOPs on eLMIS	34%	0%	33%	20%
Percentage of facilities reporting existence of reliable internet connectivity at facility (“always or almost always works”)	63%	67%	0%	70%
Percentages of facilities reporting LMIS (electronic or paper) capacity-building sessions within the last year	80%	50%	50%	90%
eLMIS record accuracy: percentage of facilities with 100% accurate stock card, average across tracers	50%	42%	33%	27%
eLMIS record accuracy: percentage points deviation from 100% accuracy (range across tracer commodity)	61%-4,547%	0%-4,571%	0%-478%	-424%-9967%

*This metric is calculated only for commodities for which the facility had an eLMIS record available on the day of the visit. If it was not available, it was removed from the denominator

Exhibit 98. Most Frequently Cited Challenges with LMIS—Paper and Electronic

Health centers (paper LMIS)	Percent facilities	District hospitals (eLMIS)	Percent facilities
Stock-out of tools	59%	Internet connectivity	54%
Data quality or data entry errors	44%	Insufficient staff	34%
Insufficient training or human resources capability	42%	Down time centrally (system failure)	34%
Difficulties in filing	33%	Availability of computers	31%
Data loss	30%	Data quality or data entry errors	31%
Delayed feedback from higher levels (MOH or warehouse) on system and reporting	30%	Insufficient training or human resources capability	26%

Exhibit 99. Percentage of Facilities With 100% Accurate eLMIS Record, by Tracer Commodity

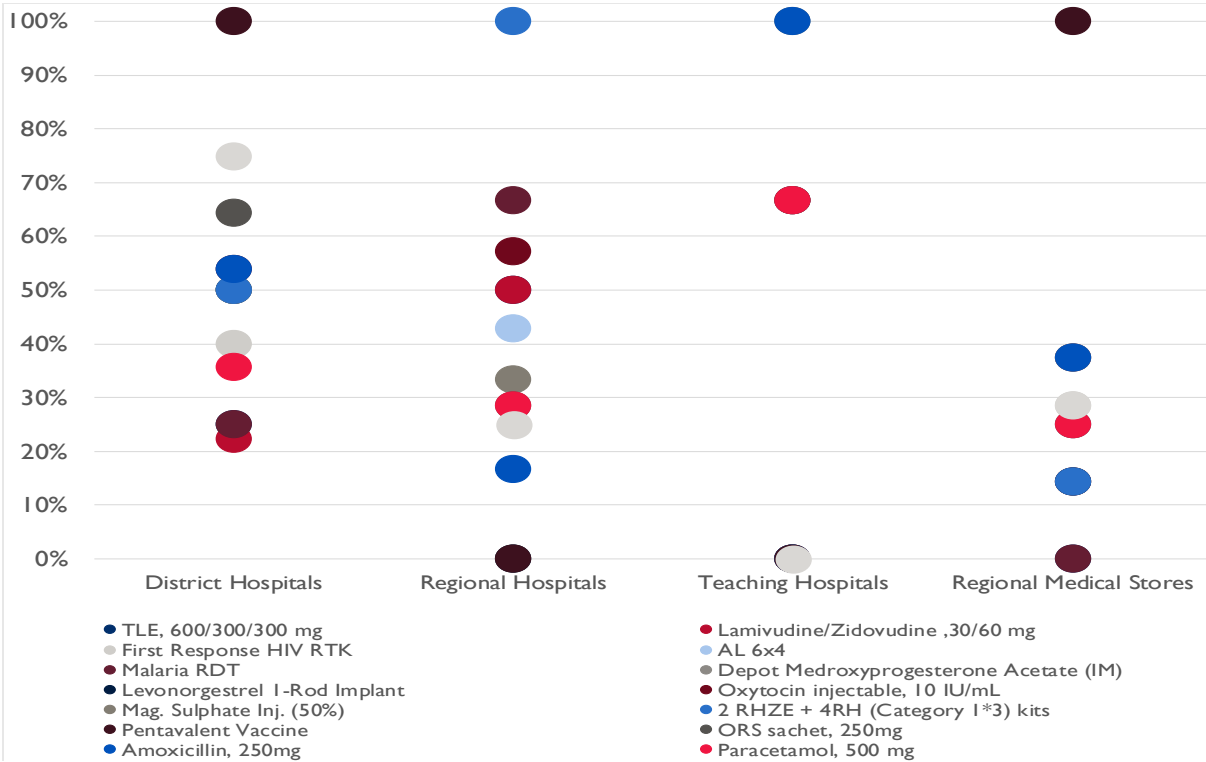
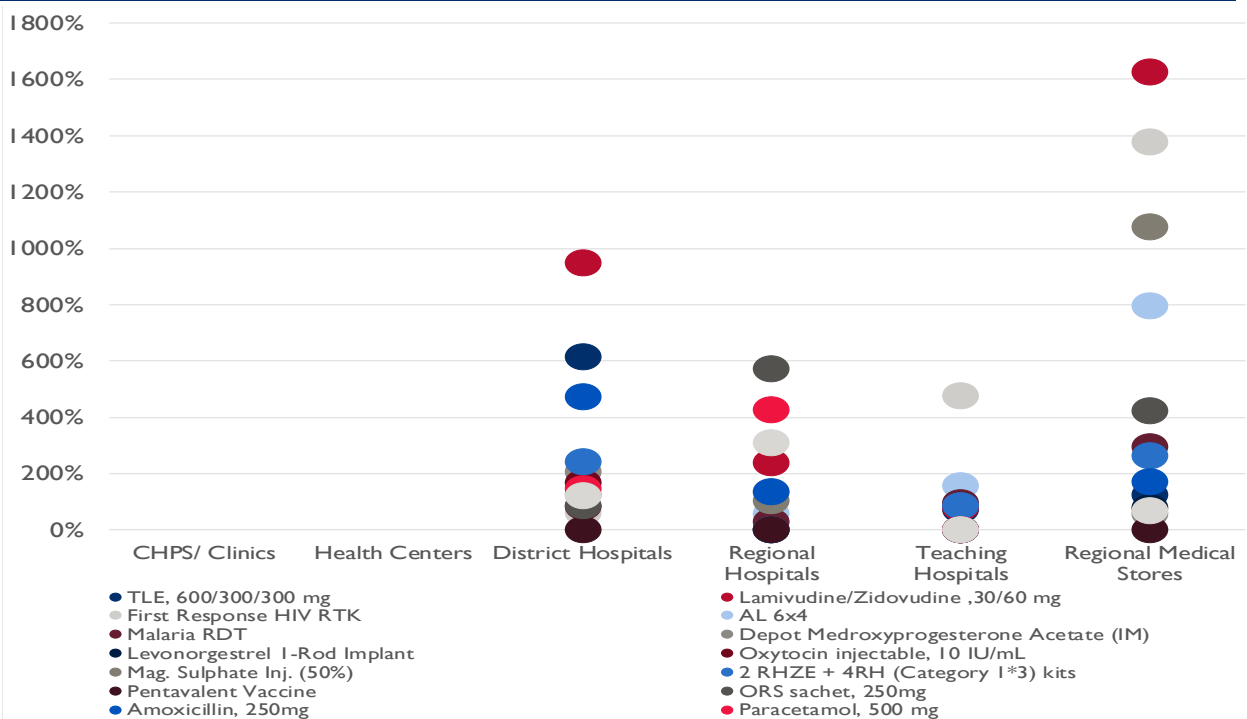


Exhibit 100. Average eLMIS Record Deviation From 100 Percent Accuracy, by Tracer Commodity



HR for LMIS. HR, while discussed in its own section, is such a critical component of LMIS that it must be considered here, especially given the still nascent stages of the national LMIS system(s). Currently, only 3 percent of CHPS and 8 percent of health centers have LMIS in the formal job descriptions of supply chain staff. This does increase to 78 percent at district hospitals and 80 percent at regional hospitals. Training opportunities were found to be limited as well. Roughly half of all facilities reported receiving LMIS training during a capacity-building session in the last year. LMIS needs to be formalized as part of the supply chain, and staff properly trained to allow continued rollout of the GHiLMIS system. As Exhibit 101 demonstrates, insufficient training, lack of human resource capability, or insufficient staff in general are among the commonly cited challenges with both LMIS systems.

Exhibit 101. LMIS Prevalence in Job Descriptions and Capacity Training Opportunities								
	Percentage of facilities reporting							
	CHPS/ clinics	HCS/ polyclinics	District hospitals	Regional hospitals	Teaching hospitals	RMS	TCMS	GHS HQ
n =	69	67	50	10	4	10	1	1
LMIS in formal job descriptions of at least one staff member	3%	8%	78%	80%	50%	80%	X	✓
Capacity training on LMIS in pass year	53%	49%	80%	50%	50%	90%	✓	✓

Data Quality Assessments. An LMIS system with poor-quality data can provide no benefit to the system it supports. The NSCA found several data quality–related gaps in capability and performance. When asked if the facility conducted internal data quality assessments (DQAs), only 5 percent of CHPS and 6 percent of health centers reported affirmatively. However, when asked who conducted DQAs at this facility (citing a range of options), the most common response was staff at the facility. This indicates that there is insufficient focus on data quality and insufficient support from higher levels to help strengthen data quality.

This lack of data quality culture is evident when examining LMIS key performance indicators. Exhibits 98 and 99 show the percentage of facilities with 100 percent accurate stock card, by tracer commodity and average stock card deviation from 100 percent accuracy, by tracer commodity. Stock card accuracy varies widely, irrespective of commodity type. Also, the magnitude of deviance found on stock cards indicates that many SDPs in Ghana do not have strong record-keeping practices and may be mis-ordering due to poor understanding of their stock-on-hand balances.

Recommendations

Ghana has a huge opportunity in leveraging a strong, reliable LMIS system as the cornerstone of their supply chain. To realize this, there must be a countrywide commitment to systems and data quality. Specifically, GOG should consider the following steps:

- Distribute SOPs, stock cards, and any other necessary LMIS-related tools to all facilities within the health system. Staff cannot complete their work without these tools, a foundational requirement for a strong LMIS system.
- Formalize LMIS responsibilities in job descriptions for all supply chain staff, especially at the last mile. The ability to coach staff into stronger performance starts by helping them understand their accountability.

- Develop a culture of data quality at all levels of the system. Significant improvement is needed in the quality of paper in both the paper and electronic LMIS systems. The country cannot reap the benefits of using data for decision making if there is no confidence in the data being used.

