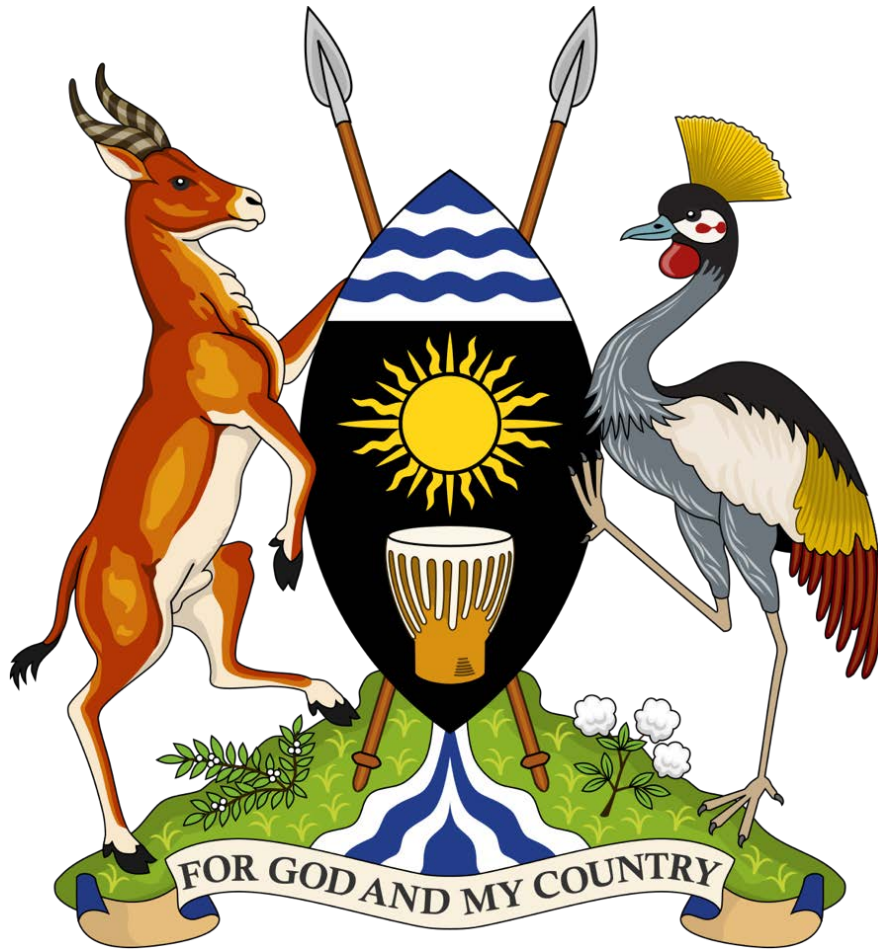




Uganda National Supply Chain Assessment

Capability and Performance

AUGUST 2018



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The USAID Global Health Supply Chain Program-Procurement and Supply Management (GHSC-PSM) project is funded under USAID Contract No. AID-OAA-I-15-0004. GHSC-PSM connects technical solutions and proven commercial processes to promote efficient and cost-effective health supply chains worldwide. Our goal is to ensure uninterrupted supplies of health commodities to save lives and create a healthier future for all. The project purchases and delivers health commodities, offers comprehensive technical assistance to strengthen national supply chain systems, and provides global supply chain leadership.

GHSC-PSM is implemented by Chemonics International, in collaboration with Arbola Inc., Axios International Inc., IDA Foundation, IBM, IntraHealth International, Kuehne + Nagel Inc., McKinsey & Company, Panagora Group, Population Services International, SGS Nederland B.V., and University Research Co., LLC. To learn more, visit ghsupplychain.org

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The views expressed in this publication do not necessarily reflect the views of the U.S. Agency for International Development or the U.S. government.

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About the Program Under Which the Assessment Is Organized

Support for this assessment was provided through the umbrella GHSC-PSM project, Contract Number: AID-OAA-I-15-0004, which brings a new approach to achieving the agency's global health priorities aiming to reach millions more people through increased efficiencies and cost savings. By incorporating lessons learned over the last decade of global health supply chain management, GHSC-PSM consolidates the agency's primary supply purchasing and distribution activities across the health sector, creating one streamlined supply chain.

At the request of Uganda's MOH, USAID and The Global Fund committed to supporting a comprehensive assessment of the public national supply chain system using the updated NSCA 2.0 toolkit. USAID designated GHSC-PSM to provide support to the Uganda NSCA in implementing the assessment, data analysis, and production of the final report as part of the above-mentioned task order. This report presents the methodology and findings of the assessment, which was carried out in Uganda in May 2018.

About GHSC-PSM

By bringing together advanced technical solutions, a team of highly qualified experts, and proven commercial processes and principles, GHSC-PSM works to reduce costs and increase efficiencies in global and national supply chains. The project directly support the U.S. President's Emergency Plan for AIDS Relief, the President's Malaria Initiative, and USAID's newborn and child health, maternal health, and

population and reproductive health programs to ensure uninterrupted supplies of health commodities to save lives and create a brighter future for families around the world. Working across Africa, Asia, Central America, and the Caribbean, GHSC-PSM operates in some of the world's most challenging environments, navigating complex issues such as poor infrastructure, inefficient bureaucracies, political and financial crises, and natural disasters to ensure that lifesaving health supplies reach those most in need. For more information, visit: <https://www.ghsupplychain.org/home>.

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Acronyms

ACT	artemisinin-based combination therapy
ADE	adverse drug event
ADR	adverse drug reaction
AIDS	acquired immunodeficiency syndrome
CMM	Capability Maturity Model
DHO	district health office
DQA	data quality assessment
eLMIS	electronic logistics management information system
EML	Essential Medicines List
EMHS	Essential Medicines and Health Supplies
FASP	forecasting and supply planning
FEFO	first expired, first out
The Global Fund	Global Fund to Fight AIDS, Tuberculosis and Malaria
GH	general hospital
GHSC-PSM	Global Health Supply Chain Program-Procurement and Supply Management
HC	health center
HIV	human immunodeficiency virus
HR	human resources
JMS	Joint Medical Stores
KPI	key performance indicator
LMIS	logistics management information system
MAUL	Medical Access Uganda Limited
MOSOH	months of stock on hand
M&E	monitoring and evaluation
MOLG	Ministry of Local Government
NDA	National Drug Authority
NEML	National Essential Medicines List
NMS	National Medical Stores
NPSSP	National Pharmaceutical Sector Strategic Plan
NSCA	National Supply Chain Assessment
OTD	on-time delivery
OTIF	on-time-in-full-delivery
PFP	private for-profit
PHSC	public health supply chain
PNFP	private not-for-profit
PV	pharmacovigilance
QPV	quality and pharmacovigilance
RDT	rapid diagnostic test
RFID	radio frequency identification
RHZE	rifampicin/INH/pyrazinamide/ethambutol

RMNCAH	Reproductive, Maternal, Newborn, Child and Adolescent Health
RRH	regional referral hospital
RTK	rapid test kit
SATP	stocked according to plan
SC	supply chain
SCM	supply chain management
SDP	service delivery point
SOA	state of the art
SOP	standard operating procedure
SOW	scope of work
STG	standard treatment guideline
TB	tuberculosis
TLE	tenofovir-lamivudine-efavirenz
UCMB	Uganda Catholic Medical Bureau
UHMG	Uganda Health Marketing Group
UHSC	Uganda Health Supply Chain
UMPP	unusable medical pharmaceutical Product
UPMB	Uganda Protestant Medical Bureau
USAID	United States Agency for International Development
USD	U.S. dollars
WMS	warehouse management system

Executive Summary

The Ministry of Health (MOH), in collaboration with the U.S. Agency for International Development (USAID), the Global Fund to Fight AIDS, Tuberculosis and Malaria (The Global Fund), the USAID Global Health Supply Chain-Procurement and Supply Management (GHSC-PSM) project, and the USAID Uganda Health Supply Chain activity, implemented by Management Sciences for Health, conducted fieldwork in Uganda for the National Supply Chain Assessment (NSCA 2.0) from May 7 to 25, 2018. The NSCA 2.0 toolkit collects information through three primary elements: supply chain system mapping, Capability Maturity Model (CMM) covering 11 functional areas (see Exhibit 1), and current performance based on 22 key performance indicators (KPIs).

Exhibit 1. NSCA 2.0 CMM functional areas

CMM functional areas
Forecasting and Supply Management
Procurement
Pharmacy and Stores Management
Distribution
Policy and Governance
Strategic Planning and Management
Quality and Pharmacovigilance
Logistics Management Information Systems
Human Resources
Financial Sustainability
Waste Management

USAID and The Global Fund jointly funded this NSCA. The assessment focused only on the Uganda health sector supply chain that is directly financed through the Government of Uganda (GOU) or public sector funding. In other words, the Uganda NSCA focused only on the public sector — National Medical Store (NMS) and sites supplied by NMS — as well as the 534 private not-for-profit (PNFP) sites supplied by Joint Medical Stores (JMS) through the essential medicines and health supplies credit line. At the PNFP sites, the USAID-procured commodities were also included in the assessment. Results identified challenges and opportunities to support Uganda’s health goals in the coming years. For instance, the MOH continues to receive significant funding from development partners, particularly with the cost of commodities.

KPI results and capability maturity scores indicated that many of the key capabilities needed for a high-performing health supply chain exist in Uganda. Strong forecasting and inventory management capabilities are found at GOU central-level entities, two critically important functions for an effective and agile supply chain. However, strong performance is not consistently achieved throughout the system. In several areas, capabilities were assessed as meeting a more mature (intermediate) level, while necessary basic capabilities remain absent. Increasing the basic capabilities could mean that facilities or functions can progress rapidly

to an intermediate rating. Capabilities and KPIs at the central-level warehouses and hospitals generally scored higher than at the health center (HC) level (for this assessment, HCs II–IV analyses are combined).

In the six months before the assessment, more than 90 percent of HCs and hospitals reported stockouts of one or more tracer commodities across the system. In 15 percent of HCs sampled, the primary first-line antiretroviral tenofovir-lamivudine-efavirenz (TLE) was stocked out on the day of the assessor's visit. None of the general hospitals (GHs) or regional referral hospitals (RRHs) were stocked out of TLE on the day of the assessor's visit. Also, 15 percent showed a stockout of the first-line malaria medicine artemisinin-based combination therapy (artemether-lumefantrine 6x4 presentation). Adherence to supply plans and results for the stocked according to plan (SATP) and stockcard accuracy KPIs were low at all HC facilities (only 25 percent of health facilities nationwide were SATP), which can contribute to higher stockout levels. NMS and JMS had stock (i.e., no stockouts) of all tracer commodities on the day of the visit. However, both central warehouses showed wide variations in stock on hand against established acceptable thresholds.

Insufficient levels of human resources to perform routine supply chain functions were observed throughout the health system. The need is clear to increase the number of supply chain staff at all system levels, particularly at hospitals and health centers. For example, general hospitals (GHs) were found to have a 55 percent vacancy rate for supply chain–related positions. This limits these facilities from adequately performing necessary supply chain activities. Currently, only 27 percent of GHs are performing internal data quality assessments of their stock management records. Hiring more staff along with using task-shifting strategies can help to rebalance the workload throughout the supply chain. A culture of improvement is apparent, as 81 percent of all HCs received supportive supervision visits last year — a clear effort from central-level participants to support and help improve service delivery points (SDPs).

High levels of LMIS record accuracy were scarce throughout the lower levels of the system. Only one-third of HCs nationally have 100 percent accurate LMIS records. Also, RRHs were found to have significant deviations between stock on hand and recorded values in the LMIS. With the insufficient levels of staff discovered throughout the supply chain, low accuracy rates are understandable. Not having enough staff can make LMIS record entry time consuming and burdensome. Capability maturity score averages ranged between 34 percent and 63 percent across all entities in the country, well below the optimal benchmark of 80 percent. Additional training and supportive supervision at facilities nationwide will be needed to help strengthen record entry and reporting practices.

Established health-care waste management policies were limited throughout the system, including at the central and policymaking levels. The MOH needs to empower an entity to be responsible for waste management practice to bring about systemwide changes. This limited presence of policies and a leading actor was reflected in the low CMM scores recorded for waste management at many sites. While reported wastage levels were relatively low throughout the system across many tracer products, large quantities of a wasted first-line tuberculosis drug were found at many SDPs. Sensitizing and training staff to properly handle this disposal will be a key learning step in solidifying the country's waste management practices.

The public sector supply chain system is committed to serving the people of Uganda and operating a well-functioning supply chain. Through analysis of CMM and KPI data, this NSCA report suggests potential opportunities for strengthening the logistics management information system, waste management, pharmacovigilance, and service at RRHs and HCs. With thoughtful planning and sustained commitment, Uganda will continue its upward trajectory toward a dynamic and efficient public health supply chain.

Background

In 2015, Uganda had an estimated population of 39 million with an annual population growth rate of 3.0 percent.¹ By 2020, the population is projected to reach 42.4 million.²

The Government of Uganda (GOU), through the Ministry of Health (MOH), has made progress toward ensuring access to affordable quality medicines for Ugandans. The 2015 National Medicine Policy and the National Pharmaceutical Sector Strategic Plan 2015–2020 (NPSSP III) focus on key health issues, including regulation and legislation, supply chain, medicine use, financing, and pricing under the consideration of the overall national development agenda.³ According to the NPSSP III, the Ugandan pharmaceutical sector includes public and private participants. The private sector includes private not-for-profit (PNFP) and private for-profit (PFP) sites. PFP participants are concentrated in urban centers and engaged mainly in pharmaceutical sales. The MOH sets policy and strategic direction, while district governments engage in service delivery under Uganda's decentralized health-care delivery model. The MOH is responsible for coordinating the sector, overseeing policy implementation, quantifying national requirements for pharmaceutical products, harmonizing the supply chain management system, and promoting rational use of pharmaceutical products.

The GOU directly finances two health supply chain systems, the National Medical Store (NMS) and Joint Medical Store (JMS). Together, they supply the full range of commodities needed to support public health-care service delivery in Uganda. GOU manages the NMS, which was established as a statutory corporation (i.e., parastatal) in 1993 by an Act of Parliament. Its primary responsibility is procuring, warehousing, and distributing pharmaceutical products to all public health facilities. Uganda has 6,404 health facilities — 3,084 (48 percent) public, 2,373 (37 percent) PFP, and 947 (15 percent) PNFP. NMS supplies the lion's share in its responsibility to support the public health sector (see Exhibit 3 for a summary of health facilities by level and by type). In FY 2009/10, the Essential Medicines and Health Supplies (EMHS) procurement for public facilities was centralized to NMS through the Primary Health Care (PHC) vote (i.e., direct credit line of public funds). Through this vote, NMS receives a sizeable share of the \$74.2 million U.S. dollars (USD) allocated for EMHS procurement. Nearly half of this allocation is for antiretrovirals, tuberculosis (TB) medicines, vaccines, and reproductive health and malaria commodities. NMS implements a pull system (that requires placing orders) to supply health commodities to health center (HC) IVs and hospitals, while a kit system (regular standing order, specific to each district) is used to supply all HCs II and III.⁴

JMS is the leading and oldest private pharmaceutical store in Uganda. It was established in 1979 as a joint venture between Uganda Catholic Medical Bureau (UCMB) and Uganda Protestant Medical Bureau (UPMB); the two other faith-based medical bureaus, Muslim and Orthodox, have since signed memoranda of understanding with JMS. JMS is licensed by the National Drug Authority (NDA) to engage in import, export, wholesale of medicines, and related health-care supplies. As a faith-based organization, JMS engages in procurement, warehousing, and distribution of pharmaceutical products to private health facilities.

¹ "Uganda," World Health Organization, 2017, retrieved from <http://www.who.int/countries/uga/en/>

² "National Pharmaceutical Sector Strategic Plan III 2015–2020," The Republic of Uganda. Ministry of Health, retrieved from <http://health.go.ug/content/national-pharmaceutical-sector-strategic-plan-iii-2015-percentE2 percent80 percent93-2020>

³ Ibid.

⁴ Ibid.

Overall, JMS supplies 3,106 health facilities (2,237 private for-profit and 869 private not-for-profit)⁵; however, its support role to supply faith-based PNFP facilities was recently bolstered through legislative action for public sector funding. In July 2017, Uganda's Parliament approved an MOH proposal to establish an EMHS credit line of \$2 million USD in public funds for 534 PNFP facilities supplied through JMS.⁶ Representing half of the primary health-care nonwage grant of public funds for the PNFP sector, this amount was to finance procurement and distribution of key tracer medicines by JMS as a more cost-effective and transparent EMHS procurement mechanism for PNFP facilities. JMS and NMS have an intimate interplay within the mainstream PFP sector in sourcing and supplying EMHS to the NMS and JMS. Both warehouses are also supplied by the local private market.