Supplemental exhibits

Exhibit 102. LMIS: Distribution of Questions and Assignment of Weight Across Capability and Facility Levels								
MODULE	BASIC (50%)		INTERMEDIATE (30%)		ADVANCED (15%)		SOA (5%)	
	# of Qs	WEIGHT	# of Qs	WEIGHT	# of Qs	WEIGHT	# of Qs	WEIGHT
CHPS/clinics (n=68)	12	4.1%	11	2.7%	5	3%	2	2.5%
Health centers/polyclinics (67)	12	4.1%	11	2.7%	5	3%	2	2.5%
District hospitals (50)	12	4.1%	11	2.7%	5	3%	2	2.5%
Regional hospitals (10)	11	4.5%	14	2.1%	6	2.5%	2	2.5%
Teaching hospitals (4)	11	4.5%	14	2.1%	6	2.5%	2	2.5%
Regional medical stores (10)	20	2.5%	21	1.4%	11	1.4%	2	2.5%
TCMS (1)	20	2.5%	21	1.4%	11	1.4%	2	2.5%
IHS (1)	20	2.5%	21	1.4%	11	1.4%	2	2.5%
MOH (1)	43	1.2%	22	1.4%	12	1.3%	3	1.7%

Quality Assurance and Pharmacovigilance

Ensuring that the health commodities consumed by patients are safe, effective, and remain in good quality as they travel throughout the health system is a critical function of effective supply chains. This section of the NSCA seeks to make sure that a well-resourced system is in place for ensuring drug quality and that facilities at all levels understand and can act on their role in pharmacovigilance for medicines. Exhibit 103 outlines key capabilities of an effective quality assurance and pharmacovigilance strategy, including the existence of formal guidelines and SOPs, regular quality testing, and the availability of data collection tools and processes for pharmacovigilance.

Exhibit 103. Examples of Scored Quality Assurance and Pharmacovigilance Capabilities	
Basic	Formally approved national-level product quality assurance strategy or policy Formally approved guidelines or manual/SOPs
Intermediate	Samples of received pharmaceutical products taken for quality control testing (intermediate capability at MOH, RMS, and RH levels, advanced for SDPs) Quarterly (or more frequent) quality control samples Data collection tools available for pharmacovigilance
Advanced	Dedicated department responsible for implementing pharmacovigilance strategy All laboratories conducting quality control testing accredited by a competent body (e.g., WHO) SOPs to quarantine and/or recall product determined to be compromised Certificates of analysis and conformance recorded for ALL medicines received from international sources
SOA	Action protocols, based on pharmacovigilance results

Note: These are illustrative examples of the types of capabilities scored in this module, not an exhaustive list. Each module contains many dozens of questions and capabilities. For a full list, please refer to the NSCA toolbox, available at www.ghsupplychain.org.

The development of the SCMP identified quality assurance and pharmacovigilance as an area of focus for reform activities. Identifying the Food & Drug Authority, an authority housed within the MOH, as the key agency to lead these reform activities, the SCMP assigned the following key activities:

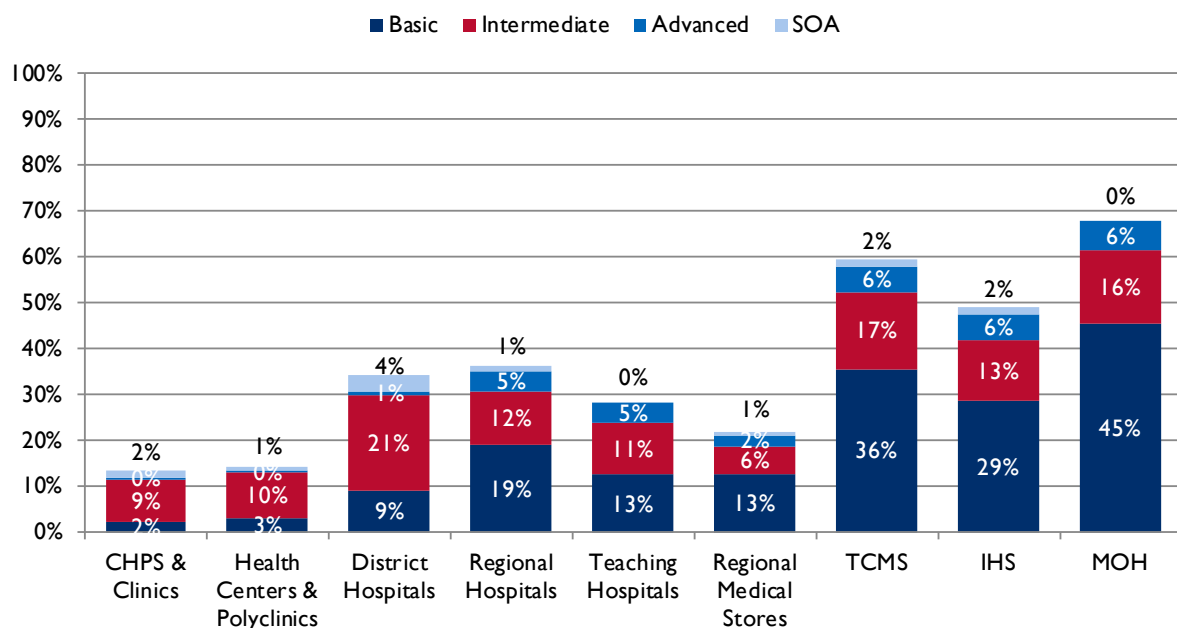
- “The health commodity quality assurance program of the MOH, FDA and other agencies will be strengthened so that it is comprehensive and includes quality standards, regulations, and indicators to assist in quality assessment, inspection, testing, and tracking.”
- “The SCMA and the FDA will develop and publish protocols regarding medicine and medical supply quality assurance processes and defining how cooperation in facilities and through all levels will be managed. The FDA will support the SCMA to assure product quality and will train facilities and others on quality regulations and practices.”

While pharmacovigilance was identified as an area for improvement in the SCMP, no specific activities were identified other than general strengthening of the pharmacovigilance system. There is mention of regulatory strengthening for suppliers and wholesalers, but the focus of this module is more on the supply chain’s ability to identify issues with medicine quality downstream.

2019 NSCA Findings and Analysis

Exhibits 104 and 105 below display the capability scores, by facility type, for quality assurance and pharmacovigilance. Encouragingly, the MOH scored the well at 68 percent with almost all basic items in place. Unfortunately, from there, scores trend sharply downward for all service delivery points. This indicates that significant work is still needed to strengthen capabilities for pharmacovigilance in all parts of the supply chain and health system.

Exhibit 104. Quality Assurance and Pharmacovigilance Capability Maturity Scores



Note on interpreting results: Recall that CMM scores are a composite of assessed basic (max 50 percent), intermediate (30 percent), advanced (15 percent) and “state of the art” (SOA) (5 percent) capabilities. Reported percentages are the scored results averaged across all assessed sites, for each capability level and facility type. For more information, please refer to the Understanding the CMM Results section above.

Any system requires policies and procedures to define its operations and expectations. Pharmacovigilance (PV) is no exception to this. The NSCA found that availability of SOPs for

pharmacovigilance in service delivery points is scarce at best. Six percent of CHPS, 10 percent of health centers, and 26 percent of district hospitals could produce a copy (paper or electronic) of these SOPs during the assessment. Furthermore, only 45 percent of CHPS and 47 percent of health centers had reporting forms available for pharmacovigilance. The lack of SOPs and tools at the lowest levels of the health system (which is often most people's first point of contact when sick) indicates that the Ghanaian health system is missing certain fundamental components necessary to sustain a pharmacovigilance system.

Looking closer at the various types of hospitals in Ghana, some signs are encouraging. A total 96 percent or more of all hospital types reported availability of pharmacovigilance reporting forms and 90 percent or more of all hospital types report sharing their pharmacovigilance data with higher level authorities. However, there is still significant room for improvement, particularly in action-oriented areas of the PV system. When asked if SOPs exist to quarantine and/or recall the product exists when it is determined that product quality is compromised, effectively no facilities in Ghana said that they exist. This is a clear indication that expectations for action, if they exist, have not been disseminated effectively throughout the health system.

Ensuring that the basic building blocks of the PV system are in place at last mile-facilities is an excellent opportunity to prioritize for inclusion in the next iteration of the SCMP.

Regional medical stores. The RMSs, as a key point in the supply chain, need to have robust quality assurance and pharmacovigilance capabilities in place to ensure that medicines distributed by them are of sufficient quality. Worryingly, the RMSs scored 22 percent for capability, which indicates significant room for improvement. Looking more closely, the NSCA found that only 10 percent of RMSs keep Certificates of Analysis & Certificates of Conformance for medicines received from domestic sources and 0 percent from international sources. Only 40 percent of RMS have available SOPs for product quality assurance/quality control. Also, only 20 percent of RMS report that samples of pharmaceutical products are taken for testing. Considering all these points, significant opportunities are found to strengthen QA processes at the RMS level as well.

Exhibit 105. QA & Pharmacovigilance Maturity Score and Basic Capabilities in Place									
	CHPS/ clinics	Health centers/ polyclinics	District hospitals	Regional hospitals	Teaching hospitals	RMSs	TCMS	IHS	MOH
n =	69	67	50	10	4	10	1	1	1
Overall maturity score (range)	13%	14%	34%	36%	28%	22%	60%	49%	68%
Percent of basic items in place (range)	4%	6%	19%	38%	25%	26%	71%	57%	91%
Availability of SOPS for pharmacovigilance	6%	10%	26%	40%	25%	--	--	--	--
Availability of reporting forms for pharmacovigilance	45%	47%	96%	100%	100%	--	--	--	--

Special Note. The NSCA scoring model assumes that service delivery points are expected to take samples of product received for quality testing. The authors of this report understand that this responsibility lies with the FDA and is conducted in post-market surveillance. At the same time, the quality of post-market surveillance was identified as a weakness during the SWOT analysis component

of the Supply Chain Mapping workshop conducted with numerous MOH and GHS staff. Therefore, while the final score is lower due to two questions that ask about the frequency of pulling samples for testing, we feel the score still is a good representation of NSCA's discovery that formalized processes and availability of tools for pharmacovigilance are not commonplace at service delivery points in the Ghanaian health system.

Recommendations

- The pharmacovigilance system cannot function without the widespread availability of SOPs, reporting tools, and prepared staff. The MOH and GHS should print and distribute all necessary pharmacovigilance tools to facilities across the country.
- The presence of tools is only one part of the system. Distribution of materials should be paired with a cascading training program to ensure that staff understand how and when to use PV tools.
- Before tools are disseminated and trainings are implemented, MOH and GHS should review all PV SOPs, reporting tools, and job aids to ensure that the information is accurate, appropriate, and up to date.

Supplemental Exhibit

Exhibit 106. QPV: Distribution of Questions and Assignment of Weight Across Capability and Facility Levels								
MODULE	BASIC (50%)		INTERMEDIATE (30%)		ADVANCED (15%)		SOA (5%)	
	# of Qs	WEIGHT	# of Qs	WEIGHT	# of Qs	WEIGHT	# of Qs	WEIGHT
CHPS/clinics (n=68)	4	12.5%	3	10.0%	4	3.8%	1	5.0%
Health centers/ polyclinics (67)	4	12.5%	3	10.0%	4	3.8%	1	5.0%
District hospitals (50)	4	12.5%	3	10.0%	4	3.8%	1	5.0%
Regional hospitals (10)	5	10.0%	8	3.8%	4	3.8%	1	5.0%
Teaching hospitals (4)	5	10.0%	8	3.8%	4	3.8%	1	5.0%
Regional medical stores (10)	7	7.1%	9	3.3%	8	1.9%	3	1.7%
TCMS (1)	7	7.1%	9	3.3%	8	1.9%	3	1.7%
IHS (1)	7	7.1%	9	3.3%	8	1.9%	3	1.7%
MOH (1)	11	4.5%	15	2.0%	14	1.1%	3	1.7%

Note that interpretations of the scoring, and discussions of “differences” in the scores, need to recognize that the number of assessed capabilities differs by facility type and module. Thus, positive responses to individual questions (i.e., reports of present capabilities) carry different weights, depending on the technical area and facility type.

Note also that the number of questions and the question weighting for these modules vary because some conditionally scored questions are included. Figures presented here assume all conditions are met and all questions are included.

Waste Management

Medical waste management is a core operation of effective public health supply chains, ensuring that used, unsafe, or unusable pharmaceutical products are efficiently removed from the supply chain and properly disposed. Major areas that were factored into scoring of capabilities and performance of waste management included the existence of an approved national waste management plan, existence of SOPs and guidelines for waste management in all facilities, active monitoring of waste management and removal, and complete records of waste management events (see Exhibit 107).

Exhibit 107. Examples of Scored Waste Management Capabilities

Basic	SOPs for waste management and disposal National regulatory agency or department for enforcing regulations Unusable pharmaceutical products stored separately Minimal government or facility budget contribution toward waste management
Intermediate	Disposal methods: on site incineration, inertization or solidification Waste disposal events authorized and documented Internal audits of waste management
Advanced	Disposal supervised and certified by a regulatory authority Unusable pharma waste products sorted by method of disposal
SOA	Waste management system integrated with LMIS

Note: These are illustrative examples of the types of capabilities scored in this module, not an exhaustive list. Each module contains many dozens of questions and capabilities. For a full list, please refer to the NSCA toolbox, available at www.ghsupplychain.org.

The 2015 SCMP recognizes waste management as an important part of a broader plan to improve distribution within the Ghanaian supply chain. It assigns the SCMA the task of “developing/updating waste disposal policies and procedures (SOPs), including reverse logistics strategies and establishing/revising waste disposal infrastructure” and dictates that facilities “provide appropriate storage space, conditions, and equipment to ensure commodity safety and quality and to address waste and disposal needs.” In bulleted form, one can pull out three waste management priorities from the SCMP:

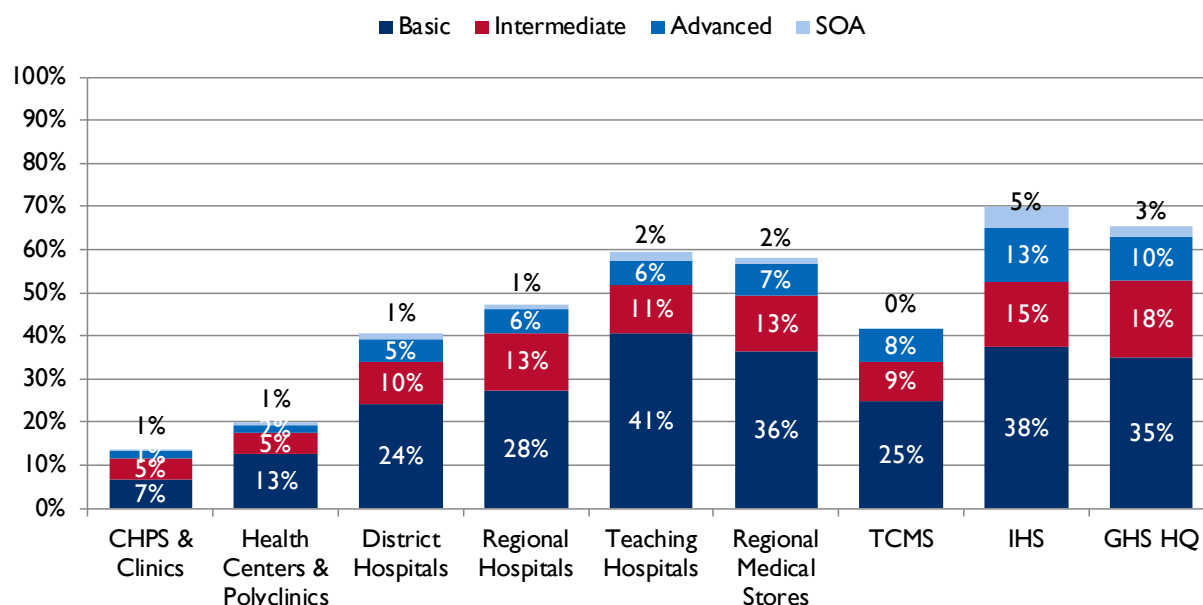
- Develop and/or update waste disposal policies and procedures, including reverse logistics
- Establish and/or revise waste disposal infrastructure
- Ensure facilities have appropriate storage space and resources for waste and disposal needs

The overarching objective is, “Waste and disposal issues will be addressed carefully to protect public safety and support organizational effectiveness.”

2019 NSCA Findings and Analysis

Exhibits 107 presents the NSCA capability maturity results for waste management in the Ghanaian supply chain system. The level of waste management capabilities varies significantly across the supply chain, increasing from only a 14 percent capability score only among CHPS and clinics to GHS HQ’s report of a 66 percent capability maturity score. No facility type achieves the 80 percent capabilities maturity threshold for this supply chain technical area.

Exhibit 108. Waste Management Capability Maturity Model Scores



Note on interpreting results: Recall that CMM scores are a composite of assessed basic (max 50 percent), intermediate (30 percent), advanced (15 percent), and “state of the art” (SOA) (5 percent) capabilities. Reported percentages are the scored results averaged across all assessed sites, for each capability level and facility type. For more information, please refer to the Understanding the CMM Results section above.

Exhibits 108 demonstrates that many key waste management capabilities—including waste management regulations, guidelines and SOPs, reverse logistics, and a national regulatory agency—exist at the national level. Few lower-level facilities, however, could produce extant guidelines or SOPs when asked—no assessed CHPS or clinics, only 7 percent of health centers and polyclinics, and 36 percent of district hospitals (Exhibit 109). Guidelines were more widely available at the regional level, if still not universally so. Thus, the SCMP’s proposed intervention that waste disposal policies and procedures be developed and updated appears to have been achieved, even absent the creation of the SCMA, and the next step appears to be the need to focus on ensuring full dissemination of extant policies.

Exhibit 109. GHS HQ Waste Management Maturity Score, and Select Capabilities and Performance Indicators

GHS HQ	
n =	1
Overall maturity score (range)	66%
Percent of basic items in place (range)	70%
Formally approved waste management regulations exist	✓
National regulator agency or department for managing and enforcing waste management regulations exists	✓
Policies and procedures that cover distribution include aspects about reverse logistics (from “distribution” module)	✓
Environmental regulations that affect waste treatment exist	✓
Approved guidelines for waste management and disposal exist	✓
Approved SOPs for waste management exist	✓

Approved SOPs for waste management are updated

Every four
years or less
often

Note: MOH not assessed in this functional area as central-level waste management responsibilities are housed within GHS HQ

Exhibit 110. Waste Management Maturity Scores and Select Capabilities and Performance Indicators								
	Percent of facilities reporting:							
	CHPS & clinics	HCs & polyclinics	District hospitals	Regional hospitals	Teaching hospitals	RMS	TCMS	IHS
n =	68	67	35	50	10	4	1	1
Overall maturity score (range)	14% (0–41%)	20% (0–74%)	40% (3–84%)	47% (24–87%)	59% (52–70%)	58% (42–80%)	42%	70%
Percent of basic items in place (range)	13% (0–50%)	25% (0–100%)	49% (0–100%)	55% (25–100%)	81% (75–100%)	73% (50–100%)	50%	75%
Percentage of facilities demonstrating presence of SOPs for waste management and disposal at site	0%	7%	36%	50%	75%	80%	No	✓
Percentage of facilities reporting that waste disposal events are authorized and documented	1%	5%	42%	50%	75%	80%	✓	✓
Percentage of facilities demonstrating that unusable pharmaceutical products are stored separately	31%	57%	84%	70%	100%	90%	✓	✓
Percentage of facilities reporting disposal supervised or certified by a regulatory authority	24%	27%	70%	100%	100%	100%	✓	✓

The SCMP pointed explicitly to reverse logistics as a priority area within waste management policy for the country. In the distribution module, the NSCA asked central level entities and warehouses whether policies and procedures that cover distribution include aspects on reverse logistics. GHS HQ respondents answered “yes,” a response confirmed by IHS but not TCMS and 70 percent of RMSs.

Other best practices in waste management—e.g., separate storage of pharmaceutical products, supervision of disposal—are more widely reported, though again decreasingly so as one moves down the supply chain. For example, all teaching hospitals and 90 percent of regional medical stores reported (and data collectors visually confirmed) that unusable pharmaceutical products are stored separately. About a third of CHPS and clinics and half of health centers and polyclinics reported the same. While these are higher proportions than those reporting the presence of waste management SOPs, it suggests that the SCMP’s goal of ensuring facilities have appropriate storage space and resources for waste disposal needs requires further investment.