Uganda's public sector funding for its supply chain system benefits from direct investments from several external development partners, including Gavi, the Vaccine Alliance; the United Kingdom's Department for International Development; the United Nations Children's Fund; the United Nations Population Fund; the United States Agency for International Development (USAID); The Global Fund to Fight AIDS, Tuberculosis and Malaria (The Global Fund); and The World Bank.

Ugandans receive services from the public and private sectors. The public sector includes national and regional referral hospitals (RRHs); general hospitals (GHs); HCs II–IV; and community medicine distributors.⁷ The private sector includes PNFP and PFP providers, traditional and complementary medicine practitioners, private manufacturers, distributors, wholesalers, private pharmacies, private hospitals, private clinics, and other private health-care providers. About half of health services and products come through the PFP sector.⁸

Health-care financing for Uganda's public supply chain system comes from the government, private sources, and development partners. The GOU continues to receive significant funding support from development partners for health commodities; according to the NPSSP III, more than 70 percent of funding for public sector health commodities is financed by development partners. Less than 10 percent of government expenditure is estimated to be spent on health. In 2015/16, the GOU spent 6.9 percent of the total budget on health (1,270.8 billion Ugandan shillings).⁹ This translates to approximately 36 percent of health-care expenditures as out-of-pocket expenses for Ugandans, which is particularly burdensome for poor and vulnerable populations seeking health care.¹⁰

⁵ Of the total 947 PNFP facilities, 646 are faith-based and the remaining 301 are categorized as "other." JMS supplies all 646 faith-based PNFPs and an additional 223 "other" facilities for a total of 869 facilities.

⁶ The EMHS credit line relates to the PHC vote accredited to 534 facilities (which includes faith-based and other facilities), all of which have accounts at JMS for EMHS ordering. Specific to HIV commodities, only 257 of the 646 faith-based PNFP facilities provide antiretroviral services. Of the 257 facilities, 118 are supplied by JMS and 139 by Medical Access Uganda Limited (MAUL), which is primarily funded by the U.S. Department of Health Services Centers for Disease Control and Prevention for HIV commodities. Of the 139 facilities, JMS also supplies them with all other EMHS (except for TB and vaccines, which are supplied by NMS to all eligible in the PNFP network).

⁷ Ibid.

⁸ Ibid.

⁹ Ministry of Finance, Planning, and Economic Development 2015. Budget Speech Financial Year 2015/16

¹⁰ Ibid.

The Quantification and Procurement Planning Unit (QPPU) within the MOH coordinates forecasting and supply planning at the central level. This includes liaising with all relevant partners, monitoring national stock levels, conducting quantification exercises, and identifying any supply gaps.¹¹

Overview of the Supply Chain Assessment Activity

Under MOH leadership, USAID, The Global Fund, GHSC-PSM, and Uganda Health Supply Chain (UHSC) provided support for the requisite fieldwork for the National Supply Chain Assessment (NSCA) in Uganda from May 7 to May 30, 2018. The assessment provided results that identify strengths, potential bottlenecks, and opportunities within Uganda's public health supply chain (PHSC). Based on the findings, the GOU, in collaboration with key supply chain stakeholders, can prioritize areas for root-cause analysis and develop strategic and operational plans to strengthen the PHSC in Uganda. To this end, the assessment examined the capability and performance of Uganda's PHSC. The NSCA 2.0 includes three distinct elements: the supply chain mapping exercise provides a visual representation of the country's supply chain; the capability maturity model (CMM) measures the overall capability, resources, processes, and functionality of the country supply chain; and the key performance indicators (KPIs) are used to measure supply chain performance.

The primary objectives of this assessment were as follows:

- Measure PHSC performance and capability
- Analyze PHSC overall operational capacity and performance, identifying bottlenecks and opportunities for improvement
- Identify focus areas of opportunity for MOH planning and stakeholder coordination to inform the development of transformational plan(s) to guide future system strengthening investments

Funded by USAID and The Global Fund, the NSCA focused only on the Uganda health sector supply chain directly financed through GOU or public sector funding. In other words, the NSCA focused on the public sector — NMS and sites supplied by NMS — as well as the 534 PNFP sites supplied by JMS through the EMHS credit line. At the PNFP sites, the USAID-procured commodities were also included in the assessment.

The discussion is focused on providing interpretations of the 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 for analysis. The report annexes, contained in a second volume, provide the complete assessment tools and other detailed information.

¹¹ Ibid.

Methodology

This section describes the methodology used to conduct the NSCA 2.0 in Uganda.

Over seven months, from September 12, 2017, through April 18, 2018, the assessment team engaged relevant in-country stakeholders to define the scope of work (SOW), determine the tracer commodities for the assessment, and train teams to reflect the national context. This approach also aimed to strengthen buy-in from the MOH, NMS, JMS, and other key supply chain stakeholders. The team used the NSCA 2.0 toolkit to guide data collection, storage, and analysis.

Scope of Work

The SOW required that the assessment team conduct a comprehensive assessment of the Uganda public sector health supply chain system at the following levels: central, district (intermediate), and service delivery, which included HCs II–IV, GHs, and RRHs. Exhibit 3 on the next page shows the list of all the sites where data were collected in May 2018.

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 elements: supply chain mapping, the CMM tool, and the KPI assessment tool, as described in Exhibit 2.

Exhibit 2. Description of key elements of the NSCA 2.0 toolkit

Activity	Description
Supply chain mapping	The objective of mapping the health supply chain is to obtain an in-depth understanding of the health supply chain, including the roles and responsibilities of key supply chain participants.
CMM tool	The CMM diagnostic tool assesses capability and processes across functional areas and cross-cutting enablers (human resources (HR), financial sustainability, etc.) using interviews and structured direct observation.
Supply chain KPIs	The KPIs include a set of indicators that measure supply chain performance in selected functional areas.

Sampling

The sample frame consisted of GOU-owned facilities across the country that are supplied by NMS and PNFP facilities receiving public funding through the Primary Health Care fund and supplied by JMS inclusive of HIV commodities. Thus, the final sampling frame consisted of 2,024 HCs II, 1,105 HCs III, 177 HCs IV, 66 general hospitals, and 16 RRHs across 112 districts. Also, central-level entities — NMS, JMS, MOH, NDA, and the faith-based medical bureaus — were included.

The minimum sample size was determined using the hypergeometric sample size formula, assuming a margin of error of ± 10 percent, and a 90 percent level of confidence (i.e., $\alpha=0.10$) as the NSCA 2.0

guidance suggests. A two-stage sampling process was used (with selection of central facilities done separately). 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. 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, one HC II, one HC III, one HC IV (if available in the district), and one GH (if available in a district) were selected at random. If a selected district included RRHs, all RRHs in that district were included in the sample.

The final sample included 83 HCs II–IV, 16 GHs, and seven RRHs in 31 districts, plus four central-level entities. A total 143 sites were visited across 32 districts during the assessment (see Exhibit 3). Four districts, Bukwo, Kaabong, Kween, and Mayuge, were excluded from the sample frame due to weather-related difficulty in travel. National-level referral hospitals were not included in the assessment, as they were not considered an assessment priority.

Exhibit 3. Final number of sites assessed during the NSCA 2.0

Site level	Total number of 143 sites visited across 32 districts	Sampling frame
Central warehouse	2	2
Health centers II–IV	83	3,306
General hospitals	16	66
MOH or similar institution	4	4
District health offices	31	35
Regional referral hospitals	7	16

Team Composition and Training

Central-level and field teams were formed and trained to conduct this assessment. The central-level team included members from GHSC-PSM, USAID, and GFATM. At the subcentral sites, 20 two-person teams (40 members total) collected data. These teams included a mixture of pharmacists, nurses, clinical officers, and dispensers, all professionally affiliated with the MOH. Given the camaraderie and relationships developed during the training, individuals were invited to self-pair and ensure that each team had broad professional representation. Having national supply chain participants from varying backgrounds expedited access to key informants and data sources while promoting local ownership and buy-in of the assessment. To avoid potential bias, data collectors were not sent to their home or neighboring districts.

Data collectors attended a four-day training in Kampala from May 8 to 11, 2018, beginning with an overview of the objectives and methodology of the NSCA tool. Throughout the week, they were familiarized with the paper and electronic versions of the CMM and KPI modules. Facilitators reviewed the tracer commodities, facility selection, and use of the SurveyCTO electronic survey tool. Teams of data collectors conducted mock interviews before a half-day pilot exercise in nonparticipating health facility settings. On day three, enumerators piloted the NSCA tool using SurveyCTO to gain experience in and familiarity with electronic data collection and identify questions requiring revision. Tool revisions

and team assignments were completed on day four. See Annex 7 for the NSCA training agenda.

Limitations

Sampling

When sampling, balancing the competing interests of all possible avenues of analysis with resource considerations (time and money) requires making compromises in what can be assessed and to what level of disaggregation. The NSCA 2.0 focuses on drawing a nationally representative sample with an estimated error within 10 percentage points. This margin of error holds true for each of the six categories listed in Exhibit 3. However, this means that all health centers throughout the country, be they public or PNFP, were treated as one single group from which the sample was drawn. The sampling approach did not distinguish between HCs II, III, or IV. While there are clear benefits in examining differences between health center types, the sample size would have had to increase roughly two to three times its current size to allow for such comparisons. The sampling approach used in this assessment represents the best value for money, balancing sufficient statistical precision for meaningful analysis with the reality of budgetary constraints.

Interpreting CMM Scores and KPIs

The NSCA 2.0 uses a two-stage cluster-sampling approach designed to yield a maximum error of ± 10 percent. This approach was used 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 is 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.

This does not imply that scores or KPIs are unimportant or the underlying data are not useful, but 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.

Assessing Peripheral Supply Chain Entities

The NSCA leveraged the collaborative nature of this assessment to interview as many public health entities as possible and ensure full stakeholder engagement during this assessment. This means that the medical bureaus as well as the NDA of Uganda were interviewed for the CMM modules. While key players in Uganda's public health system, these entities are not regular supply chain participants. Therefore, their scores are related only to their responsibilities within the supply chain and may not be indicative of their true maturity in their indigenous function within the Uganda public health system. This dynamic is further discussed in the appropriate sections for these entities.

Actual Versus Planned Sites Visited

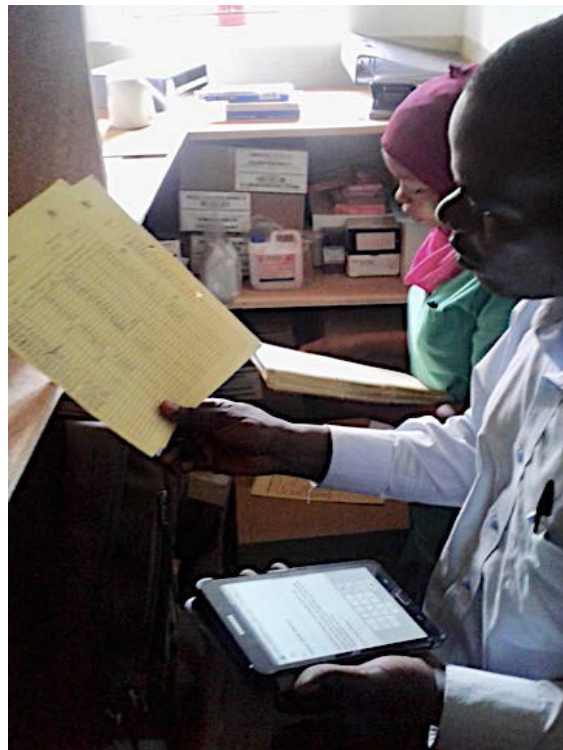
Due to heavy rains and poor road conditions, two of the selected facilities, Gisozi and Kamirampango, were replaced (using random selection) before the start of data collection. Also, Kiruddu RRH was dropped due to its categorization as an annex of the larger Mulago Hospital. Given the proper sampling weight at the RRH level, the absence of Kiruddu will not adversely affect the overall representativeness of the sample drawn.

Procedures

Before data collection, the MOH emailed notification letters along with a list of study sites, informing district health officers (DHOs) that facilities in their districts had been randomly selected to participate in the NSCA. Letters were also sent directly to the selected facilities. DHOs were responsible for communicating the exercise to the main points of contact at each HC under their oversight. MOH also successfully secured special permission from the Chief of Medical Services of the Uganda People's Defense Force (UPDF) to access three military facilities. Throughout the data collection process, enumerators carried the notification letter, signed by the Director General of the MOH, along with letters informing facilities that they had been chosen and trained by the MOH to conduct the survey.

The central-level team collected data from JMS, NMS, and the MOH for items in the CMM and KPI questionnaires. The field teams collected data from HCs II–IV, GHs, RRHs, and the DHOs.

Over the course of the data collection period, from May 14 to 25, 2018, teams conducted two surveys at each health facility: the capability questionnaires and the KPI assessment.



Enumerators verifying KPI data (photo credit: Meghan Douglas, USAID)

Capability Maturity Model

The CMM measures the capability and functionality of the supply chain based on 11 functional areas using interviews and direct observation. Each of the 11 questionnaires also has a supervisory interview to validate results and verify supporting documents. Only relevant modules were assessed at specific sites. Relevance was determined by consultations with Ugandan counterparts to understand what supply chain functions are expected at different facility types throughout the system.

The capability questionnaires were completed by interviewing one or more people at each site best suited to respond to each module based on the respondent's area of operation (i.e., stock manager and/or health facility manager). As part of that tool, documentation confirmation (e.g., logistics reports, requisitions forms) and direct observations (e.g., storage space for health commodities) were captured. Depending on the questionnaire, on average, one to two hours were needed to complete each capability questionnaire, including documentation verification. Data were collected electronically using the SurveyCTO¹² platform on individual tablets.

Exhibit 4 provides an overview of functional areas that were addressed in the capability questionnaire by type of facility. Annex 5 provides a map of the geographic coverage of sites assessed, and Annex I includes a complete list of the facilities assessed.

¹² <https://www.surveyccto.com/>

Exhibit 4. CMM functional area by level in the Uganda supply chain system

No.	Functional modules assessed	MOH	NMS	JMS	DHOs	RRHs	GHs	HCS II–IV	Medical bureaus	NDA
1	Strategic Planning and Management	✓	✓	✓		✓			✓	✓
2	Human Resources	✓	✓	✓	✓	✓	✓	✓	✓	
3	Financial Sustainability	✓	✓	✓		✓	✓	✓		
4	Policy and Governance	✓	✓	✓	✓	✓				✓
5	Quality and Pharmacovigilance (QPV)		✓	✓		✓	✓	✓		✓
6	Forecasting and Supply Planning	✓	✓	✓		✓				
7	Procurement and Customs Clearance		✓	✓		✓				
8	Warehousing and Storage		✓	✓		✓	✓	✓		
9	Distribution		✓	✓						
10	LMIS	✓	✓	✓		✓	✓	✓		
11	Waste Management	✓	✓	✓		✓	✓	✓		✓

Key Performance Indicators

KPIs are used to measure current supply chain performance. The assessment team used the KPI assessment tool to collect quantitative data for a core set of indicators that are aligned with international standards for health supply chain management, as shown in Exhibit 5. Data sources included stockcards, logistics management information system (LMIS) and electronic LMIS (eLMIS) reports, invoices, orders, proof of delivery notes, temperature excursion data, and dispatch notes. Some of the documentation data were retrospectively collected for the six months before the assessment to better illustrate the consistency of past performance.

At the field level, data to support the calculation of KPIs were collected electronically using the SurveyCTO platform on individual tablets. However, due to the number of KPIs and the quantity of data points assessed at NMS and JMS, the central-level team created an Excel data collection tool that mimicked the KPI data collection form on SurveyCTO for data collection at JMS and NMS. The team developed an Excel spreadsheet and shared it with JMS and NMS, and staff were asked to assist in completing the KPI verifications. Over a week, the central-level data collection team visited NMS and JMS to conduct data validation and data quality checks. After completing data entry in Excel, the team reentered data into SurveyCTO for data cleaning, analysis, and standardization.