Method of disposal. Exhibit 111 shows that the most frequently used pharmaceutical waste disposal methods differ across sites. Most lower levels sites reported transporting pharmaceutical waste to higher-level government facilities—namely, DHAs—for disposal. Hospitals, conversely, frequently reported disposing waste at municipal landfills or through onsite incineration. According to GHS HQ, practices are monitored through a mix of external and internal audits and on-site monitoring and,

indeed, most assessed facilities reported some form of monitoring of waste management practices. Combined, these findings suggest that the SCMP's plan to “establish/revise waste disposal infrastructure” is advancing and the next step may be to shift focus beyond baseline coverage toward optimization and quality control.

Exhibit 111. Methods of Pharmaceutical Waste Disposal								
What means or methods are used for treating and/or disposing of pharmaceutical waste generated or in storage at the site or facility?	Percent of facilities reporting:							
	CHPS & clinics	HCS & poly-clinics	District hospitals	Regional hospitals	Teaching hospitals	RMSs	TCMS	IHS
n =	68	67	35	50	10	4	1	1
Transport to higher-level government facility or warehouse	68%	63%	22%	10%	25%	10%		
Municipal landfill disposal	7%	15%	30%	70%	50%	100%	✓	✓
Incineration (onsite) followed by landfill disposal of ash residues	20%	12%	54%	80%	25%	60%		
Contract (third-party) pick-up, transport and disposal by certified waste management company	3%	3%	16%	0%	0%	0%	✓	✓
Steam autoclaving followed by landfill disposal of treated waste residues	0%	0%	8%	30%	0%	0%		

Integration of waste management into LMIS. To the extent that reverse logistics is a key part of Ghana's infrastructure and strategy for waste management, tracking stock, logistics, and disposal data is important. In the LMIS module, the NSCA queried sites on what activities are incorporated into LMIS reporting systems. Exhibit 112 presents the reported percentage of facilities using LMIS data to inform waste management activities. Results are mixed. Current waste disposal guidelines are more oriented toward waste handling and disposal, rather than tracking and information management. The new LMIS system currently being rolled out, however, has the capability to track and aggregate wasted pharmaceuticals and thus presents an opportunity to systematize this approach.

Exhibit 112. Waste management and LMIS systems									
	Percent of facilities reporting:								
	CHPS & clinics	HCS & poly-clinics	District hospitals	Regional hospitals	Teaching hospitals	RMS	TCMS	IHS	GHS HQ
n =	68	67	35	50	10	4	1	1	1
Waste management activities are among those informed by LMIS (from “LMIS” module)	23%	40%	50%	70%	50%	50%	No	Yes	Yes

Recommendations

The findings on waste management practices in the Ghanaian supply chain system point to opportunities to expand and deepen capabilities in this key technical area. Recommendations include:

- Focus on fully disseminating extant waste management policies, guidelines, and SOPs throughout the system, perhaps through inclusion in supervisory support systems.

- Commission an assessment of the waste disposal infrastructure to determine efficiency and efficacy of current mix of waste disposal means and to inform future intervention that move waste management toward greater optimization and quality control.
- Investigate whether inconsistent separation of usable and unusable pharmaceutical waste is the result of unfamiliarity with best practices or insufficient storage space. In the former case, again focus on dissemination of guidelines. In the latter case, ensure facilities have appropriate storage space and resources for waste disposal needs, especially at lower levels.
- Ensure waste management is fully incorporated into LMIS to inform efficient reverse logistics practices in disposing of pharmaceutical waste.

Supplemental Exhibit

Exhibit 113. Waste Management, Distribution of Questions, and Assignment of Weight Capability and Facility Levels								
MODULE	BASIC (50%)		INTERMED. (30%)		ADVANCED (15%)		SOA (5%)	
	# of Qs	WEIGHT	# of Qs	WEIGHT	# of Qs	WEIGHT	# of Qs	WEIGHT
CHPS and clinics (n=68)	4	12.5%	7	4.3%	5	3.0%	1	5.0%
Health centers and polyclinics (67)	4	12.5%	7	4.3%	5	3.0%	1	5.0%
DHAs (35)	4	12.5%	7	4.3%	5	3.0%	1	5.0%
District hospitals (50)	4	12.5%	7	4.3%	5	3.0%	1	5.0%
Referral hospitals (14)	4	12.5%	10	3.0%	6	2.5%	2	2.5%
Warehouses (12)	4	12.5%	10	3.0%	6	2.5%	2	2.5%
MOH and GHS HQ (2)	10	5.0%	5	6.0%	3	5.0%	2	2.5%

Note that interpretations of the scoring, and discussions of “differences” in the scores need to recognize that the number of assessed capabilities differs by facility type and module. Thus, positive responses to individual questions (i.e., reports of present capabilities) carry different weights, depending on the technical area and facility type.

Note also that the number of questions and the question weighting for these modules vary because some conditionally scored questions are included. Figures presented here assume all conditions are met and all questions are included.

Cross-cutting Analysis

This report examines the pharmaceutical supply chain across the various technical/functional areas that inform and shape the way the supply chain operates. However, it is also important to notice trends across technical areas but within a certain tier of the health system. CMM scores are presented by facility type. Major takeaways from a cross-cutting perspective are:

- **Duplication of central-level entities:** One of the largest focus areas of the SCMP is the establishment of a Supply Chain Management Agency. This SCMA was envisioned to consolidate supply chain oversight, strategic planning, and operations. In the intervening years since the SCMP was published, no appreciable progress has been made in implementing this new agency. The lack of this agency's presence in the current supply chain landscape is felt in every corner of the system and will continue to hold back GOG as it attempts to improve the supply chain incrementally. The absence of this agency has caused consequences to materialize across the supply chain.
- **Temporary central medical stores:** Typically, in a centrally funded and managed health system, the central medical stores play an outsized role in organization, planning, and communication for the supply chain. Currently in Ghana, the TCMS is essentially playing a receiving, storage, and distribution role. Lack of an entity at the top of the supply chain to provide strategic leadership on supply chain operational functions is apparent and is causing reverberations through the entire health system. GOG must prioritize and expedite construction on its new CMS, as any material advances that it makes in improving the supply chain will be stymied and blocked by this issue.
- **Last-mile waste management and pharmacovigilance:** Waste management and pharmacovigilance capability scores are consistently low across all last-mile facilities. These last-mile entities, CHPS, clinics, health centers, and polyclinics did not score higher than 20 percent in the capability maturity module for either technical area. That means that few if any of even the most basic capabilities are in place for these facilities. As this is the first point of contact that most Ghanaians have with the health system, it is a significant gap that should be addressed in the next SCMP. The opportunity is compelling to implement foundational activities in both these technical areas in the next set of reform activities.

Exhibit I 14. Ministry of Health, CMM Scores for All Relevant Technical Areas

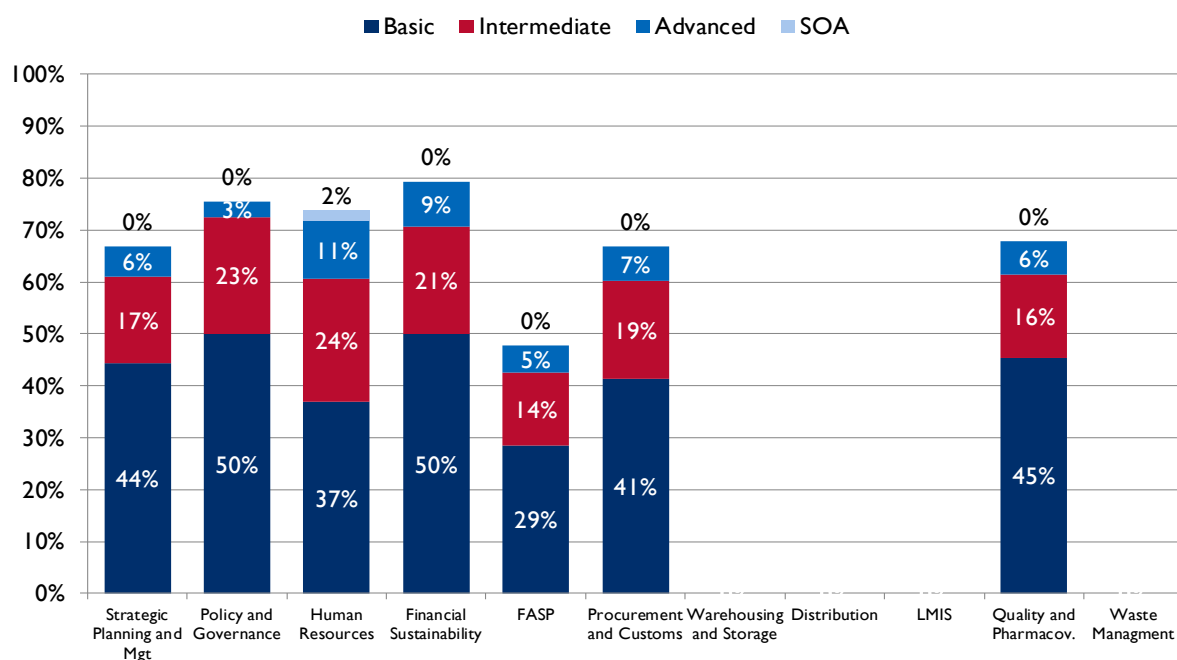
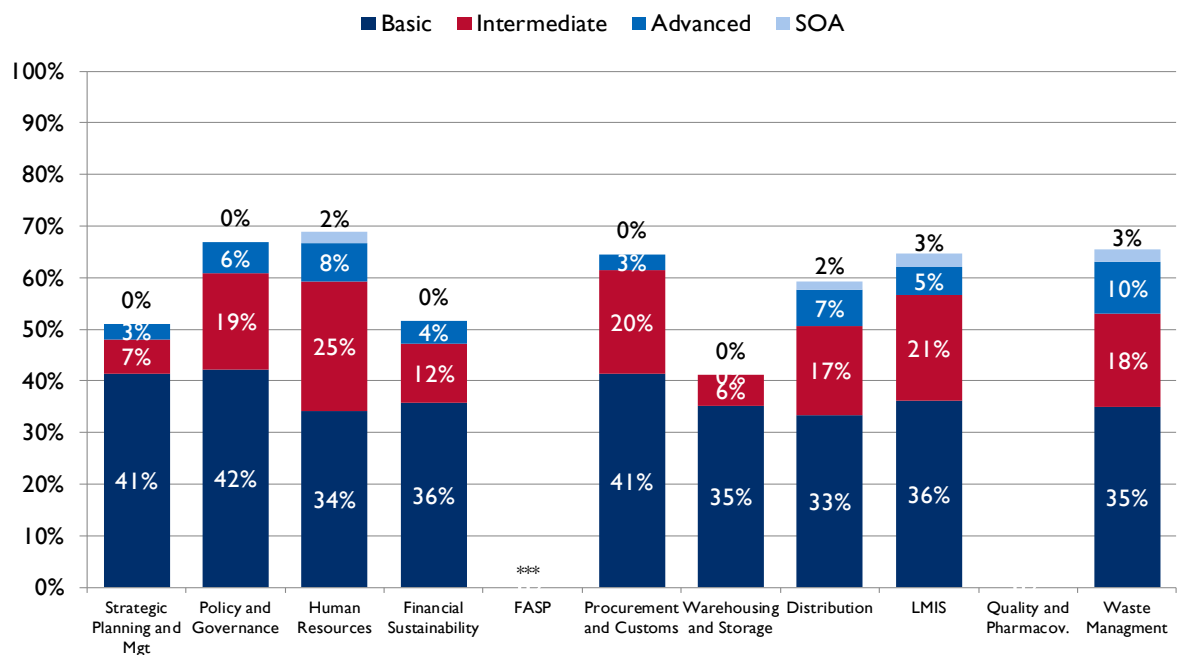


Exhibit I 15. Ghana Health Services HQ, CMM Scores for All Relevant Technical Areas



*** FASP activities are led by the program streams within GHS. Their capabilities were assessed individually by program area and are presented in the FASP section.

Exhibit I 16. Temporary Central Medical Store, CMM Scores for All Relevant Technical Areas

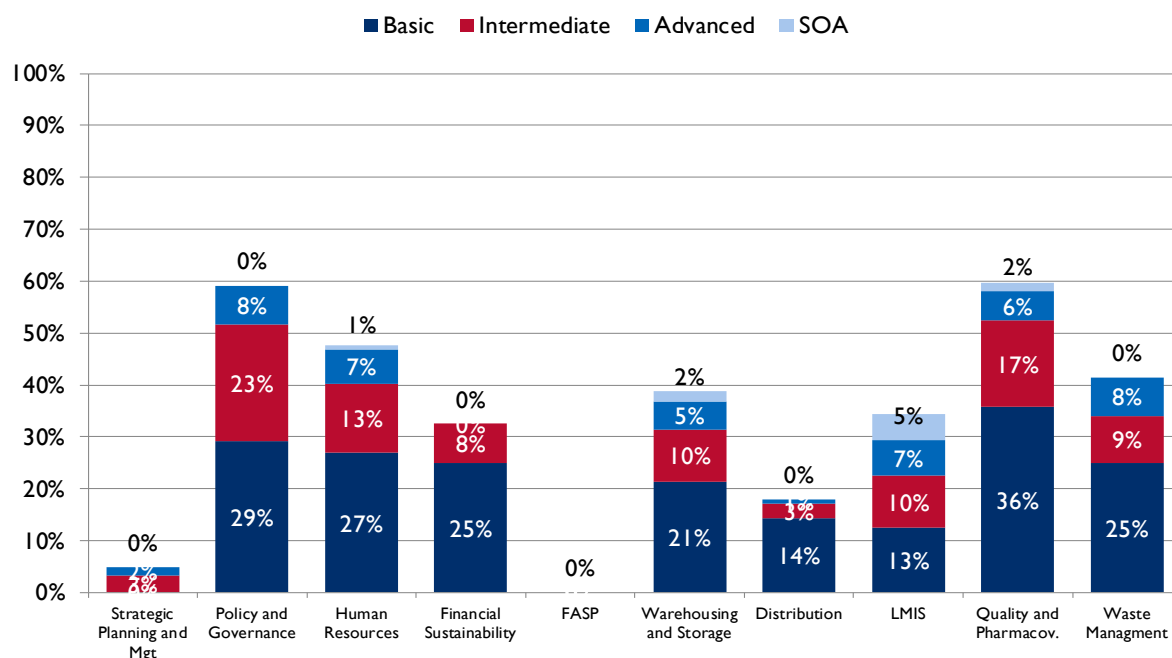


Exhibit I 17. Imperial Health Services, CMM Scores for All Relevant Technical Areas

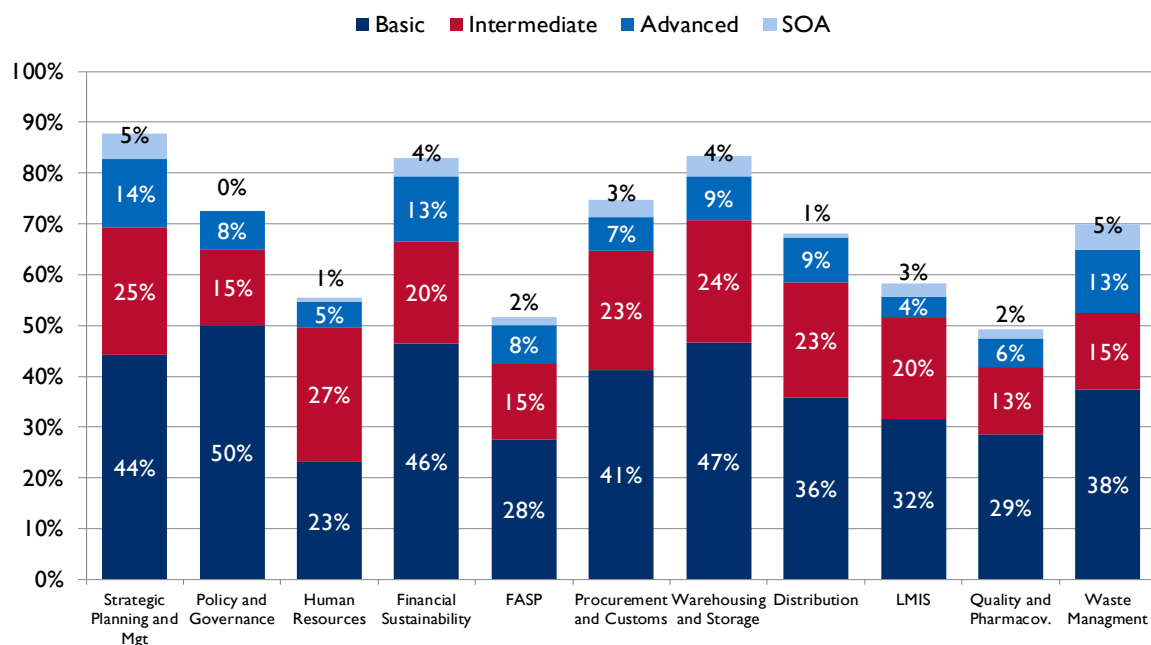


Exhibit 118. Regional Medical Stores, CMM Scores for All Relevant Technical Areas