	KPI (sample names)	NMS	JMS	RRH	GH	HCS II–IV
1	SATP	✓	✓	✓	✓	✓
2	Stockout by tracer, by level on day of assessment	✓	✓	✓	✓	✓
	Stockout days for 182-day period by tracer, by level			✓	✓	✓
	Average number of days per month with a stockout, given there was a stockout			✓	✓	✓
	Percentage of facilities with any stockout of any tracer commodity in the period (Nov. '17 to Apr. '18)			✓	✓	✓
3	Stockcard accuracy	✓	✓	✓	✓	✓
4	eLMIS accuracy: percentage of facilities at 100 percent	✓	✓	✓		
	eLMIS accuracy: average deviation from 100 percent across facilities			✓	✓	✓
5	Wastage from damage, theft/expiry	✓	✓	✓	✓	✓
6	On-time order rate			✓	✓	✓
	Order fill rate	✓	✓			
7	Emergency orders as a percent of total orders placed	✓				
8	Temperature excursions	✓	✓	✓	✓	✓
9	Facility reporting rates (from lower levels)	✓	✓			
10	Forecast accuracy	✓	✓			
11	Supply plan accuracy	✓	✓	✓		
12	Vendor on-time delivery (OTD)	✓	✓			
13	Source of funds data	✓	✓			
14	Percentage of international reference prices paid	✓	✓			
15	Staff turnover rate	✓	✓	✓	✓	✓
16	Percent of key positions vacant	✓	✓	✓	✓	✓
17	Percent of product selection based on the National Essential Medicines List (NEML)	✓	✓			

In collaboration with the MOH, NMS, and JMS, the tracer commodities shown in Exhibit 6 were selected for the NSCA based on the following criteria: they are a fair representation of the different commodity types that can be found in the Uganda PHSC, provide enough information for the MOH to make decisions, represent a unique supply chain challenge, represent unclear reporting channels resulting in critical challenges, and are available, at least to the HC III level, according to Uganda's EMHS list.

Exhibit 6. Tracer commodities

	Product name	Strength/dosage	Product category
1.	Tenofovir/lamivudine/efavirenz	600mg/300mg/300mg tablet	Antiretroviral
2.	Male condoms	Single condom	Reproductive, maternal, newborn, child and adolescent health (RMNCH)
3.	Malaria RDTs	Test	Malaria
4.	Long-lasting insecticidal nets	Net	Malaria
5.	Rifampicin/INH/pyrazinamide/ethambutol	150/75/400/275mg	TB
6.	Depot medroxyprogesterone acetate intramuscular	Vial	RMNCAH and family planning
7.	ORS + zinc	Sachet	RMNCAH
8.	Tetanus toxoid	Vial	RMNCAH and voluntary medical male circumcision
9.	Oxytocin international units	Vial	RMNCAH
10.	ACTs (AL) 6x4	20/120mg	Malaria
11.	Amoxicillin 250mg capsule	250mg capsule	EMHS
12.	Metformin 500mg tablets	500mg	EMHS
13.	Determine HIV RTK	Test	HIV

Data Management

Each enumerator 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 conducting daily quality checks. Original copies of the collected data were held on SurveyCTO's server. While both enumerators on a field team used tablets to collect data, each enumerator collected data on different modules, ensuring that only one completed collective survey was uploaded per site. A monitoring and evaluation (M&E) advisor from Abt Associates or GHSC-PSM reviewed, verified, and uploaded data daily. This served to verify that all answers were correctly coded and nonresponse data points were removed, facilitating more efficient analysis. Further, the frequency of this data review (sometimes referred to as "cleaning") enabled identification of unexpected issues, which were systematically addressed. After the daily review, data collection teams were immediately contacted (often through WhatsApp by a central-level point of contact) to clarify discrepancies in, or questions related to, the uploaded data.

SurveyCTO exports data using a comma-separated values format. Data analysis workbooks 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, the CMM interviews, and the KPI data collected.

First, the supply chain map produced during the mapping exercise will be explained, showing the flow of commodities and information (see Exhibit 8). The map presentation is followed by an overview of CMM results and a summary of the 22 KPI results. Results and findings are then detailed for each functional area and then for each level of service. For each of the 11 functional areas included in the CMM questionnaire, results are presented as follows: 1) CMM score, broken down by level of maturity, 2) key capability achievements, and 3) key capability gaps. Key capabilities and gaps are discussed only when they convey actionable information. For warehousing and storage, distribution, LMIS, and HR modules, relevant KPI metrics have been included.

Discussion and recommendations specific to the function or service level follow the presentation of findings.

Supply Chain Mapping

All NSCA 2.0 implementations include, as a first step, a comprehensive and participatory mapping of the national supply chain. The objective is not only to obtain an in-depth understanding of its structure and processes but also to create an opportunity for key stakeholders to contribute meaningfully to this assessment. This activity goes beyond connecting lines from one administrative level to the next. It defines and elaborates the roles and responsibilities of key participants all along the supply chain as well as business rules within the national supply chain (min and max levels, ordering processes) and any rule-breaking commodities. Information was gathered on all components of the supply chain and how they are interconnected. This map is not an operational map of the supply chain; rather, it helps delineate individual commodities and where they flow to. Commodities are often transported together to maximize efficiency, and these dynamics are not reflected in the map. Exhibit 7 illustrates the organization and elements within the Ugandan supply chain as well as the flow of commodities and information through the system.

To map the supply chain, a one-day supply chain mapping workshop was conducted in Kampala on May 7, 2018, with representatives from the MOH and other government representatives, NMS, JMS, implementing partners, and development partners (see Annex 8a, 8b, 8c for the workshop slides, agenda, and final participant list). Participants were divided into eight working groups, with representatives from different organizations. Each group was asked to discuss and develop a comprehensive commodity flow map from the manufacturers to the service delivery level. These maps were later consolidated by the central-level assessment team to develop the information and commodity flow map for Uganda's public health commodities. The final version presented here has been reviewed and endorsed by the MOH.

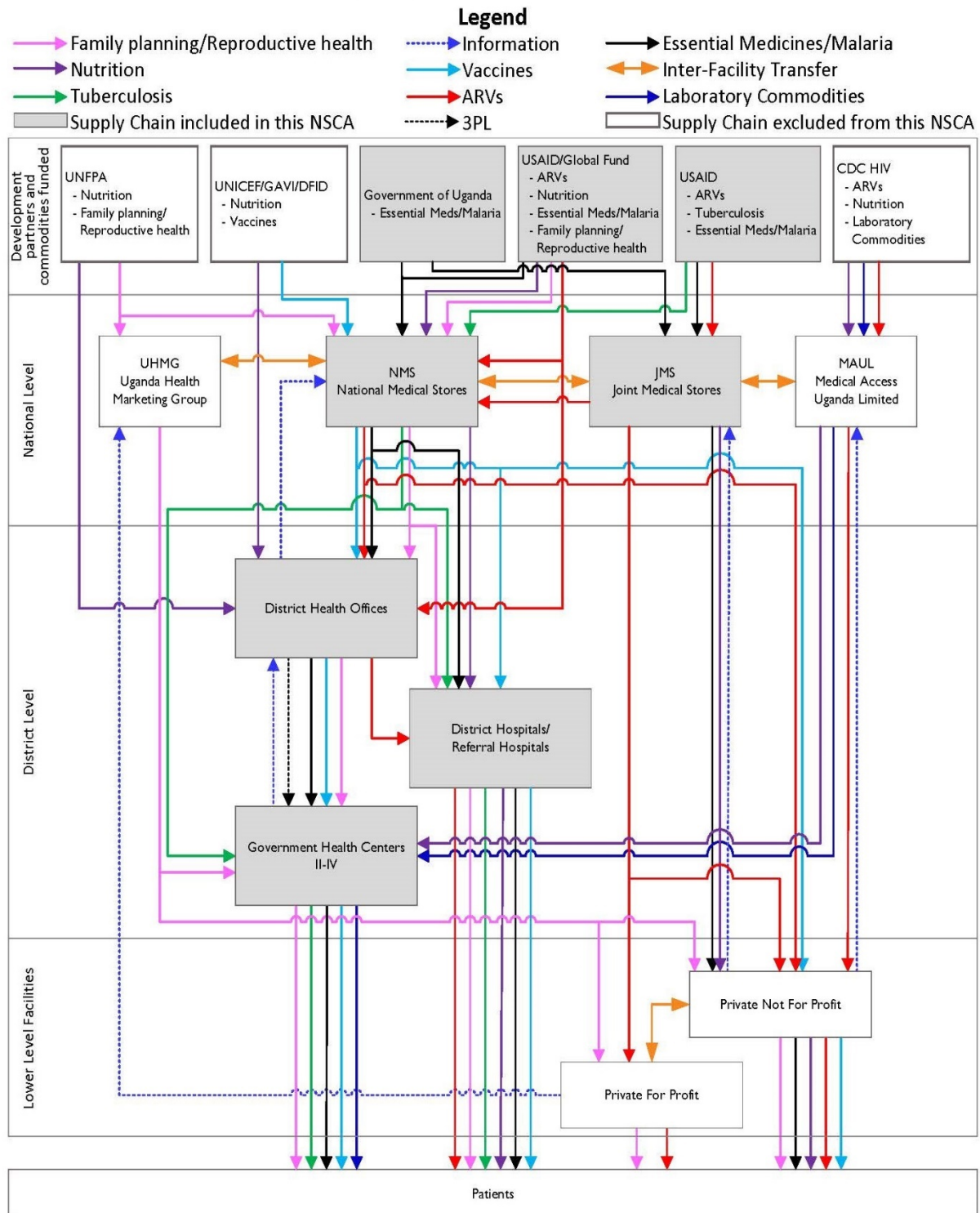
Uganda's PHSC has four tiers, which align with the governance structure.

Exhibit 7. The four tiers of Uganda's public health supply chain



Notable characteristics of this map include the large number of participants involved in Uganda's public sector supply chain; the number of sources procuring the same commodities; the appearance of parallel supply chains; the facilities' ability to transfer commodities within the same level; and NMS's and JMS's ability to inter-transfer commodities between warehouses (see Exhibit 8). At the district level, a third-party logistics provider is used for distributing health commodities down to government-run HCs II–IV, while hospitals are directly supplied by NMS. *This assessment focused only on the public supply chain system directly financed by GOU (or public funds) to support central-level warehouse, storage, and distribution to the facility level.*

Exhibit 8. Uganda's commodities and information flow



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 9 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 state-of-the-art 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 9. Definitions of level of maturity and contribution to the overall CMM score

Level of maturity	Definition	Maximum contribution to the CMM score (100 percent of total)
Basic	These are the must-have policies, structures, processes, procedures, tools, indicators, reports, and resources to operate a supply chain system (e.g., a stockcard as a tool for inventory management).	50 percent
Intermediate	These are not must-haves but are intermediate -level policies, structures, processes, procedures, tools, indicators (e.g., an Excel sheet).	30 percent
Advanced	These are nice-to-have policies, structures, processes, procedures, tools, indicators, reports, and resources to operate a supply chain system (e.g., Rx solution, a dispensing and stock management electronic tool).	15 percent
State of the art	These are 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 percent

Capability achievements and gaps are also presented for each module in tabular form.

The key capability achievement tables detail the most significant results related to positive achievement, as defined by the data, indicating ≥ 80 percent of facilities having the specific feature under inspection. Similarly, the key capability gaps tables represent results from a selection of questions that indicated key gaps within the supply chain management (SCM) system, as defined by ≤ 20 percent of facilities responding positively.

The capability gaps tables also identify possible solutions for addressing the gaps highlighted by the data. However, further analysis is required to confirm the root cause.

Overall Results (Summary Tables)

Capability Maturity Model Scores

Exhibit 10a shows the CMM scores for the 11 different modules, and Exhibit 10b shows the heatmap visualization of the CMM scores

Exhibit 10a. Average CMM score (with range of scores where applicable) presented by level of facility for each functional module)

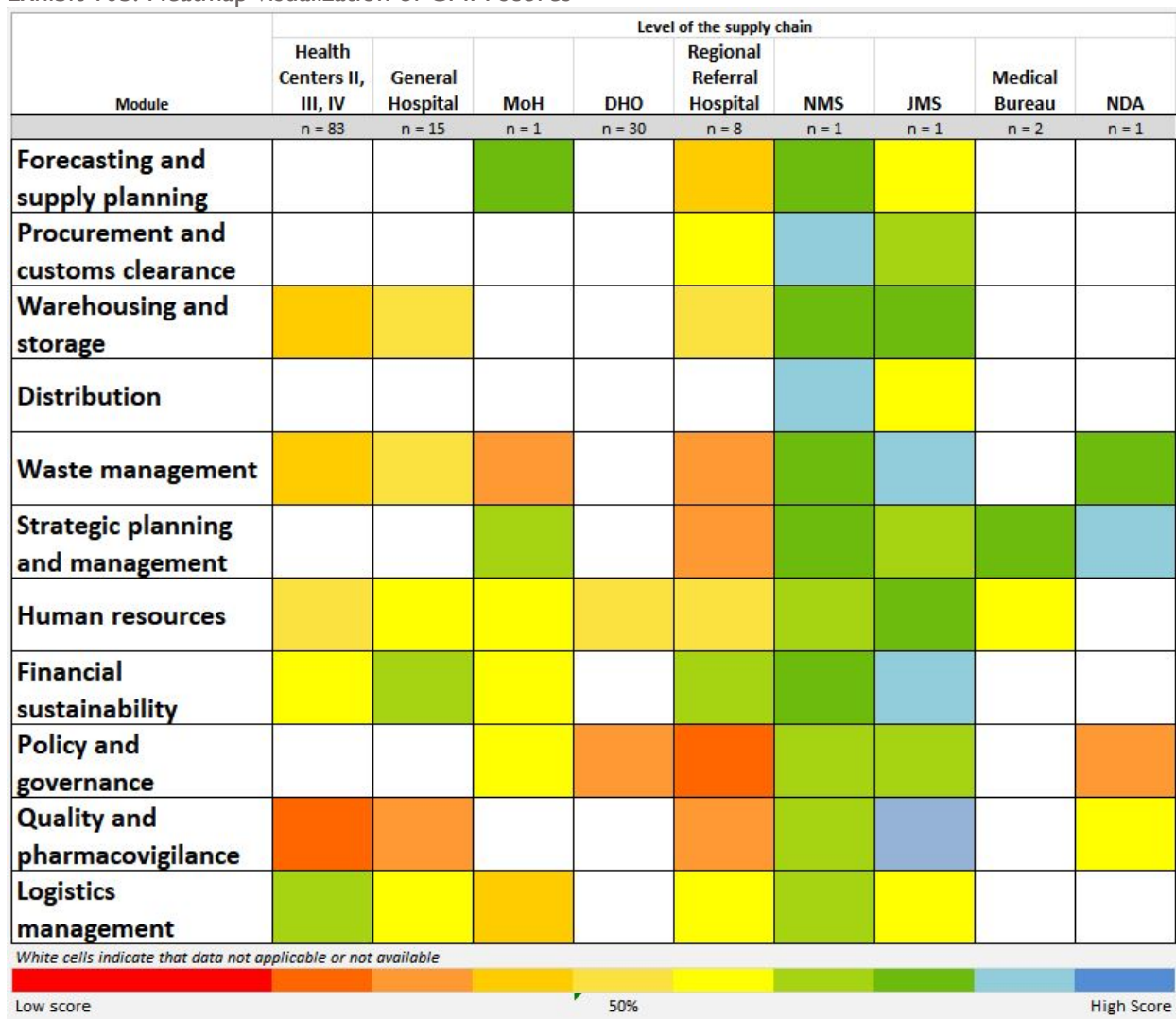
Module	HCs n = 83	GHs n = 16	MOH n = 1	DHOs n = 31	RRHs n = 7	NMS n = 1	JMS n = 1	Medical bureau n = 1	NDA n = 1
Forecasting and Supply Planning			77 percent		35 percent (26–44 percent)	78 percent	57 percent		
Procurement and Customs Clearance					60 percent (39–75 percent) *	80 percent	69 percent		
Warehousing and Storage	38 percent (26–59 percent)	47 percent (29–61 percent)			50 percent (44–55 percent)	77 percent	79 percent		
Distribution						82 percent	60 percent		
Waste Management	36 percent (4–75 percent)	44 percent (15–77 percent)	23 percent		23 percent (3–45 percent)	75 percent	81 percent		76 percent
Strategic Planning and Management			66 percent		27 percent (0 percent to 60 percent)	80 percent	68 percent	79 percent	87 percent
HR	48 percent (12–73 percent)	60 percent (38–77 percent)	56 percent	47 percent (26–66 percent)	47 percent (2–62 percent)	65 percent	72 percent	55 percent	

Financial Stability	55 percent (13–82 percent)	65 percent (54–86 percent)	56 percent		66 percent (51–79 percent)	70 percent	81 percent	
Policy and Governance			57 percent	25 percent (6–63 percent)	20 percent (6–83 percent)	68 percent	64 percent	26 percent
Quality and Pharmacovigilance	18 percent (0–50 percent)	21 percent (0–51 percent)			24 percent (4–45 percent)	62 percent	92 percent	57 percent
LMIS	60 percent (36–89 percent)	55 percent (39–69 percent)	37 percent		56 percent (40–77 percent)	63 percent	56 percent	

Note: Gray indicates module not assessed because it is not applicable to that level of the supply chain.

**RRHs can procure commodities on their own.*

Exhibit 10b. Heatmap visualization of CMM scores



These results show the average and the range for performance across the 11 supply chain functions and facility. Performance varies widely across the different supply chain levels. Aside from a few scores at the MOH, NMS, and JMS, most facilities scored less than 80 percent for all 11 supply modules, indicating the need to strengthen all supply chain functions. Service delivery points (SDPs), which include HCs II–IV, GHs, and RRHs, scored the lowest across all supply chain functions. The procurement and customs clearance and distribution function at NMS scored notably higher (80 percent and 82 percent, respectively), while JMS received high capability scores for pharmacovigilance at 92 percent, followed by financial sustainability and waste management, both at 81 percent.

Select KPIs

Exhibit I la summarizes eight selected KPIs. KPIs that were not assessed at a certainty entity are marked with a dash.

Exhibit I la. Average key performance indicator scores by level for selected KPIs (with ranges, where applicable)

Indicator	HCS n=83	GHs n=16	RRHs n=7	NMS n=1	JMS n=1	DHOs** n=31
SATP	25 percent (13–36 percent)	23 percent (5–61 percent)	24 percent (7–45 percent)	59 percent (29–86 percent)	33 percent (0–43 percent)	----
Avg. stockout rate on day of assessment	22 percent (8–46 percent)	11 percent (0–32 percent)	11 percent (0–31 percent)	0 percent	0 percent	0 percent
Avg. stockout days for 182-day period (Nov. '17 to Apr. '18)*	17.9 (4.5–42.4)	9.8 (0.4–18.7)	16.1 (0.0–39.9)	----	----	2.4
Average number of days per month with stockout, given that there was a stockout	6.4 (2.1–13.9)	4.3 (0.5–10.5)	6.3 (1.1–12.5)	----	----	2.4 (2.4–2.4)
Percentage of facilities with any stockout of any tracer commodity in the period (Nov. '17 to Apr. '18)	92 percent	90 percent	100 percent	----	----	24 percent
Stockcard accuracy	55 percent	65 percent	41 percent	----	----	19 percent
eLMIS record accuracy***	33 percent	21 percent	19 percent	97 percent	119 percent (94–138 percent)	----
Emergency orders as a percent of total orders	0 percent	3 percent	1 percent	3.4 percent	----	----

* The first number in this table refers to the average number of days the commodity was out of stock across the facilities from November 2017 through April 2018, a period of 183 days. The number in parenthesis is the percentage of days the commodity was out of stock, on average. Thus, $6.6/183 = 3.6$ percent.

** DHOs were assessed only for the tetanus toxoid vaccine.

***Record accuracy was assessed with a physical count of stock on the day of the visit.

A dash implies that the indicator was not collected at that level, whereas a zero implies the true value of that indicator is zero.

SATP of tracer commodities is poor across all supply chain tiers, with averages of 33 percent and below, except for NMS. NMS has a better SATP average at 59 percent, but a wide range of 57 percentage points between the tracer commodities. Refer to Exhibit 11b for SATP figures, by product and by facility type. SATP refers to the number of stock observations where the stock level observed lies between the established maximum and minimum acceptable levels of stock. These are normally determined by historical consumption. Average stockout rates of tracer commodities on the day of assessment increased through supply chain tiers, with 0 percent at the central levels, 11 percent at GHs and RRHs, and 22 percent at the HCs. Stockcard and eLMIS record accuracy was lowest at the RRHs, with HCs demonstrating higher eLMIS record accuracy (33 percent) than both tiers of hospitals (GH = 21 percent, RRH = 19 percent). However, all KPI metrics below the central level are generally poor.

Exhibit 11b. Stocked according to plan, by tracer commodity and facility type

Facility type	HC	GH	RRH	NMS	JMS
n=	83	16	7	7	7
1 Tenofovir/lamivudine/efavirenz	28 percent	25 percent	45 percent	29 percent	43 percent
2 Male condoms	26 percent	5 percent	7 percent	43 percent	
3 Malaria RDTs	13 percent	19 percent	10 percent	43 percent	43 percent
4 Long-lasting insecticidal nets	29 percent	29 percent	21 percent		29 percent
5 Rifampicin/INH/pyrazinamide/ ethambutol (RHZE)	18 percent	33 percent	34 percent	43 percent	
6 Depot medroxyprogesterone acetate intramuscular	23 percent	22 percent	33 percent		
7 ORS + zinc	36 percent	20 percent	21 percent	86 percent	0 percent
8 Tetanus toxoid	18 percent	10 percent	13 percent	71 percent	43 percent
9 Oxytocin international units	24 percent	21 percent	25 percent	86 percent	14 percent
10 ACTs (AL) 6x4	21 percent	22 percent	18 percent	71 percent	14 percent
11 Amoxicillin 250mg capsule	25 percent	25 percent	21 percent	71 percent	0 percent
12 Metformin 500mg tablets	34 percent	61 percent	42 percent	57 percent	0 percent
13 Determine HIV RTK	30 percent	8 percent	21 percent	57 percent	
Average	25 percent	23 percent	24 percent	59 percent	33 percent
Range	13–36 percent	5–61 percent	7–45 percent	29–86 percent	0–43 percent

The low KPI indicator of emergency orders placed as a percentage of total orders, ranging from 0 percent at HCs to 3.4 percent at NMS, may be misleading, as the system is designed to be a kit system for lower-level facilities where each district is provided a customized kit based on the district's needs. Moreover, the facilities have an ad hoc system of commodity transfers between sites to avoid emergency orders. These emergency orders may be anomalies from the normal operations. The metric may therefore not fully capture a health facility's need for emergency orders.

By Functional Module: Overall Capability Maturity Model and KPI Results

The following results, along with Exhibits 12 and 13, highlight some of the key findings from the assessment of the II supply chain functions. Results of the CMM scores are presented by level and followed by KPIs (where applicable). Where relevant, key capabilities and gaps are further elaborated to convey meaningful information.

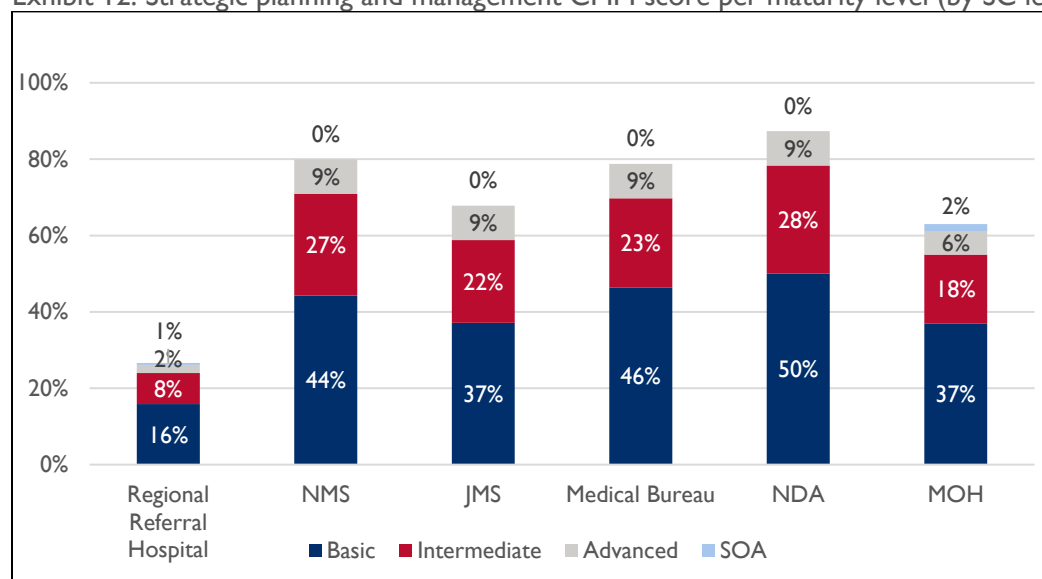
In the functional module subsections below, the following results are presented:

- KPIs (where applicable)
- Breakdown of CMM scores by level of achievement
- Key capabilities, key gaps
- Tracer commodity figures (where applicable)

Strategic Planning and Management

The strategic planning and management section seeks to determine if health supply chain levels are aware of and using an existing strategic plan, in accordance with the NPSSP III, to ensure that each level is monitoring its own performance to improve. Strategic planning and management are the purview of the MOH, 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.

Exhibit 12. Strategic planning and management CMM score per maturity level (by SC level)



Maximum scores: Basic 50 percent; Intermediate, 30 percent; Advanced, 15 percent; State of the Art, 5 percent. For instance, if the Basic portion is actually 45 percent, it should be interpreted as 45/50. See Exhibit 9 for more detail on CMM scores.

Exhibit 13. Strategic planning and management key capability gaps

Key capability gaps for the RRH level	Percent of facilities achieved	Possible solutions
Percentage of facilities that include LMIS in their supply chain strategic plan	0 percent	Advocate for and ensure inclusion of LMIS in the supply chain strategic plan
Percentage of facilities that monitor implementation of their supply chain strategic plan	27 percent	Institute periodic reviews and stand up as a review board to ensure that the supply chain strategic plan is implemented in all facilities

Summary of results and discussion

The strategic planning and management score of 87 percent is highest at the NDA, the regulatory agency for medicines, achieving a maximum possible value of 50 percent for basic items and 28 percent of a possible 30 percent for the intermediate. The NDA has a comprehensive supply chain strategic plan that includes all appropriate components. The plan is reviewed and updated every three years and monitored quarterly to ensure progress is meeting expectations.

Scores at NMS and the medical bureaus for the basic items are also high, with 44 percent and 46 percent of a maximum of 50 percent, respectively. NMS has a comprehensive supply chain strategic plan with all appropriate components included; the only notable exception is waste management, which was missing from the document. The NMS plan is reviewed and updated every three years and monitored annually to ensure progress in meeting expectations. The medical bureaus were missing only a few items to have a complete basic score: a performance monitoring plan and the identification of specific services from strategic private sector partnerships in their operational plan.

JMS has scored well at 68 percent but not quite hitting the 80 percent benchmark. The main difference between JMS and NMS is an operational plan that includes a stakeholder map and SWOT analysis. While a formal strategy is in place for engaging strategic partnerships with the private sector, it is not integrated into the operational plan. Also, the operational plan was only for a one-year period, which is shorter than a more ideal multiyear plan.

At the RRHs, however, the score is much lower (27 percent), with only 16 percent of the 50 percent for the basic items. Less than half (40 percent) of the RRHs have a copy of the approved NPSSP. Furthermore, only 13 percent of RRHs reported that they have a strategic supply chain plan and that reforms identified in their plans are being implemented. These results suggest a need for improved strategic planning and management at the RRHs. Those with supply chain strategic plans have key components missing: 0 percent include LMIS, and only 13 percent include M&E. Downstream outcomes of high-level strategy and planning deficiencies at RRHs are visible when examining other modules later in the report.

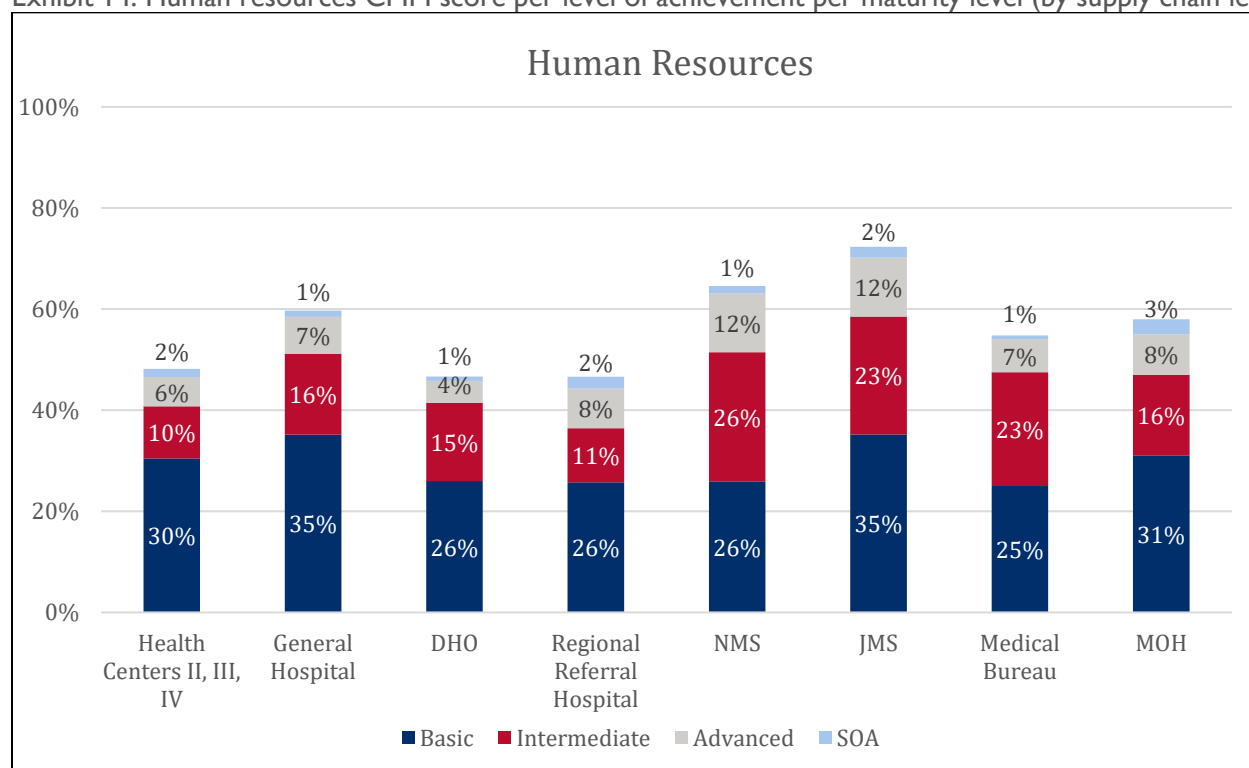
Recommendations

- Develop strategic plans for RRHs with assistance from the MOH. Align any plans developed with the MOH's overall strategic vision and direction. Further root-cause analysis at the RRHs can help identify possible reasons for the low scores.
- Provide further technical assistance to the RRHs so that strategic plans can map out improvement plans for poor performance in other functional areas, such as stock management and LMIS record keeping.
- Ensure JMS has a multiyear operational plan that ties in its partnerships and strategic goals so that the operations contribute to those strategic goals.

Human Resources

The human resources section seeks to ensure that facilities have the needed resources and staff have the necessary training, knowledge capacity, time, and scope to support the supply chain. Exhibit 14–16 present HR results. Major areas that were factored into the scoring for this CMM module are existence of supply chain–specific recruitment policies, appropriate supply chain functions in job descriptions, regular capacity-building efforts for staff, and mechanisms for supportive supervision and performance improvement.

Exhibit 14. Human resources CMM score per level of achievement per maturity level (by supply chain level)



Maximum scores: Basic, 50 percent; Intermediate, 30 percent; Advanced, 15 percent; State of the Art, 5 percent. For instance, if the Basic portion is actually 45 percent, it should be interpreted as 45/50. See Exhibit 9 for more detail on CMM scores.

Exhibit 15. Human resources KPI score by level

Indicator	HCs	GHs	RRHs	NMS	JMS
n=	83	16	7	1	1
Average number of supply chain positions	2.4	7.7	12.1	220	24
Staff turnover ratio	17 percent	0 percent	5 percent	5.4 percent	6 percent
Percentage of position vacant	23 percent	55 percent	27 percent	10 percent	0 percent
Average percentage of staff seconded	7 percent	11 percent	2 percent	----	----

Exhibit 16. Key capability gaps, human resources

Gaps	Percent of facilities achieved	Possible solutions
<i>HC level</i>		
Percentage of facilities that include ordering and reporting in job descriptions for pharmacy and store personnel	6 percent	Advocate for including ordering and reporting in the job descriptions of all pharmacy and store personnel and conduct trainings accordingly
Percentage of facilities that had 50 percent or more of their staff participate in capacity-building programs in the last year	16 percent	Advocate for including all staff in capacity-building programs and allow staff the time to participate in them
<i>RRH level</i>		
	17 percent	0 percent
Percentage of facilities that have any type of staff recruitment policy in place	33 percent	Advocate for leadership at each facility to develop and implement staff recruitment policies
Percentage of facilities that identified finances as a critical barrier to implementing supply chain capacity-building programs	100 percent	Advocate for GOU to increase resource allocation to support capacity-building programs

Summary of results and discussion

None of the facilities assessed scored above 80 percent. JMS and GHs scored the highest basic scores, at 35 percent, followed by HCs II–IV with a score of 30 percent. RRHs, DHOs, and NMS scored only 26 percent for the basic items. The HCs II–IV and RRHs have an aggregate maturity score of less than 50 percent. Overall low scores for the HR capability maturity highlight a lack of sufficient human resources

to support supply chain functions at all levels. The KPI scores further corroborate the capability scores; more than half of the supply chain positions (55 percent) are vacant at the GHs, followed by approximately a quarter at HCs II–IV and the RRHs. The staff turnover rate is particularly high at HCs II–IV, at 17 percent. NMS counted all staff members across different functions, from the truck driver to the forklift personnel, in their supply chain personnel roster, while JMS counted only key supply chain staff involved in making management decisions on behalf of JMS.