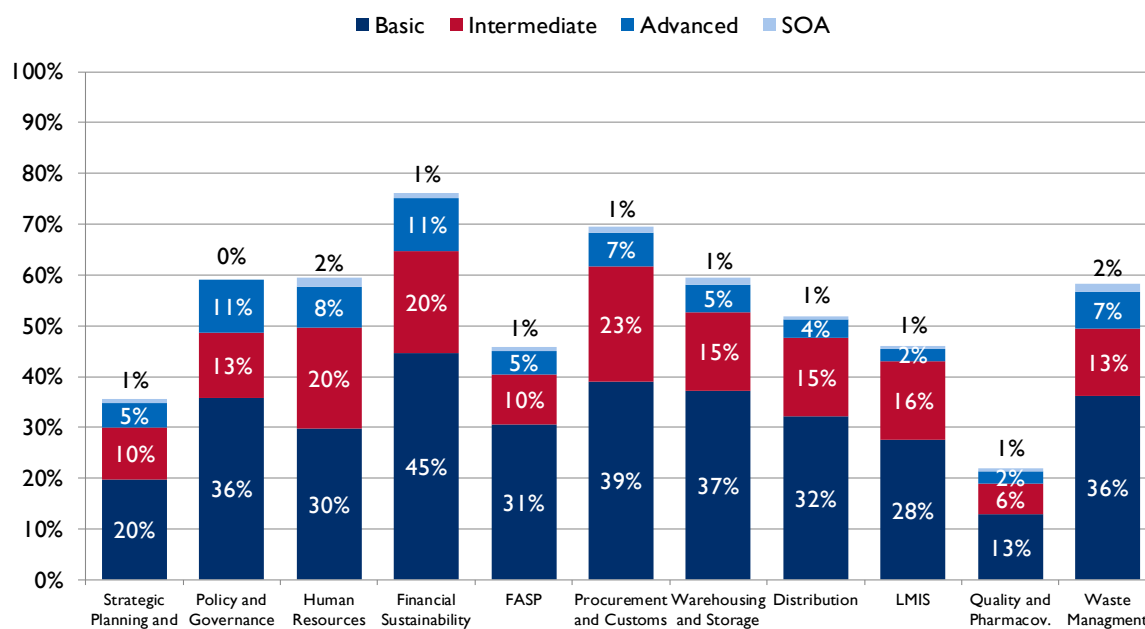


Exhibit 119. Teaching Hospitals, CMM Scores for All Relevant Technical Areas

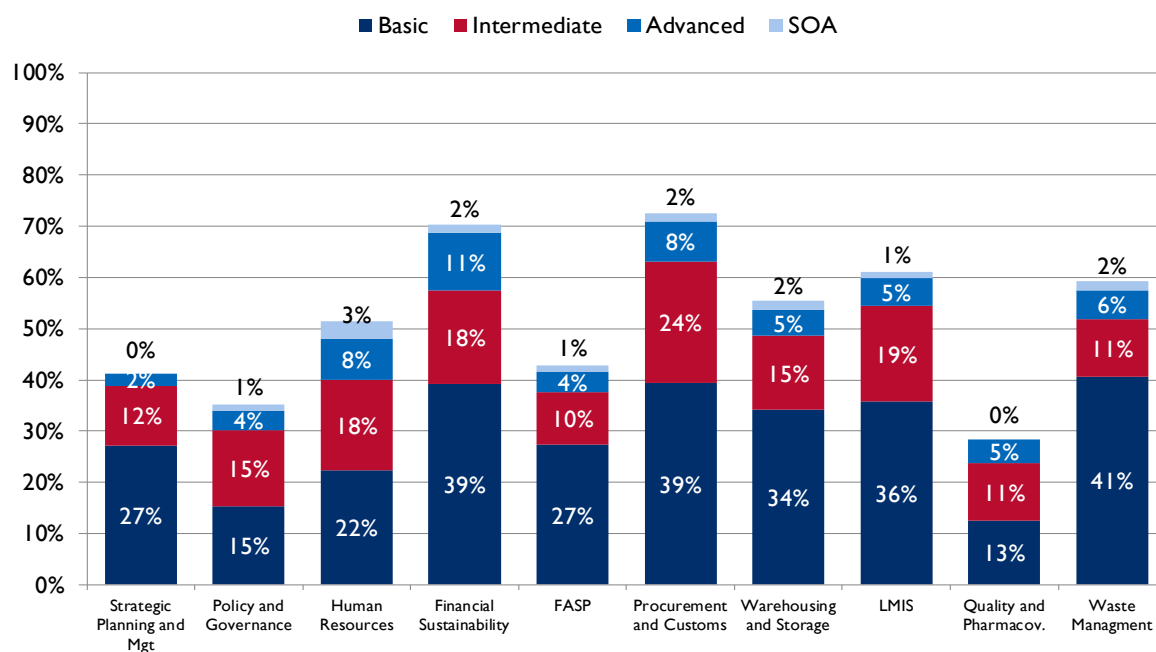


Exhibit 120. Regional Hospitals, CMM Scores for All Relevant Technical Areas

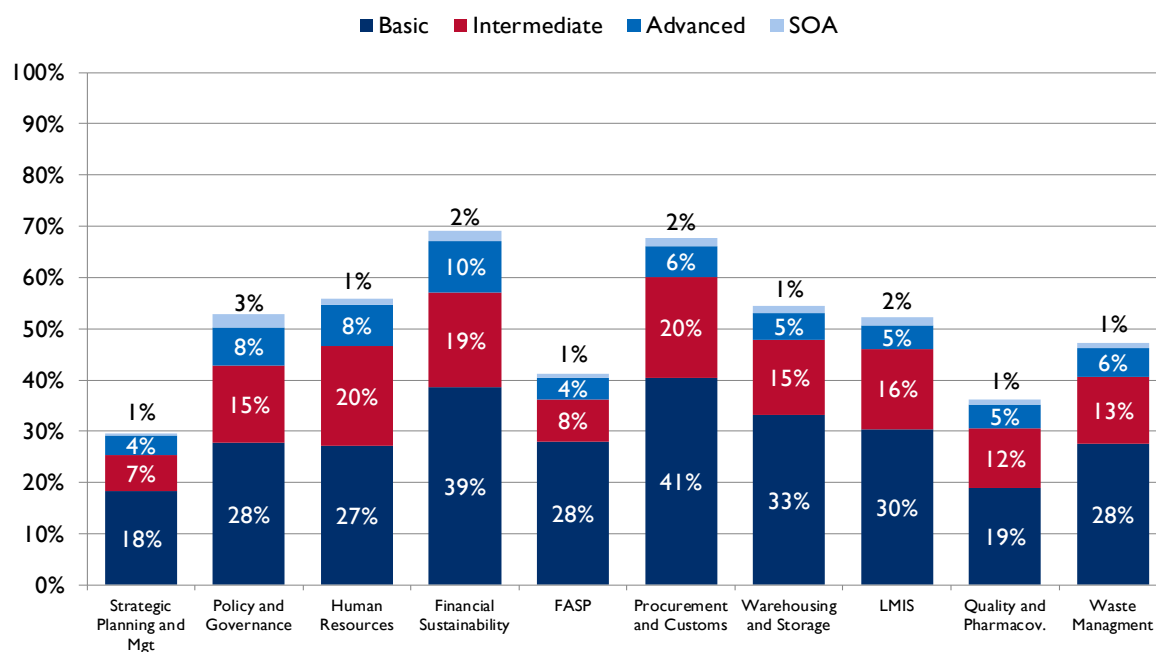


Exhibit 121. District Hospitals, CMM Scores for All Relevant Technical Areas

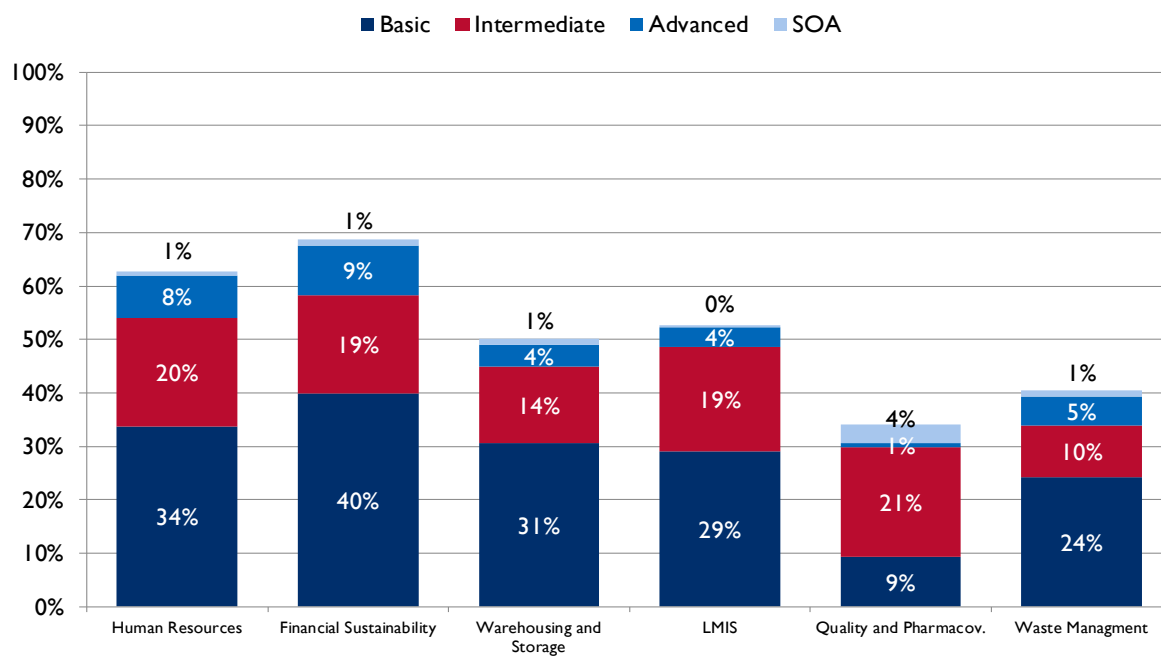


Exhibit 122. Health Centers and Polyclinics, CMM Scores for All Relevant Technical Areas*****