While the highest basic score is only 35 percent out of the maximum 50 percent, all levels scored at least 1 percent for the SOA items, out of the possible 5 percent. This suggests that although facilities have not yet achieved a basic score, all have at least some SOA requirements. Also, JMS, NMS, and the NDA scored between 23 percent and 26 percent for the intermediate items (out of 30 percent), indicating varying maturity at these facilities. At the RRHs, none of the sites has a staff recruitment policy for supply chain positions, and only a third have a general recruitment policy applied specifically to supply chain positions. Similarly, none of the RRHs includes supply chain functions in their personnel job descriptions. These results underscore the importance of conducting an in-depth, root-cause analysis to better understand the reasons for low HR scores across *all* levels, with special emphasis on the service delivery sites. Targeted interventions to address basic-level deficiencies would be the best approach for rapid improvements at this level.

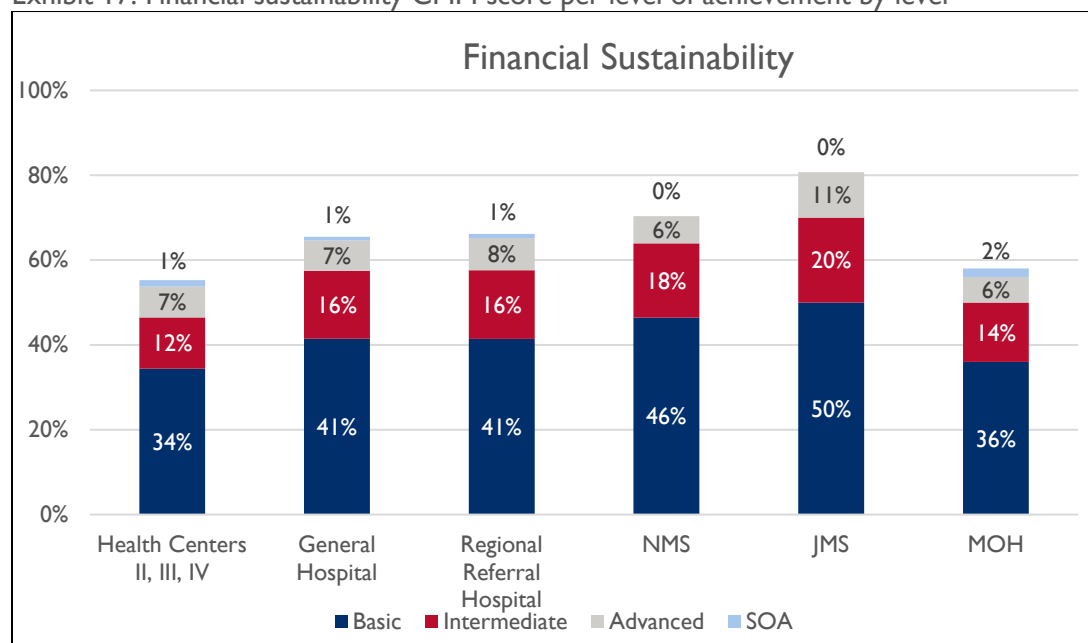
Recommendations

- Review other recent in-country HR analyses and identify gaps between the reports suitable for a root-cause analysis to better understand the low HR scores across all levels, with emphasis on service delivery sites (HCs II–IV, GHs, and RRHs).
- Retain and train staff, especially at HCs II–IV, on waste management practices, stock management, LMIS record keeping, and pharmacovigilance (PV) reporting practices. Develop and deploy recruitment, training, and retention strategies to ensure trained staff retention.
- Develop and/or review job descriptions for all supply chain positions and make them available to all relevant staff.
- Increase supply chain dedicated staffing levels at GHs and RRHs, as they have the biggest workforce gaps.
- Support the MOH in realizing its current HR staffing norms for the health sector and develop a strategy for incremental funding by the GOU to MOH and local governments to sustain appropriate levels of HR in the longer term.

Financial Sustainability

The financial sustainability section seeks to ensure that supply chain operations are sufficiently funded, that facilities practice good financial management techniques, and that any financing gaps are identified. Exhibits 17 and 18 show financial sustainability results. This CMM module places greater emphasis and scoring value on 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 being self-sufficient, the intent of the module is to understand how facilities manage the funds they receive.

Exhibit 17. Financial sustainability CMM score per level of achievement by level



Maximum score for Basic is 50 percent; for Intermediate, 30 percent; for Advanced, 15 percent; for State of the Art, 5 percent. For instance, if the Basic portion is actually 45 percent, it should be interpreted as 45/50. See Exhibit 9 for more detail on CMM scores.

Exhibit 18. Key capability gaps, financial sustainability

Gaps	Percent of facilities achieved	Possible solutions
RHH level		
Percentage of facilities that had a budget shortfall for health commodities	40 percent	Advocate for larger budgets at the highest levels of the MOH and train facility management to develop, monitor, and adapt budgets more proactively
HC level		
Percentage of facilities that had a budget shortfall for health commodities	42 percent	Advocate for larger health facility budgets at the highest levels of the MOH to ensure that shortfalls do not occur in the future
Percentage of facilities that have a funding strategy explicitly including supply chain costs	6 percent	Advocate for a larger portion of the health facility budgets to be explicitly allocated for supply chain costs

Summary of results and discussion

Apart from JMS (81 percent), whose governance policies are designed to ensure financial solvency, overall capability maturity scores across all facility types are below 80 percent, with HCs II–IV at 52 percent, GHs at 65 percent, and RRHs at 66 percent. Scores for all service delivery points (HCs II–IV, GHs, RRHs) show room for improvement, although GHs and RRHs scored 41 percent for the basic level. NMS and JMS scored 46 percent and 50 percent, respectively, for the basic level, indicating the existence of basic items to contribute toward financial sustainability.

In general, scores are lower at the service delivery level, most likely due to lack of self-reliance for financial resources. For example, only 11 percent of health centers use cost recovery for any portion of funding for health commodities. In GHs, only 29 percent use cost recovery for any portion of funding for health commodities. However, 52 percent of health centers have secured most, or all, of their total identified financial need to be covered by government budget. This does leave plenty of room for improvement, however. The scores in this module indicate that there is not enough reliance on cost recovery for essential medicines and that overall budgets for health centers need to be set higher at the central government level.

A maximum basic-level score at JMS could be explained by the availability of financial resources for supply chain operations, regular financial reporting, and real-time tracking of supply chain costs. JMS has strong financial practices, including generating regular reports with profit and loss statements as well as measuring liabilities and monitoring cash flow. NMS also has strong financial practices, having scored almost all basic items in place.

The MOH scored a 58 percent on this module. Key gaps were identified in the module, such as the lack of any supply chain cost monitoring to understand its financial burden against the projected costing in the NPSSP, inclusion of unobligated funds in annual budgets to address unexpected issues during the year, and the lack of a cost-sharing policy and plan for supply chain costs.

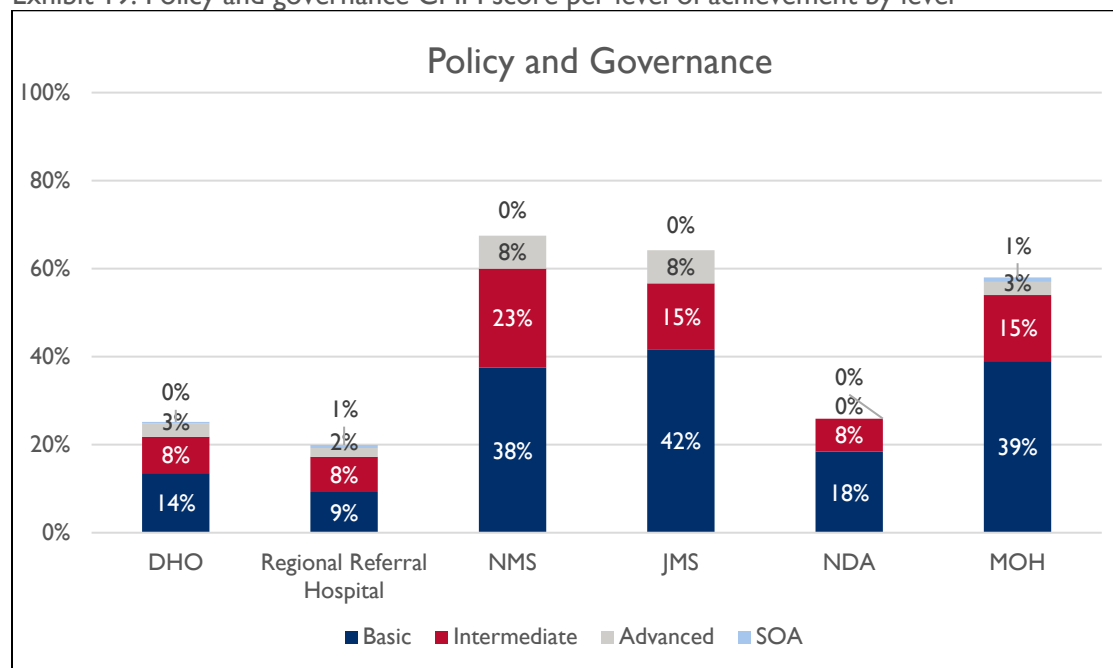
Recommendations

- Ensure Uganda's health strategy includes short-, medium-, to long-term plans to address budget shortfalls, especially for procuring health commodities at HCs II–IV. Include development partners in the conversation and creation of these plans to better ensure a unified strategy, allowing for efficiencies and strengthening the ability to achieve sustainability.
- Conduct a root-cause analysis to determine the reasons for the lower financial sustainability scores at the lower supply chain tiers.
- Review financing mechanisms to ensure that health centers are getting appropriate financial resources recovered to help bolster operational budgets.

Policy and Governance

The policy and governance section seeks to ensure that policies and guidelines (such as standard treatment guidelines) exist, are managed by oversight bodies, and are used across the supply chain. Exhibits 19 and 20 show policy and governance results. Major areas that were factored into the scoring for this CMM module are the existence of a national medicines policy with supply chain components, an active oversight committee with broad representations from all levels of government and civil society, drug registration lead times, and standard treatment guidelines.

Exhibit 19. Policy and governance CMM score per level of achievement by level



Maximum score for Basic is 50 percent; for Intermediate, 30 percent; for Advanced, 15 percent; for State of the Art, 5 percent. For instance, if the Basic portion is actually 45 percent, it should be interpreted as 45/50. See Exhibit 9 for more detail on CMM scores.

Exhibit 20. Key capability gaps, policy and governance

Gaps	Percent of facilities achieved	Possible solutions
<i>RRH level</i>		
Percentage of facilities with formally documented management policies or guidelines for the supply chain system	27 percent	Update and disseminate policies to all facilities
Percentage of facilities that include storage, financing, or HR components in their management policies or guidelines for the supply chain system	0 percent	Ensure that update policies include sections on storage, financing, and HR
<i>DHO level</i>		
Percentage of facilities with formally documented management policies or guidelines for the supply chain systems	25 percent	Update and disseminate policies to all facilities

Summary of results and discussion

At the central level, the MOH, NMS, and JMS have high Policy and Governance scores but do not reach the benchmark of 80 percent. The overall scores ranged from 20 percent at the RRHs to 69 percent at NMS, while none of the facilities scored above the benchmark. Across all facilities, NMS and JMS had the two highest basic scores of 38 percent and 42 percent, respectively. Low basic scores observed at the other facilities could be explained by the fact that supply chain policies and guidance fall outside their mandate. The directive to establish policies and guidelines falls within the purview of the MOH, which had a composite score of 57 percent, with 39 percent of the maximum 50 percent for the basic elements. Results that contributed to this score include the lack of procurement and inventory management policies as well as lack of inclusion of any stakeholders other than central government staff appointing members into the supply chain oversight committee.

The central-level assessment team who interviewed staff at the NDA noted that many of the questions in this module were not applicable to the entity. This could help explain the NDA's composite score of 26 percent, achieved only in the basic and intermediate CMM categories, with no points earned in advanced or state of the art. There are no formally documented guidelines or policies for any of the supply chain functions at the NDA, or a formal, high-level committee that provides supply chain oversight and governance.

Recommendations

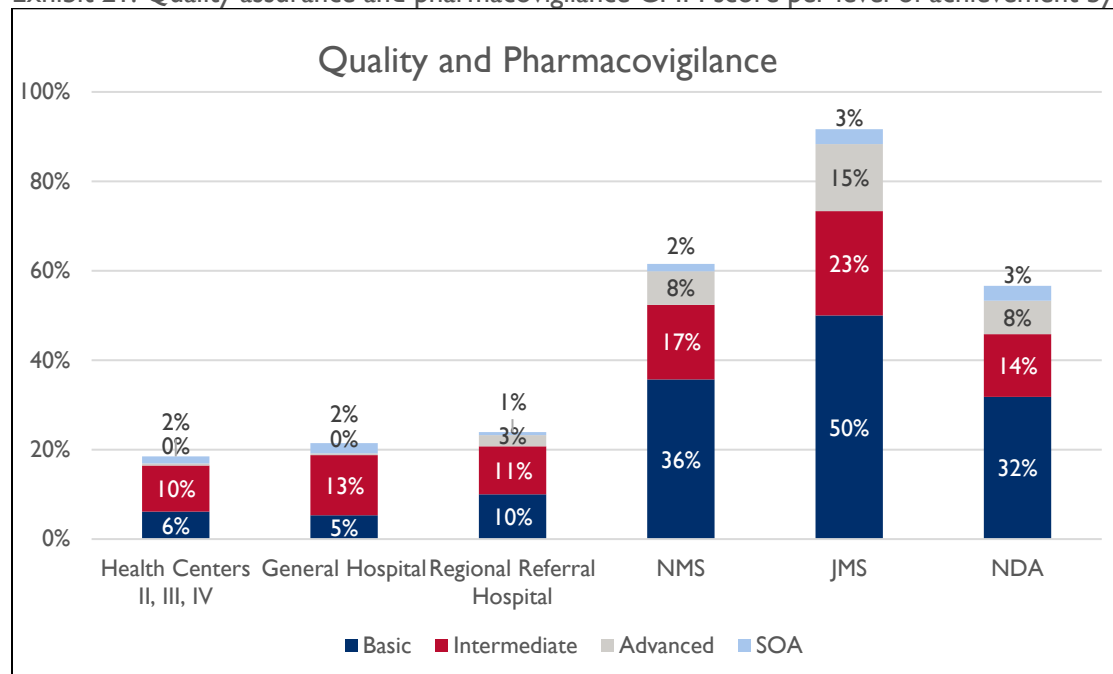
The MOH, having the mandate for such activities, should:

- Ensure that policy documentation and guidelines are disseminated to the requisite staff and entities at the national and subnational levels and implemented accordingly.
- Conduct routine refresher trainings on the guidelines to ensure understanding of and compliance with the established policies.
- Use root-cause analysis to establish why policy and governance scores are low in all supply chain tiers but particularly in the DHOs and RRHs.

Quality and Pharmacovigilance

Quality and pharmacovigilance in Uganda are mandated to the NDA to ensure guidance and implementation across the country. This section seeks to ensure that a resourced quality system exists for commodities across the supply chain and that facilities at all levels understand and can act on their role in pharmacovigilance for medicines. Exhibits 21 and 22 show QPV results. Major areas factored into the scoring for this CMM module are strong practices for quality assurance at the central level, evidence of a well-established PV system at all levels, and documented action protocols for PV results.

Exhibit 21. Quality assurance and pharmacovigilance CMM score per level of achievement by level



Maximum score for Basic is 50 percent; for Intermediate, 30 percent; for Advanced, 15 percent; for State of the Art, 5 percent. For instance, if the Basic portion is 45 percent, it should be interpreted as 45/50. See Exhibit 9 for more detail on CMM scores.

Exhibit 22. Key capability gaps, QPV

Gaps	Percent of facilities achieved	Possible solutions
<i>HC level</i>		
Percentage of facilities that identify stoppage of issuing medicines as a possible solution in an adverse drug reaction (ADR)	15 percent	Train dispensing agents at health centers to better understand how to adjust dispensing practices in an ADR
Percentage of facilities that have tools available for PV reporting	51 percent	Update and distribute PV reporting tools to all facilities
<i>GH level</i>		
Percentage of facilities that have action protocols based on PV results	46 percent	Disseminate and train staff on action protocols for ADRs and other PV events in all facilities
Percentage of facilities that identify stoppage of issuing messages as a possible solution in an ADR	21 percent	Train dispensing agents at HCs to better understand how to adjust dispensing practices in an ADR

Summary of results and discussion

The QPV scores reveal a divide between the central and downstream entities. JMS has the highest overall maturity score among all the facilities as revealed by its composite score of 91 percent, and a maximum possible score of 50 percent for basic and 15 percent for advanced. JMS performs quality checks on drugs it procures. However, scores at the service delivery sites were low, with 18 percent for HCs II–IV, 20 percent for GHs, and 25 percent for RRHs, indicating a lack of some of the basic elements to run a PV system.

Although the aggregate score for the NDA is 55 percent, the central-level assessment team who completed the CMM assessment noted that the NDA had a robust PV system, with all the relevant tools and processes in place, and properly documented; however, some of the functions were below the optimal level of performance. While the function was in place, certain levels of frequency or documentation practices were missing. Some of the questions that resulted in a lower basic score are:

- No recording of Certificates of Analysis and Certificates of Conformance for medicines received from international and/or domestic sources
- Long delays for QA results to return from the in-house laboratory (up to one month for results when it should be closer to one week)
- If the product quality is compromised, as determined through the quality assurance process, no standard operating procedures (SOPs) are in place to quarantine and/or recall the product available at this site/facility (in either electronic or paper copy).

Although drugs are checked for quality when entering the system from suppliers, the approach to QPV at the SDP level is not consistent. Only 51 percent of HCs II–IV reported having SOPs for quality control for adverse drug reaction, and only 28 percent of SDPs send an adverse reaction report to the NDA. Also, only 15 percent of health centers identified the stoppage of issuing products from a specific batch as a possible solution in an ADR.

This is a serious cause of concern that requires urgent attention from the GOU, since the quality and efficacy of the drugs consumed could be questionable, thus putting patients' lives at risk. It is a best practice that when QPV data are collected at hospitals and health facilities, these data are shared with the NDA and the MOH so that appropriate protocols are followed in ADRs and poor-quality medicines.

Recommendations

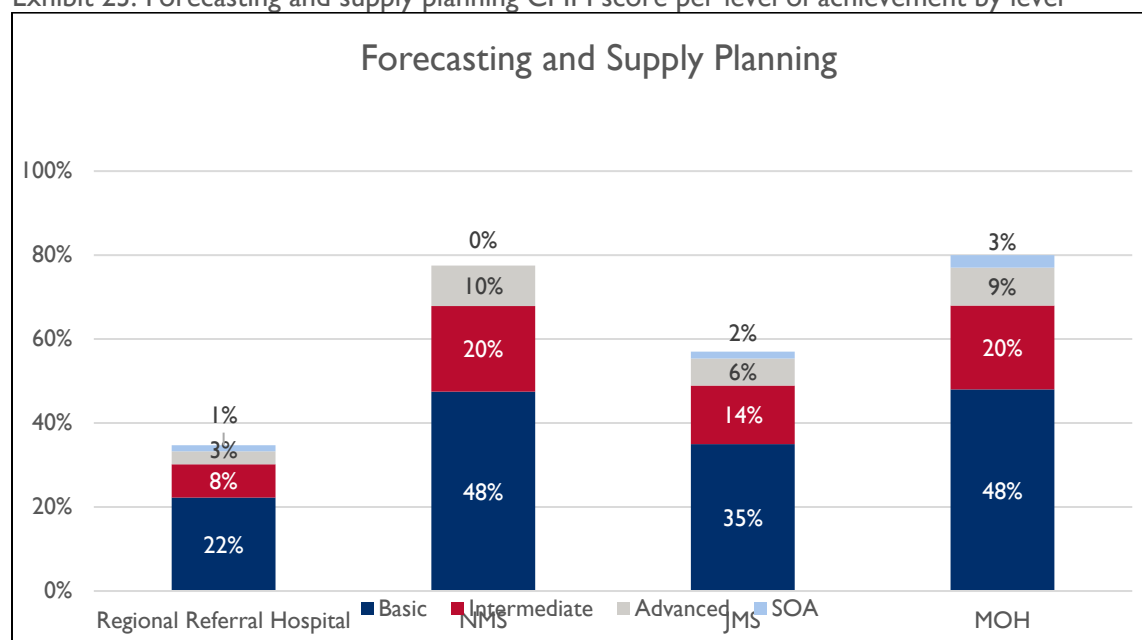
The NDA and the MOH should:

- Ensure that SOPs for pharmacovigilance are made available to relevant staff at all levels of the health system and staff are trained in the proper use of the SOPs
- Develop, share, and disseminate PV tools, updated regularly and made available across the entire system to support improved QPV
- Conduct a root-cause analysis to identify why quality and PV are low in the subnational facilities
- Ensure PV data are duly analyzed and results fed back to health providers

Forecasting and Supply Planning

The forecasting and supply planning section seeks to ensure forecasts are being created, using quality data and sound methodologies monitored frequently and ultimately informing procurement decisions. Exhibits 23 and 24 show FASP results. 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.

Exhibit 23. Forecasting and supply planning CMM score per level of achievement by level



Maximum score for Basic is 50 percent; for Intermediate, 30 percent; for Advanced, 15 percent; for State of the Art, 5 percent. For instance, if the Basic portion is actually 45 percent, it should be interpreted as 45/50. See Exhibit 9 for more detail on CMM scores.

Exhibit 24. Selected forecasting and supply plan accuracy indicators by level

Indicator	NMS	JMS	RRHs
n=	1	1	7
Average supply plan accuracy	100 percent	97 percent	3 percent
Average forecast accuracy	87 percent	95 percent	---

Summary of results and discussion

Forecasting is completed only at the following levels of service in Uganda: RRHs, MOH, NMS, and JMS. Data points from these entities are used to inform forecasting and supply planning across Uganda's decentralized health care delivery model. The MOH scored 80 percent, a positive achievement, followed by NMS with a composite score of 78 percent. Both entities nearly reached the maximum basic score of 50 percent. JMS earned a composite score of 57 percent, and RRHs had a total score of 34 percent. The MOH and NMS achieved 48 percent for the basic level, nearly meeting the 50 percent threshold, and the MOH attained a 3 percent state-of-the-art score, indicating the presence of more sophisticated forecasting tools and processes. Looking at the KPIs, NMS has high forecast and supply chain accuracy rates, signifying better availability and use of logistics data, and the consistent development, updating, and execution of supply plans.

The maturity observed at the basic levels of the central entities suggests that Uganda has a solid foundation from which to generate and execute forecasts and supply plans, particularly at the MOH and NMS. Using standard software, a dedicated forecasting and supply planning (FASP) unit at the MOH leads the forecasting exercise on established annual dates, developing plans for one, two, and three years into the future, accuracy that is evaluated each year. This collaborative process involves stakeholders from different MOH divisions, NMS staff, development partners, vertical disease program representatives, consultants, and lower-level facility staff. Without specialized software, the MOH QPPU unit also leads forecasting activities for NMS, creating plans informed by stock on hand, consumption, shipment status, financial cycles and lead times, one year into the future. Forecasting exercises at the MOH and NMS use all available data: morbidity, consumption, demographic projections, and service statistics. NMS received full points for including all possible participants — the MOH QPPU unit, other MOH personnel, vertical disease program representatives, NMS staff, development partners, and lower-level supply chain staff from warehouses and SDPs — in the annual forecasting exercise and sharing the resultant plan with external partners for coordination purposes.

An imbalance in forecasting capabilities observed at JMS and RRHs is evident from their maturity scores. While 100 percent of RRHs forecast their health commodity requirements, only 13 percent involve the MOH FASP unit and only 20 percent involve the central medical stores, misalignment that could be contributing to their lower CMM composite score and a larger outcome of day-to-day stock challenges that might be otherwise avoided if forecasts were shared. The RRH average supply plan accuracy KPI value of 3 percent indicates that RRHs require further technical assistance in this area. A further explanation could be that only 13 percent of RRHs use standardized health forecasting software (e.g., PipeLine, Quantimed, LabEquip, or other commercial sector solutions), and only 33 percent of RRHs have generated action plans based on forecast accuracy. For data inputs, 100 percent of RRHs use consumption data for forecasting and 60 percent also use morbidity-based forecasting. While software may be an issue, other signs, including low forecast accuracy, poor LMIS record accuracy, and no outside technical assistance during forecasting, suggest that RRHs could use additional technical assistance in forecasting. JMS, on the other hand, leads its own forecasting exercise without input from the MOH, vertical disease programs, or development partners, and forecasts one year into the future using only consumption data, which factors in wastage and missed demand. Forecasts at JMS are used mainly to inform ordering and mobilize resources from outside entities without measuring accuracy annually. With no formal process to update

the supply plan, changes are not communicated to downstream facilities. Further, cost recovery is the only mechanism to finance the forecasting function at JMS.

Exchange of knowledge and skills from the MOH's QPPU unit beyond NMS could foster a balanced, shared, and robust pool of forecasting and quantification experts. Coordination between the MOH and all downstream entities could improve Uganda's FASP process and targets, achieved through information dissemination, transparency, and better stakeholder alignment.

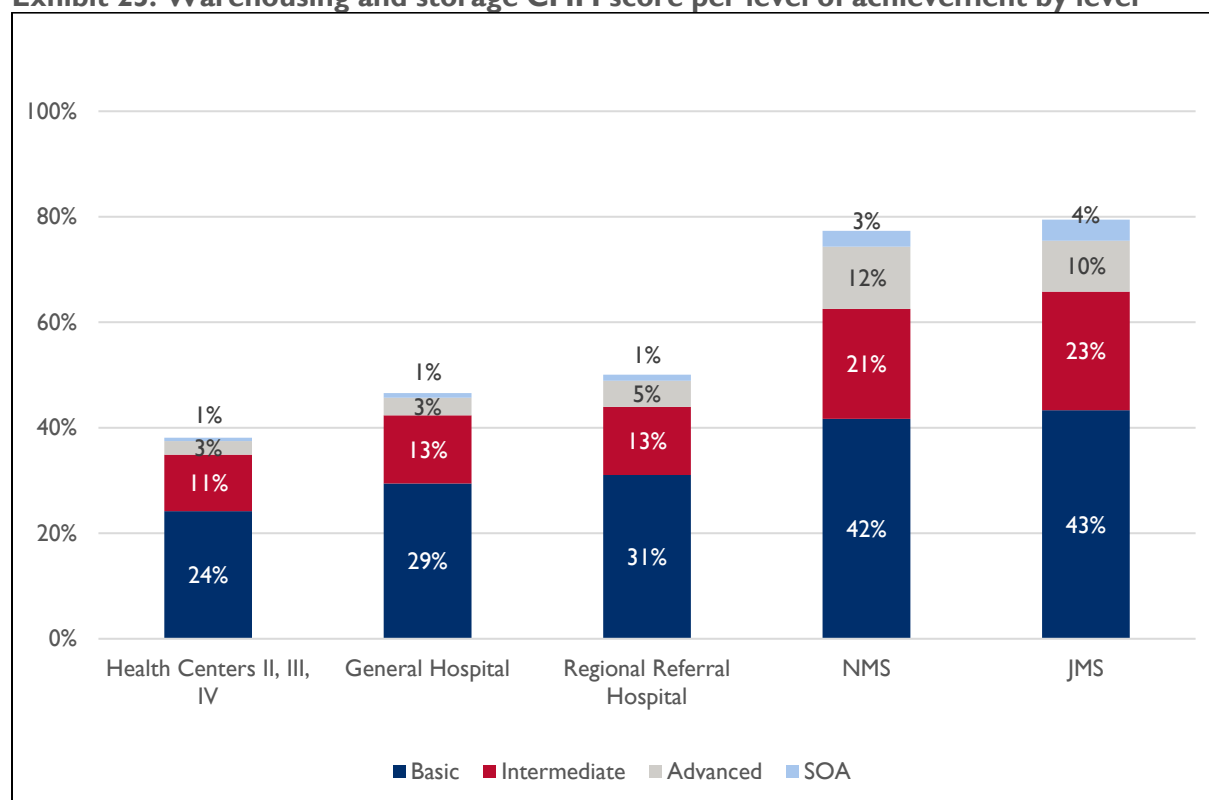
Recommendations

- Conduct a detailed review of FASP across all central entities and hospitals to establish why there is a wide range of functional capability.
- Track MOH supply planning accuracy to enable timely interventions that prevent supply disruptions.
- Strengthen capacity building for forecasting and supply planning as well as implementation skills. The MOH should set up a process or system for exchanging knowledge, skills, and capacity-building interventions between itself, NMS, JMS, and RRHs.
- Develop FASP guidelines to ensure a sustainable process.
- Support RRHs in improving data quality and forecasting through training, supportive supervision, and data quality reviews.

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. Exhibits 25–29 show warehousing and storage results. 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.

Exhibit 25. Warehousing and storage CMM score per level of achievement by level



Maximum score for Basic is 50 percent; for Intermediate, 30 percent; for Advanced, 15 percent; for State of the Art, 5 percent. For instance, if the Basic portion is actually 45 percent, it should be interpreted as 45/50. See Exhibit 9 for more detail on CMM scores.

Exhibit 26. Warehousing capability maturity model score by facility type

Facility Type	Average percent	Facility Type	Average percent
HCs	38 percent (26–59 percent)	General Hospitals	47 percent (29–61 percent)
RRHs	50 percent (44–55 percent)	NMS	77 percent
JMS	79 percent		

Exhibit 27. Key capability gaps, warehousing and storage

Gaps	Percent of facilities achieved	Possible solutions
<i>HC level</i>		
Availability of SOPs for controlled substances and high-value products available on day of visit	3 percent	Review, update, revise, and redistribute SOPs for controlled substances and high-value products
Annual internal audits performed at the facility	20 percent	Initiate standardized audit tools and practices at all HCs
<i>RRH level</i>		
Proportion of facilities that have buffer or security stock in inventory management system	47 percent	Update guidelines and train appropriate staff on maintaining buffer stock on hand
Annual internal audits performed at the facility	0 percent	Initiate standardized audit tools and practices at all RRHs

Exhibit 28. KPI: Average SATP by facility type and tracer product

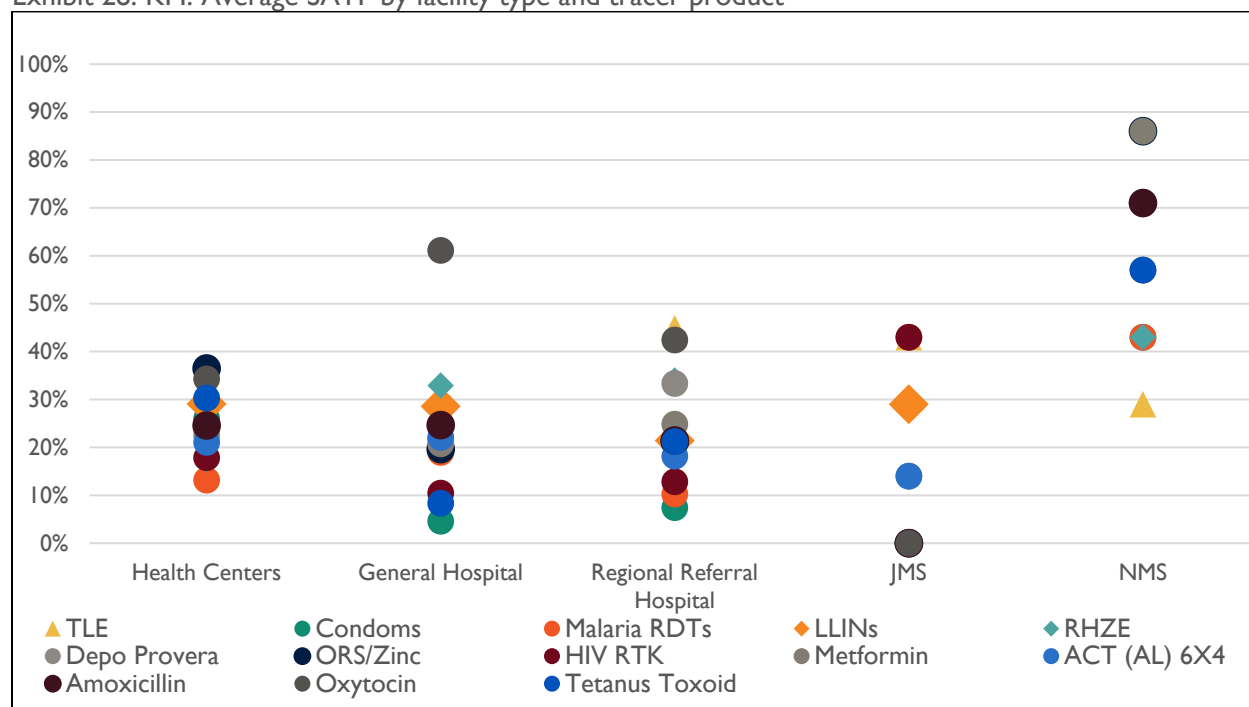


Exhibit 29. KPI — eLMIS record accuracy: percentage of facilities at 100 percent accuracy across facilities



Summary of results and discussion

The CMM scores indicate a wide range of scores across the health system. RRHs and GHs score around 50 percent, with HCs scoring 39 percent. As the primary central warehouses for public sector health commodities, NMS and JMS scored close to 80 percent, at 77 percent and 79 percent, respectively. This is encouraging, as it suggests that both entities have the maturity capability that is appropriate for being at the top of the supply chain. However, Exhibit 28 indicates a wide variance among tracer products for being SATP; 29–86 percent SATP for NMS and 0–43 percent for JMS.