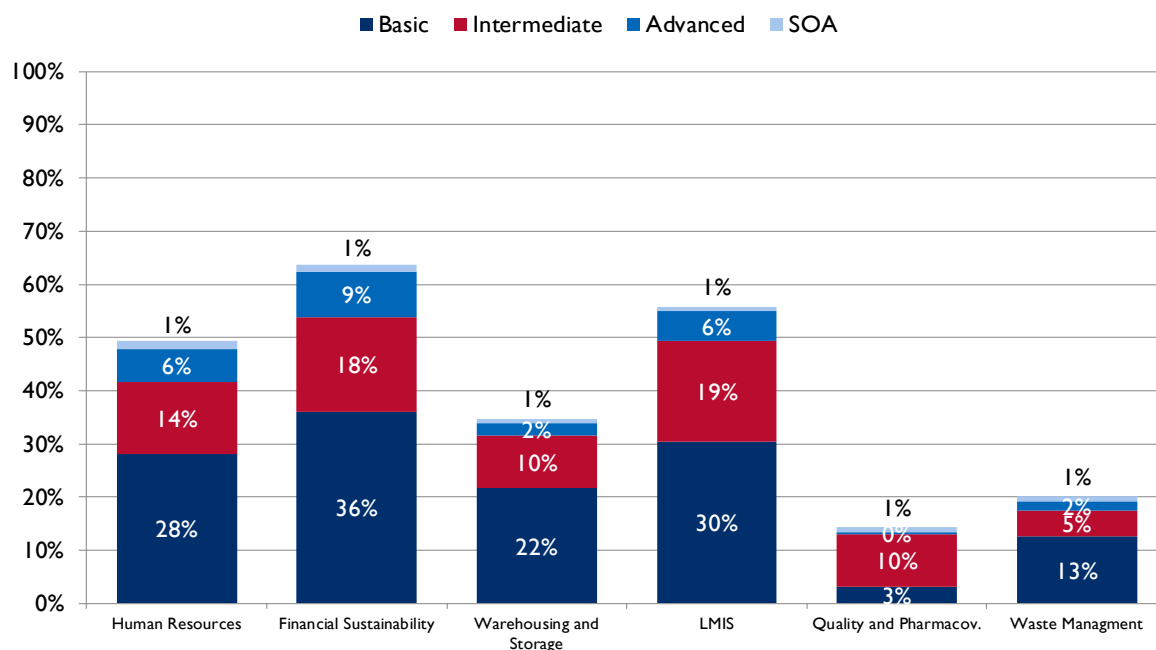


Exhibit 123. CHPS and Clinics, CMM Scores for All Relevant Technical Areas***

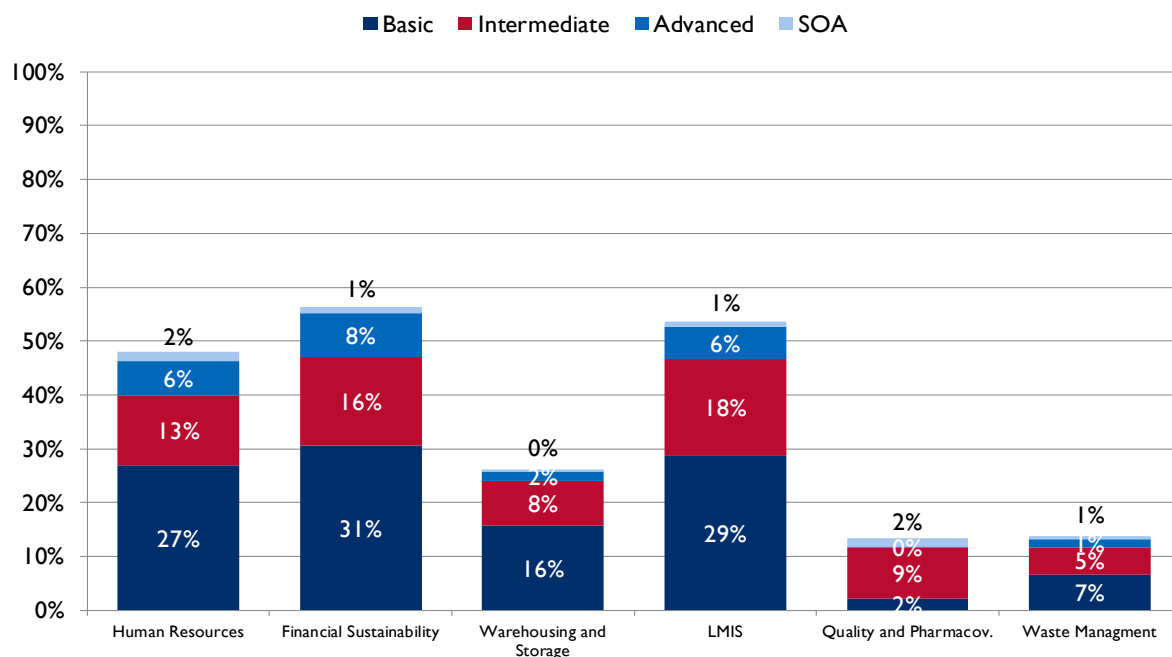
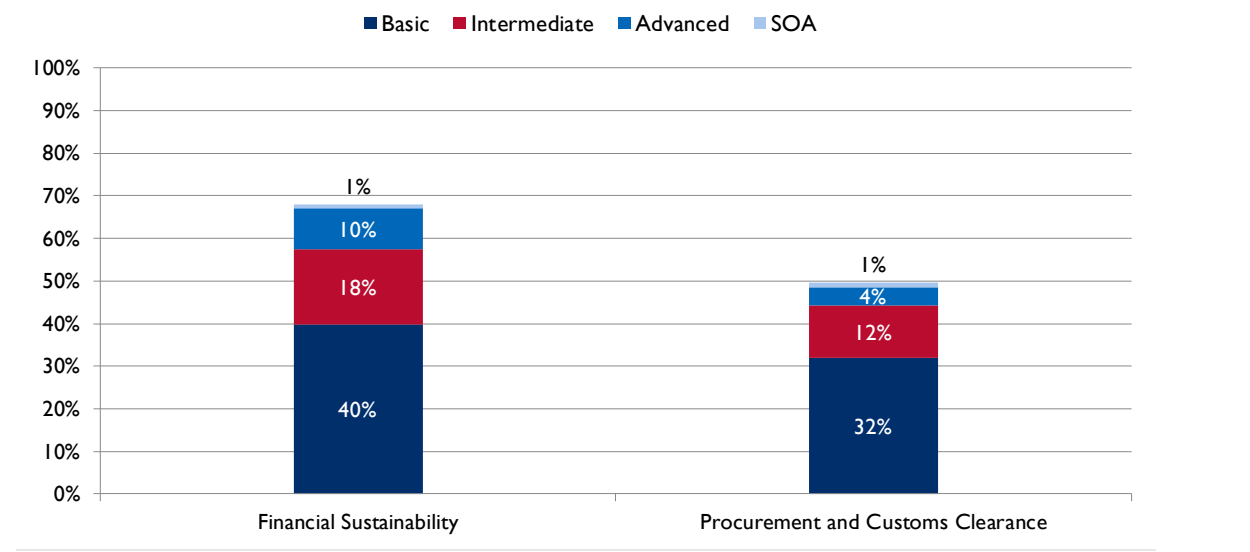


Exhibit 124. District Health Administrations, CMM Scores for All Relevant Technical Areas



Consolidated Recommendations

NSCA methodology produces targeted, actionable recommendations across the entire supply chain. To facilitate coordinated planning and action, select recommendations from across the report are consolidated here, by technical area. In updating and revising the 2020 Supply Chain Master Plan, one overarching recommendation is for leadership to prioritize specific actions more aggressively. Actions to improve the supply chain can be prioritized in three ways:

1. Low-cost/high-yield priorities, or relatively small interventions that can be achieved with minimal investment in financial or human resources
2. Time-order priorities, or actions that need to be prioritized because of sequencing effects, i.e., other future improvements depend upon them
3. Prevailing priorities, or actions that are deemed important to implement for pressing ethical or efficiency reasons, independent of time or ease of intervention

To model how Ghana might consider prioritizing supply chain interventions and reforms, we select below two recommendations per technical area that the NSCA assessment team further emphasizes as crucial for improving the country's supply chain. The reason for our selection is provided in brackets after the recommendation, according to the categorizations above. Rather than being a finalized list, these examples are meant to serve as a guide—and a stimulus for a critical and inclusive exercise in prioritization by the MOH, GHS, and GOG. Additional targeted recommendations are found at the end of each technical section in this report.

To ensure that workstreams remain on track for implementing the national strategic pharmaceutical supply chain plan, the GOG should consider prioritizing the following recommendations:

Strategic Management and Planning

- Continue to consider creating the SCMA, or a similar body, to centralize and simplify supply chain authority and responsibilities. Alternatively, confirm, ensure, and clarify the division of all supply chain functional roles and responsibilities among MOH, GHS, and other entities within the current system. [Prevailing priority]
- Increase practice of supply chain strategic planning and implementation monitoring, at central and regional levels, including TCMS and lower-level entities as well. Consider using IHS as a model for best practices. [Low-cost/high-yield]
- Clarify the appropriate role for the private sector within the public sector supply chain. [Prevailing priority]
- Formalize the practice of assessing supply chain risks at central and regional levels. [Low-cost/high-yield]

Policy and Governance

- Update NEML and STGs annually to ensure relevance and usefulness, as recommended by 2015 SCMP. [Prevailing priority]
- Ensure awareness and availability of extant national policies at all levels. Perhaps include checks for physical copies of policies, guidelines, and SOPs in supportive supervision visits. [Low-cost/high-yield]

- Ensure adherence to NSML and STGs in procurement and prescribing practices. [Prevailing priority]
- Develop and implement guidelines for sanctioning procurers within the system and for noncompliant vendors, including adherence to the certificates of non-availability process. [Time-order priority]
- Explore use of regulatory mechanisms to manage prices for health commodities. [Prevailing priority]
- Ensure sustained enhancement of FDA's capacity (technical and financial) to test medicines. [Prevailing priority]
- Ensure all procurement entities monitor vendor performance as part of contract management. [Prevailing priority]
- Ensure that Procurement and Supply Directorate (MOH) and Supplies, Stores, and Drug Management (GHS) as well as entity tender committees are fully empowered to monitor procurement practices at all levels of the supply chain. [Prevailing priority]

Human Resources

- Incorporate supply chain functions into formal job descriptions at all levels, ensuring that responsibilities for all basic supply chain functions are designated to at least one site personnel. [Time-order priority]
- Harmonize supportive supervision exercises with revised supply chain job description roles and responsibilities, ensuring staff are evaluated on supply chain functions and supported with training and monitoring feedback. [Time-order priority]
- Prioritize addressing personnel shortage of public health supply chain personnel as related but distinct from broader public health professional shortage. Consider divorcing supply chain qualifications from pharmaceutical qualifications. [Prevailing priority]
- Revisit staffing norms—checking quantitative assumptions and considering reasonableness in current funding and human resource context—to ensure relevance and usefulness as a guide. [Low-cost/high-yield]
- Continue to experiment with national policies that address geographic disparities in recruitment and retention of public health and supply chain professionals. [Prevailing priority]

Financial Sustainability

- Prioritize a national effort whereby outstanding debts will be settled/negotiated/written off, and future payment deadlines and mechanisms will be established and enforced by the MOH. [Critical prevailing priority] *****
- Ensure the financial sustainability of the NHIA and the viability of revolving funds at all levels by formal and continuous coordination among MOH, GHS, NHIA, partners, and other stakeholders. [Prevailing priority]
- Standardize fiscal support provided by DHAs to SDPs, including transparent fiscal accounting practices. [Low-cost/high-yield]

- Ensure that basic financial management best practices—annual budgets and standard inclusion of miscellaneous funds for unexpected expenses—are universally used and that supply chain costs are explicitly included in them. [Low-cost/high-yield]

Forecasting and Supply Planning

- Standardize policies and procedures for forecasting and supply planning, across programmatic areas and facility levels. GOG needs to produce guidance to all facilities conducting FASP activities to ensure consistency, quality, and comparability across forecasts. [Prevailing priority]
- Consider again the 2015 vision of a singular entity that provides standardized guidance across all health programs. Low-cost, high-value improvements can be reaped by using high-capability, high-performance entities as a standard across the government to strengthen a key component of the logistics cycle. [Prevailing priority]
- Institutionalize annual measurement of forecast accuracy and supply planning accuracy and ensure that feedback is incorporated into subsequent activities. This should be incorporated into GOG efforts to standardize FASP practices, policies, and procedures across the health system. [Low-cost/high-yield]
- Increase GOG annual funding for FASP activities to ensure long-term sustainability. [Prevailing priority]

Procurement and Customs Clearance

- Resolve discrepancies in procurement governance. The duplication of procurement authority continues to exist between MOH and GHS. With the SCMA never materializing, the symptoms of dysfunction that exist from duplication are ever present in the supply chain. [Prevailing priority]
- Ensure that SOPs are fully disseminated to all entities that are allowed to procure. Standardized guidance should be ubiquitous throughout the distributed procurement system. [Low-cost/high-yield]
- Roll out an integrated electronic procurement system to address lack of transparency in procurement processes across the system. Institutionalize collecting information to draw insights on vendor performance, private market pricing, and other factors for any systemic improvements and thoughtful policy enhancements. [Prevailing priority]
- Clarify path for procurement oversight—either within PPA or MOH—with clear roles and responsibilities at all levels. Also, clarify penalties for failure to comply with procurement policies and procedures, empowering oversight actors to enforce them. [Prevailing priority]
- The MOH in collaboration with the PPA must issue guidelines that prohibit facilities and other entities to procure beyond prices quoted through framework contracting to address the high degree of price variability across the system. [Prevailing priority]