Across all levels of service engaged in warehousing, HCs scored the lowest, at 38 percent. A further look at HCs finds that the KPIs corroborate the low score observed for the CMM module. Stockout rates were 22 percent for any commodity on the day of visit, with 55 percent of HCs having 100 percent accuracy of stockcards and 33 percent having 100 percent accuracy of eLMIS records (of those that have one). For GHs the CMM module score was 47 percent, with 11 percent having a stockout of any commodity on the day of visit.

At RRHs, a CMM score of 50 percent was achieved with 11 percent of RRHs having a stockout of any commodity on the day of visit. Also concerning is that only 19 percent of RRHs had 100 percent eLMIS record accuracy, and 41 percent of RRHs had 100 percent stockcard accuracy. RRHs also had commodities stocked according to plan only 24 percent of the time, on average, with 9 percent of the 182-day period measured with a stockout.

Exhibit 30. Warehousing and storage KPI score by level (average score with some ranges)

Indicator	HCS	GHs	RRHs	NMS	JMS
n=	83	16	7	1	1
Stocked according to plan (tracer commodities)	25 percent (13–36 percent)	23 percent (5–61 percent)	24 percent (7–45 percent)	60 percent	33 percent
Stockout on day of assessment	22 percent	11 percent	11 percent	0 percent	0 percent
Stockout for 182-day period: percent of days out of stock in previous six months	12 percent	6 percent	9 percent	---	---
Average number of days per month with stockout, given that there was a stockout	6.4	4.3	6.3	---	---
Stockcard accuracy (percentage of facilities at 100 percent)	55 percent	65 percent	41 percent	----	----
eLMIS record accuracy	33 percent	21 percent	19 percent	97 percent (87–144 percent)	119 percent (94–138 percent)
Emergency orders as a percent of total orders	0 percent	3 percent	1 percent	3.40 percent	----
Percentage of facilities that have temperature logs	68 percent	66 percent	85 percent	100 percent	100 percent
Percentage of time with temperature excursion	2 percent	0 percent	1 percent	2 percent	6 percent

A dash implies that the indicator was not collected at that level, whereas a zero implies the true value of that indicator is zero.

The observed low maturity scores and poor indicator performance for selected tracer commodities suggests the need for significant improvements in warehousing and storage. SATP levels that are consistently below 60 percent and as low as 23 percent indicate poor inventory management and stock management practices at all levels of the supply chain system. While JMS and NMS have high overall warehousing and distribution scores (almost 80 percent), they have poor performance for SATP with 33 percent and 60 percent, respectively. This suggests that further examination is needed to understand if maximum and minimum stock thresholds are set appropriately or if an operational issue is limiting performance. In examining the eLMIS record accuracy for NMS and JMS, both have strong performance with stock accuracy, further indicating that the problem may be around minimum/maximum policies, but further investigation is required to understand the root cause.

Most concerns are at the HC level, where poor stockcard accuracy (55 percent), poor eLMIS accuracy (33 percent), and poor SATP metrics (25 percent) are all contributing to the consistent stockout rates. A total 22 percent of all HCs were stocked out of at least one tracer item on the day of the visit. Also, over a 182-day period, HCs were stocked out of at least one tracer product 12 percent of the time. Looking at the CMM score, this poor performance is corroborated with only 48 percent of basic items in place for warehousing and storage, leaving much room for improvement. Key gaps in these basic items are 41 percent of HCs lacking any secondary source for consistent power supply and only 12 percent of health centers having controlled access and/or a lockable container for high-value products and controlled substances. Also, only 68 percent of HCs have temperature monitoring logs in place.

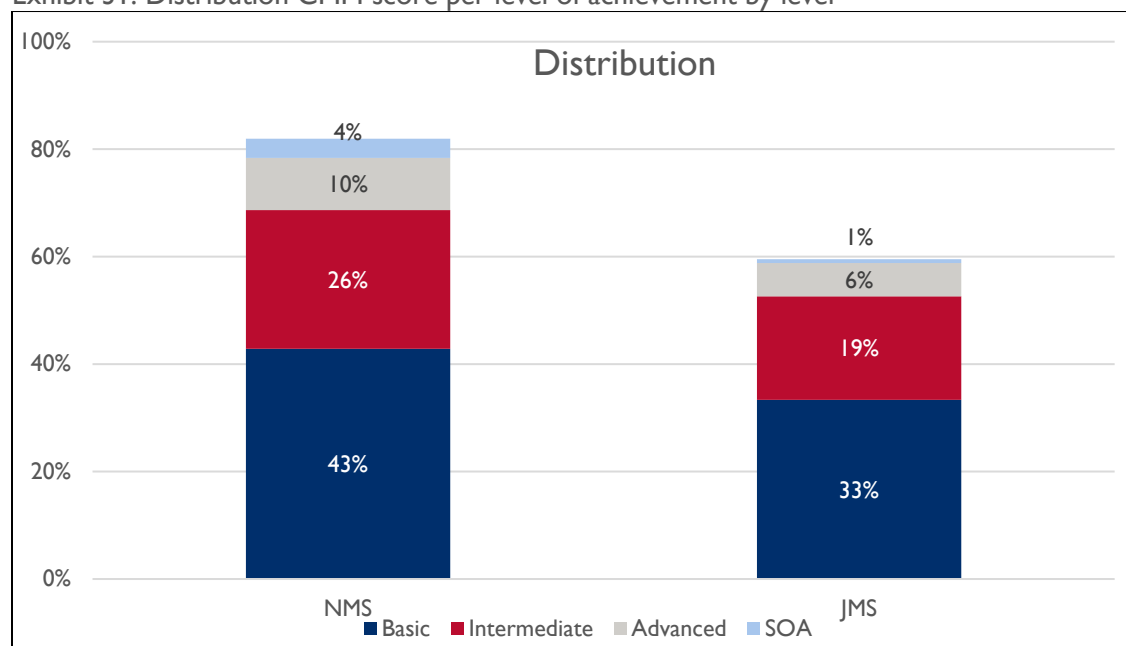
Recommendations

- Strengthen inventory management and control through training, supportive supervision, mentoring, and data quality reviews at all health system levels. Health centers especially need to strengthen systems for record-keeping practices for stockcards and eLMIS records, SOPs for high-value products and controlled substances, and equipment and training for temperature monitoring.
- Identify whether the poor SATP at the central level is due to inaccurate stock-level recommendations or an inability to adhere to them operationally. This will require further root-cause investigation.
- Conduct a root-cause analysis to determine why the stockouts become worse the further down the supply chain tiers the facility is. Also, provide training on completing various LMIS forms (e.g., stockcards, inventory control cards, and other record-keeping and reporting forms) across all supply chain tiers.
- Provide training on paper LMIS and eLMIS across all supply chain tiers to ensure sites accurately record and report logistics data for making informed decisions on quantities to resupply, quantify, and procure.
- Conduct an equipment and records assessment to determine the requirements for cold chain backup, monitoring, and tracking and raise funds to equip HCs with inverters and solar equipment. This should include regular supply of monitoring and tracking tools.
- Create a separate space and conduct an optimization assessment to accommodate planned stock levels. Based on observations, and not specifically through the assessment tools, enumerators noted this need, as it affects facilities' ability to stock according to plan.

Distribution

The distribution section seeks to ensure that distribution plans are structured and monitored to ultimately achieve on-time distribution of health commodities to service delivery points. Exhibits 31 and 32 show distribution results. Major areas that were factored into the scoring for this CMM module are existence of a distribution plan, consideration of appropriate factors for optimizing distributions, appropriate policies and procedures, active recording and monitoring of cost and transit data, and appropriate mechanisms to ensure safety and quality of products during transit.

Exhibit 31. Distribution CMM score per level of achievement by level



Maximum score for Basic is 50 percent; for Intermediate, 30 percent; for Advanced, 15 percent; for State of the Art, 5 percent. For instance, if the Basic portion is 45 percent, it should be interpreted as 45/50. See Exhibit 9 for more detail on CMM scores.

Exhibit 32. KPI 13, On-time order rate

Indicator: OTD rate	HCs	GHs	RRHs
All orders	22 percent	53 percent	75 percent
Routine orders	21 percent	53 percent	75 percent
Emergency orders	N/A	6 percent	8 percent

Note: OTD is defined as +/-0 days of agreed delivery date.

Summary of results and discussion

With the central responsibility of procuring, warehousing, and distributing pharmaceutical products to all public health facilities, the NMS composite score above 80 percent is a positive achievement. NMS

achieved higher marks in each scoring category, where JMS scored 60 percent in total. Contributors to this low score are a lack of data management system for capture transport data, a lack of KPIs for monitoring transportation activities, and a lack of key vehicle or product considerations during route planning. Supplying the lion's share of pharmaceutical products, an 82 percent score suggests that NMS can deliver on its responsibility to support Uganda's public health sector. It has most of the appropriate policies and procedures in place to support this function. However, a review of OTD data from NMS customers, the facilities, finds some performance gaps. Overall, NMS delivers on time to health facilities just 22 percent of the time with significantly better performance at GHs (53 percent) and RRHs (75 percent). OTD is measured as the exact promised delivery date, with no buffer or multiday delivery window.

NMS operates under an approved distribution plan that captures downstream distribution and operations in a data management system. Most disease programs or partners integrate distributions where possible. NMS has in place a daily, real-time system for capturing and maintaining transportation data. Further, distribution routes are reviewed annually, considering truck capacity and geographic location. NMS has SOPs available for distribution, which cover all relevant areas except redistribution. NMS uses radio frequency identification (RFID) tags as a security measure along with GPS, barcode scanning, unannounced inspections, and partnerships with local policy precincts. While the GOU covers 100 percent of the distribution budget, NMS has used total cost data and specific interventions to target transportation cost reduction.

JMS publishes an approved distribution plan and communicates schedules to facilities. The distribution routes are preplanned with routes reviewed biannually. While routing at JMS does not consider truck capacity, product volumes, or geographic locations, distribution is integrated whenever possible. Policies are in place at JMS that cover distribution and include cold chain, transport of expired drugs, security, storage during transport, and documentation, and outbound shipments stocks are reconciled with proofs of delivery. For security purposes, JMS has requirements in place for trucks and personnel and an established process for documenting loss incidents. For security management, JMS uses integrated audit procedures at beginning/end, along with barcode scanning, and performs unannounced inspections.

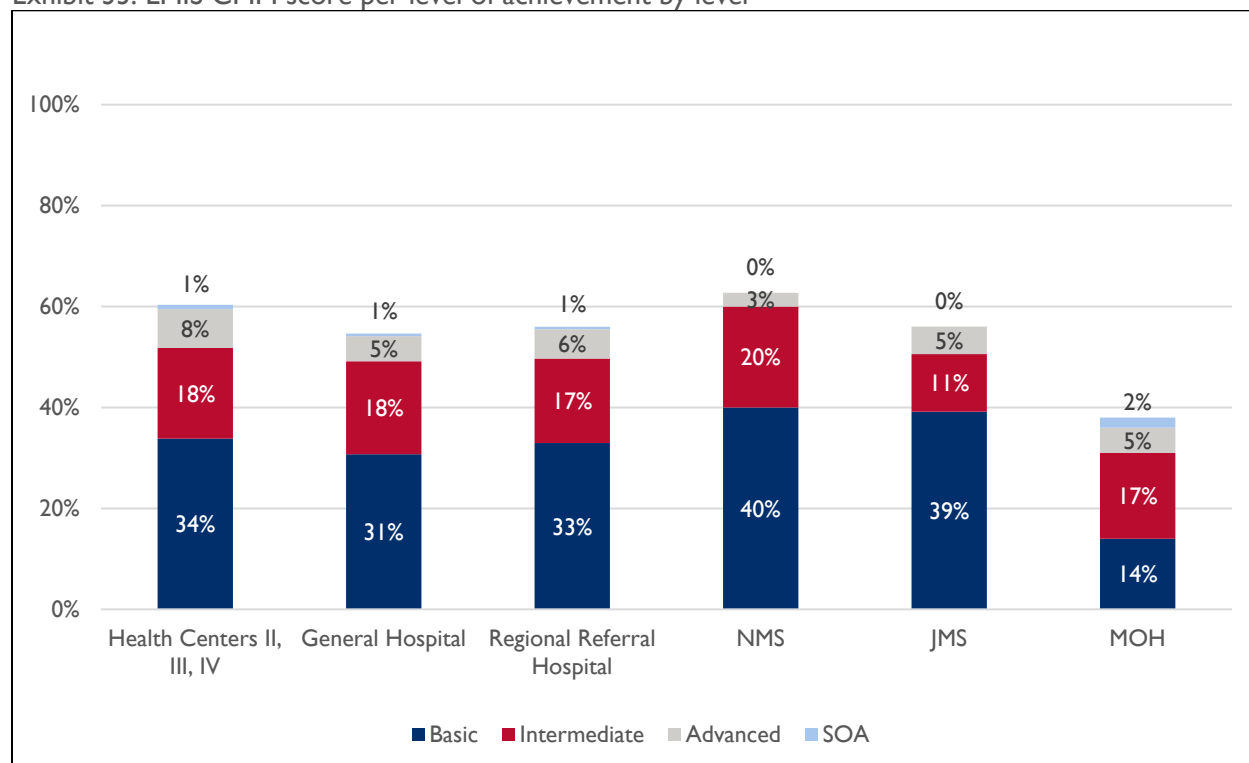
Recommendations

- Review JMS distribution practices and launch an improvement to systematically capture data on distributions and use this information in route planning (geography), as well as truck capabilities (truck capacity, weight of products, and product volumetrics).
- Set more realistic delivery windows (+/-3 days) and continue to track OTD rates at lower-level facilities to understand the true level of performance that NMS has in delivering throughout the supply chain (MOH). This will allow for performance benchmarking and the ability to create a plan to reach satisfactory performance in a smaller window.
- Consider truck capacity, product volume, product weight, and geographic location when planning distribution routes (JMS).

LMIS

The LMIS section seeks to ensure the right tools, SOPs, policies, and guides are in place to enable a site to order the required product and report stock status, on time. Exhibits 33–36 show LMIS results. Major areas that were factored into the scoring for this CMM module are evidence of standardized LMIS tools and practices used consistently throughout the system, harmonized reporting practices, regular reporting intervals, performance monitoring on quality of reporting, and appropriate equipment and support to perform the function at all facilities.

Exhibit 33. LMIS CMM score per level of achievement by level



Maximum score for Basic is 50 percent; for Intermediate, 30 percent; for Advanced, 15 percent; for State of the Art, 5 percent. For instance, if the Basic portion is 45 percent, it should be interpreted as 45/50. See Exhibit 9 for more detail on CMM scores.