Warehousing and Storage

- Expedite the decision-making process for finalizing plans for the new central medical stores. Without this key institution in place, the rest of the system cannot function at the optimal level. [Prevailing priority]
- Address outstanding gaps in warehousing capabilities and performance at the regional medical stores. [Prevailing priority]
- Ensure full dissemination and consistent application of inventory management practices. Inventory management SOPs need to be distributed to all facilities in the country and paired with refresher trainings. [Low-cost/high-yield]
- Ensure adequate specialized storage for cold chain, quarantine, hazardous, and controlled substances in facilities across Ghana. Procurement and installation of cold chain equipment at last-mile facilities should also be prioritized. [Prevailing priority]

Distribution

- High levels of indebtedness across the system are causing the RMSs to be unable to stock adequately. The RMSs are adjusting almost nine of every 10 orders they receive with only 30 percent of orders delivered in full, as guided by their policy for how to supply SDPs that are indebted for commodities. A stronger level of coordination is needed between the RMSs and those monitoring supply plans to ensure that the RMSs have timely and sufficient supply of commodities to fulfill requisitions from service delivery points. [Prevailing priority]
- Also, stronger coordination is needed between high-level supply chain actors and NHIA to ensure prompt reimbursements to service delivery points and subsequently prompt reimbursement to RMSs by SDPs. Prolonged delays in reimbursement across tiers will result in sustained stockouts at the RMSs and SDPs with attendant dire consequences for health care delivery in the country. [Prevailing priority]
- Collect and use distribution cost data to improve the direct delivery system that is in place now. [Time-order priority]
- Once cost data are systematically captured, cost-related KPIs must be used to shape RMS distribution strategies moving forward to ensure their sustainability. [Time-order priority]

Logistics Management Information System

- GOG must distribute SOPs, stock cards, and any other necessary LMIS-related tools to all facilities within the health system. Process inputs, SOPs, and tools are a foundational requirement for a strong LMIS system. [Low-cost/high-yield]
- LMIS responsibilities need to be formalized in job descriptions for all supply chain staff, especially at the last mile. The ability to coach staff into stronger performance starts by helping them understand their accountability. [Low-cost/high-yield]
- A concerted push, at all system levels, is needed to develop a culture of data quality. Significant improvement is needed on the quality of paper in the paper and electronic LMIS systems. The country cannot reap the benefits of using data for decision making if there is no confidence in the data being used. [Prevailing priority]

Quality and Pharmacovigilance

- The MOH and GHS should print and distribute all necessary pharmacovigilance tools to facilities across the country. The pharmacovigilance system cannot function without the widespread availability of SOPs, reporting tools, and prepared staff. [Low-cost/high-yield]
- The presence of tools is only one part of the system. This distribution of materials should be paired with a cascading training program to ensure staff understand how and when to use PV tools. [Prevailing priority]
- Before tools are disseminated and trainings are implemented, MOH and GHS should review all PV SOPs, reporting tools, and job aids to ensure that the information is accurate, appropriate, and up to date. [Time-order priority]

Waste Management

- Focus on fully disseminating extant waste management policies, guidelines, and SOPs throughout the system, perhaps through inclusion into supervisory support systems. [Low-cost/high-yield]
- Commission an assessment of waste disposal infrastructure, to determine efficiency and efficacy of current mix of waste disposal means. [Low-cost/high-yield]
- Investigate whether inconsistent separation of usable and unusable pharmaceutical waste is the result of unfamiliarity with best practices or insufficient storage space and respond accordingly (increasing dissemination efforts or expanding storage spaces). [Low-cost/high-yield]
- Ensure waste management is fully incorporated into LMIS to inform efficient reverse logistics practices in disposing of pharmaceutical waste. [Prevailing priority]

Conclusions

The 2015 Supply Chain Master Plan systematically identified challenges within Ghana's public health supply chain, outlined objectives for the future, and proposed numerous interventions toward that end. This 2019 NSCA demonstrates that some progress has been made on specific activities but others have failed to be implemented (most notably, perhaps, the decision not to create a centralized agency or authority to manage the supply chain). Overall, the NSCA established the presence, or absence, of key capabilities across technical areas and at all facility levels and collected key performance indicators. The balance of capabilities and performance points to opportunities for investment, reform, and intervention, as outlined in the respective sections above. In several instances, the original recommendations from the 2015 SCMP remain pertinent, underscored by updated data on the current situation of Ghana's public health supply chain system. A key task of the coming 2020 supply chain master plan will be reconsidering priorities outlined in 2015 in light of the current supply chain capabilities and performance and, crucially, in the context of contemporary leadership, priorities, and political realities. The goal is to create a new list of priority reforms and interventions to better ensure the availability of quality health commodities into the future.

A few overarching takeaways about the current state and priorities for future consideration stand out from the assessment as a whole:

SCMA. One of the largest focus areas of the 2015 SCMP was establishing a Supply Chain Management Agency. This SCMA was intended to consolidate supply chain oversight, strategic planning, and operations. In the intervening years since the SCMP was published, no appreciable progress has been made in creating this new agency. The lack of this agency's presence in the current supply chain landscape is felt in every corner of the system and may continue to stymie efforts to systematically reform—as opposed to incrementally improve—the country's public health supply chain. That said, a centralized supply chain agency or a similar body is only one option for ensuring a strategic, comprehensive, and effective approach to governing, managing, and reforming the public health supply chain. In all cases, however, an overarching priority remains ensuring that all necessary supply chain functions are covered; that extant entities are sufficiently empowered; and that the respective roles, responsibilities, and relationships among actors are clearly and universally understood.

MOH and GHS. Complementary or redundant strategic planning capabilities? Absent the proposed SCMA, the MOH and GHS share strategic planning and management responsibilities within the Ghanaian supply chain system. Individually, both approach but fall short of the NSCA's recommended capability maturity scores in several key central-level technical areas, including strategic planning and management, policy and governance, financial sustainability, and procurement. An unresolved challenge remains understanding the extent to which MOH and GHS scores are complementary and additive, or duplicative and potentially redundant. While this remains essentially a political decision, the NSCA helps to illustrate the extent to which both entities retain important yet individually insufficient capabilities to independently and fully execute the core supply chain activities assessed.

Leveraging of extant national policies, guidelines, and SOPs. The NSCA finds that Ghana's public health supply chain benefits from a plethora of existing systems and strategic-level plans and guidance for the overall health system, pharmaceutical sector, and supply chain management specifically (e.g., NEML and STGs; the Supply Chain Master Plan; activity-specific policies, guidelines,

and SOPs; program- and facility-level forecasts, supply plans, implementation plans). This is a valuable starting point for improving system capabilities and performance. Important next steps, however, include ensuring full dissemination, implementation, and enforcement—which, in turn, require investing in capacity training, providing sufficient resources for implementation, and constructing effective monitoring systems. This is required to unlock improved performance from the accumulation of latent capabilities.

Procurement practices and reimbursement rates. An overwhelming priority remains resolving the highly disaggregated procurement process and, relatedly, the problematic reimbursement rates to facilities. The NSCA results add to those of previous assessments in identifying reliable and sufficient funding as a crucial bottleneck in the current supply chain system, with problematic and significant downstream implications for the availability of health commodities. Importantly, key capabilities of sustainable financial management and responsible procurement exist at multiple levels throughout the system. Without sufficient funding, however, capabilities do not translate to high performance. Resolving outstanding debts and reforming funding streams are essential for ensuring a strong supply chain into the future.

Information systems. Currently, the logistics and information systems in Ghana remain complex and duplicative. The 2015 SCMP identified modernizing and updating information systems and processes, specifically through LMIS design, as one of seven key supply chain thematic areas of focus. Some programs have had more success (e.g., FP/RH with district health information management system) than others and, overall, the key next step is integrating existing systems and increasing visibility at all levels. The country is currently rolling out a new, dedicated LMIS system at higher levels of the system (GhiLMIS). This NSCA, then, can play the role of a baseline for an integrated LMIS system, pointing to the need for it and the requirement to invest significantly in training, full implementation, and further expansion.

TCMS. Typically, in a centrally funded and managed health system, the central medical stores play an outsized role in organization, planning, and communication for the supply chain. Currently in Ghana, the TCMS is essentially playing a receiving, storage, and distribution role. The lack of an entity at the top of the supply chain to provide strategic leadership on supply chain operational functions is apparent, with reverberations around the entire health system (e.g., the mixed success of decentralized procurement). GOG must prioritize and expedite construction on its new CMS, as any material advances that it makes in improving its supply chain will be stymied and blocked by this issue.

Supply chain HR shortages. Significant supply chain-specific training opportunities exist in Ghana—including classroom training, structured on-the-training, e-learning and certificate programs, and collegiate programs in the supply chain. However, these HR capabilities have yet to translate into positive performance in adequately and appropriately staffing supply chain functions throughout the health sector. While facilities generally reported low turnover ratios for supply chain personnel, the percentage of supply chain positions vacant is alarmingly high. A contributing factor may be the failure to universally prioritize and formally ensure that key supply chain functions are considered in staffing decisions at all levels. Storage and inventory management, for example, is formally included in the job descriptions of at least one site personnel in 75 percent or more of hospitals and regional medical stores; however, only 6 percent of CHPS and clinics and 85 percent of health centers and polyclinics reported the same. Exclusion of supply chain functions from formal job descriptions risks them being deprioritized in daily operations. Simultaneously, in the context of widespread personnel shortages throughout Ghana's public health system, one option is to consider decoupling supply chain qualifications from pharmaceutical qualifications and to recognize the supply chain as a

distinct and valuable professional field within public health. A supply chain professional with a pharmaceutical background is certainly advantageous—especially when medicines are being managed in the warehouse—but it may not necessarily be required. Divorcing the qualifications may reduce the competition for pharmaceutical professionals (currently being recruited away from pharmaceutical-specific positions into supply chain ones) and increase the pool of personnel (to include both pharmaceutical and supply chain experts), addressing the widespread personnel shortages.

Last-mile quality assurance, pharmacovigilance, and waste management. Waste management and pharmacovigilance capability scores are consistently low across all last-mile facilities—from CHPS to district hospitals—meaning that few basic capabilities are consistently in place for these facilities. This vulnerability within the public health system exposes the country to the risk that poor-quality, unusable, and expired commodities remain in the distribution system. Reports of higher capabilities at higher-level facilities suggest that protocols and best practices exist in the system but have yet to be fully disseminated (including providing sufficient funding and training), pointing to an opportunity for high-impact intervention at a relatively low cost.

The authors of this report are confident that with strong leadership, strategic investment of financial and human resources, and proper empowerment of key stakeholders, Ghana can implement appropriate reforms to further advance the capabilities and performance of its public health supply chain.