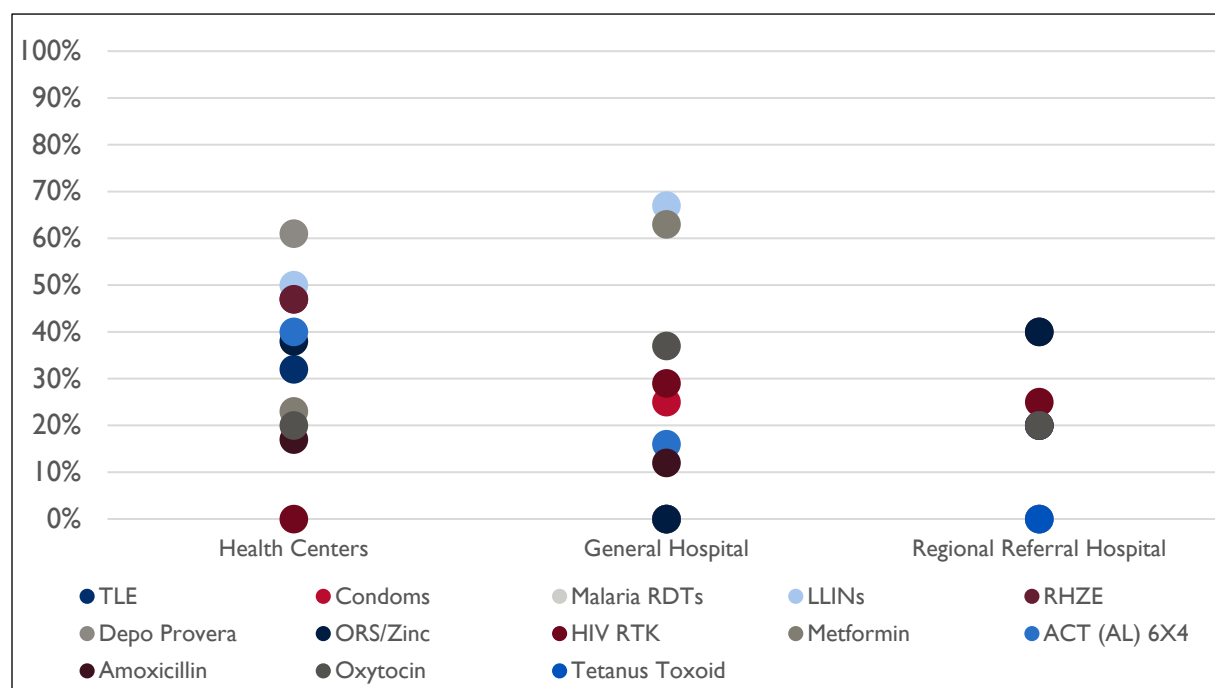
Exhibit 34. LMIS CMM score by facility type

Module		Average percent	
HCs	60 percent (36–89 percent)	GHs	55 percent (39–69 percent)
RRHs	56 percent (40–77 percent)	JMS	56 percent
MOH	37 percent	NMS	63 percent

Exhibit 35. Selected LMIS indicators by level

Indicator	HCs	GHs	RRHs
n=	83	16	7
eLMIS record accuracy: percent of facilities at 100 percent accuracy	33 percent	21 percent	19 percent
Average deviation from 100 percent accuracy across facilities	126 percent	154 percent	1,648 percent

Exhibit 36. KPI: eLMIS record accuracy: Percentage of facilities at 100 percent accuracy across facilities

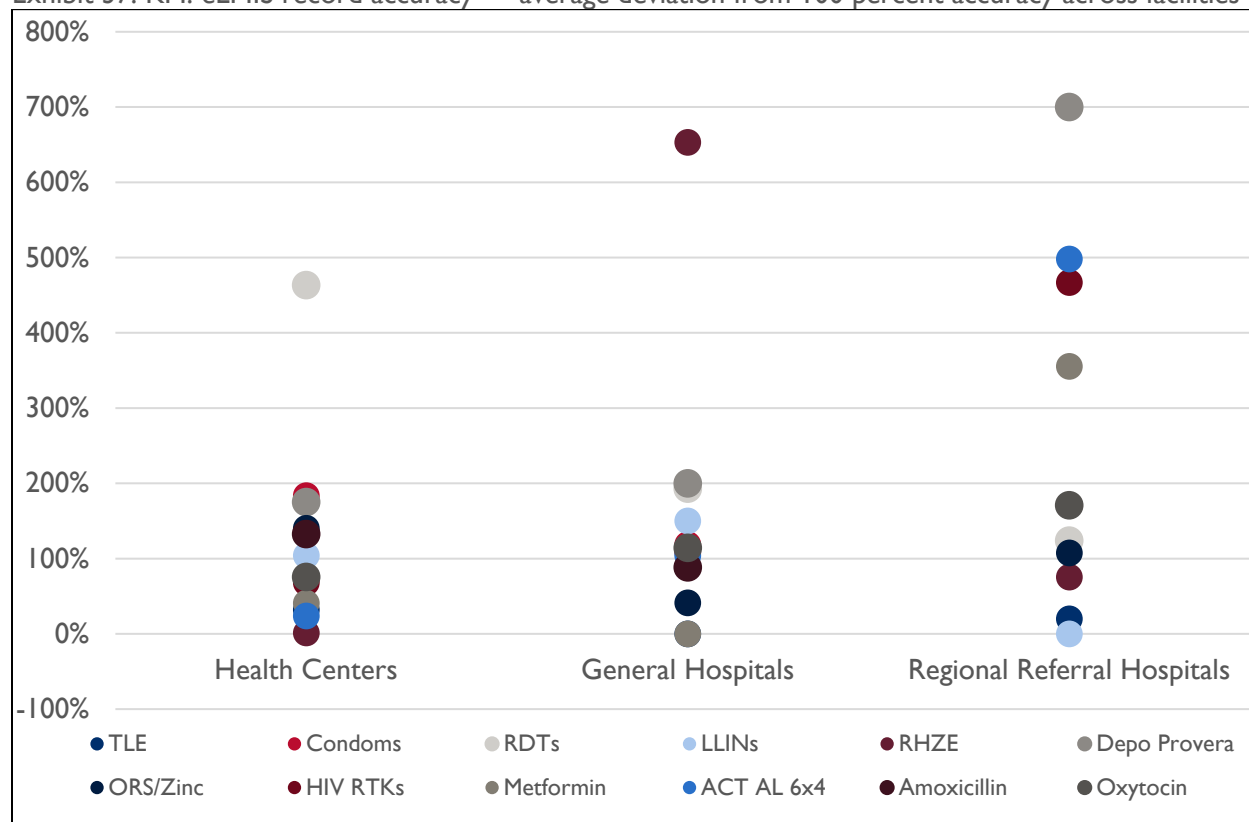


Summary of results and discussion

Virtually all entities have a foundational grasp of LMIS, with scores converging around 60 percent, except for the MOH at 38 percent. The MOH's lower score may be partially explained by its operating structure, as the recipient of data from all other entities. Many basic-level scoring points were lost at the MOH for a lack of information being recorded in the paper LMIS — almost no dimensions are captured. Although eLMIS integrates more data points, adjustments, loss/expiry, issues/receipts, and expiry dates are still missing from the ministry's data capture. Further, the MOH does not track KPIs for timeliness, completeness, or accuracy of reports submitted. The fact that the GOU has minimal funding in its budget for LMIS also impacts systems implementation and the ability of facilities down the supply chain to incorporate more robust systems. NMS had the highest composite score at 63 percent, and HCs I–IV were a close second at 61 percent.

At the lower-level facilities, HCs, GHs, and RRHs scored 60 percent, 55 percent, and 56 percent, respectively. A look at the associated KPIs finds corroboration for their suboptimal scores. For the KPI eLMIS record accuracy, average deviation from 100 percent accuracy, HCs, GHs, and RRHs scored 33 percent, 21 percent, and 19 percent, respectively.

Exhibit 37. KPI: eLMIS record accuracy — average deviation from 100 percent accuracy across facilities



Note that for ease of display, two large outliers for RRHs have been omitted in the exhibit: 13,262 percent for amoxicillin and 2,249 percent for condoms.

All the important building blocks are at various levels of completeness in holistically integrating LMIS across the health system. JMS, NMS, and the MOH use paper-based and electronic LMIS. In all, 100 percent of GHs have an LMIS in place with 16 percent strictly using eLMIS; 45 percent are still paper based, and 39 percent use a mixture of both. Of those GHs using paper, 71 percent reported that data loss, data analysis, and data sharing are all challenges faced with a nonelectronic system. Inventory management tools are standardized across JMS, NMS, and the MOH's supply chain, and a formal mechanism is in place to report technical issues with LMIS and a help desk entity to address questions. NMS and the MOH also have a technical working group for LMIS. NMS and JMS have SOPs in place for paper-based LMIS and eLMIS. The MOH has established eLMIS SOPs but updates them only every three years. LMIS data at NMS are used to inform ordering and reporting, forecasting and supply planning, procurement, reverse logistics, inventory management, and budgeting. Items missing from reports include redistribution and waste management.

The MOH has harmonized reporting frequency across system levels, aligning all vertical programs to the same reporting cycles. NMS also commented that nearly all vertical programs have the same monthly reporting cycle in Uganda. JMS has streamlined commodity reports down to just one to three per month and tracks the completeness and timeliness of reporting by lower-level facilities. For data quality assessments (DQAs), 100 percent of GHs conduct DQAs, mixing implementers with the MOH, regional warehouse staff, and internal staff. At NMS, DQAs are conducted at the central, district, and HC levels. Half of HCs have their own staff conducting DQAs.

Internet connectivity and lack of skilled staff and/or insufficient resources to train staff were uniformly cited as barriers to eLMIS uptake across the MOH, JMS, NMS, and GHs. Only 37 percent of GHs say they have strong internet connectivity that always works. The MOH and NMS noted data loss or downtime from central systems failure as challenges. The MOH included data analysis challenges, while NMS referenced the availability of computers as a barrier to implementing eLMIS. JMS and NMS indicated data integrity issues, and JMS cited lack of time as one of its biggest challenges. This lack of time stems from JMS having to enter paper-based LMIS reports on behalf of HCs that are unable to enter the data themselves. This challenge needs to be addressed **also from an HR perspective.**

Additional focus is needed at the RRH level on eLMIS operations and data quality. Having scored sub optimally on the CMM and performed poorly on the eLMIS accuracy indicator, this function is not getting enough attention at the RRH level. Accurate and consistent record keeping will ensure these hospitals have the proper medicines to treat the sickest patients.

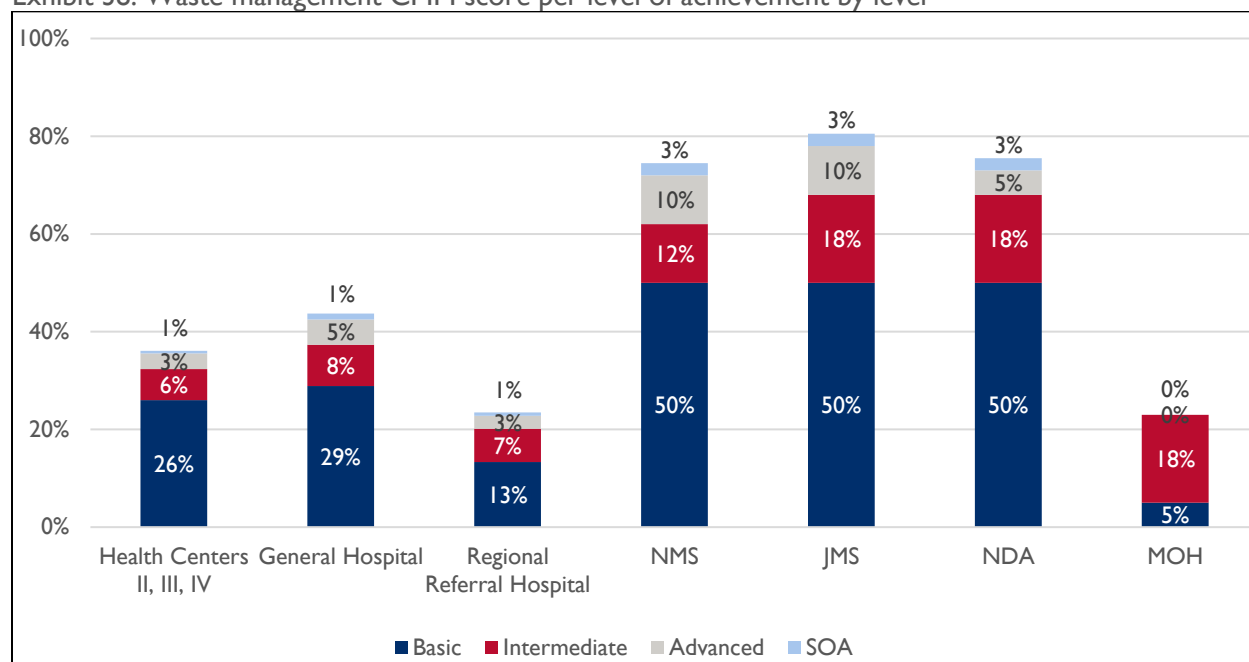
Recommendations

- Review MOH LMIS KPIs to assess accuracy and timeliness and transition to eLMIS in earnest. As performance improves with regular eLMIS use, retire the paper-based LMIS.
- Review LMIS operational capabilities across all entities, followed by appropriate data quality and LMIS SOP training, particularly at RRHs.
- Conduct supportive supervision for eLMIS staff after training to ensure retention of knowledge and improved eLMIS metrics performance.
- Advocate to the GOU and other stakeholders for the need for additional LMIS funding and seek technical assistance to improve existing data capture.

Waste Management

The waste management section seeks to guarantee that national plans are being followed and that unusable products are quarantined and properly disposed of. Exhibits 38–40 show waste management results. Major areas that were factored into scoring for this CMM module are 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.

Exhibit 38. Waste management CMM score per level of achievement by level



Maximum score for Basic is 50 percent; for Intermediate, 30 percent; for Advanced, 15 percent; for State of the Art, 5 percent. For instance, if the Basic portion is 45 percent, it should be interpreted as 45/50. See Exhibit 9 for more detail on CMM scores.

Exhibit 39. Wastage (damage, theft, and expiry) as a percentage of total stock available, by level

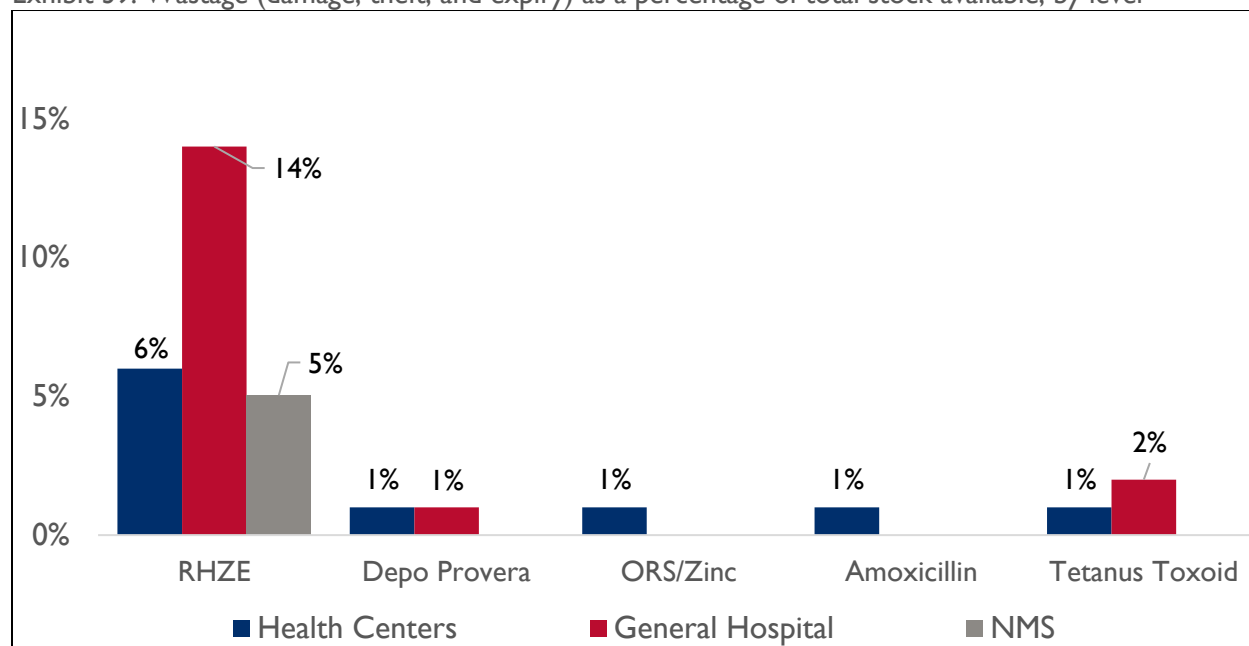


Exhibit 40. Key capability gaps, waste management

Indicator	Percent of facilities achieved	Possible solutions
<i>GH level</i>		
Percentage of sites that document and authorize waste disposal	41 percent	Conduct trainings with updated SOPs to institutionalize waste management processes
<i>RRH level</i>		
Approved waste management SOPs available on day of visit	13 percent	Update and distribute SOPs to all GHs
Annual internal audits performed at the facility	0 percent	Initiate standardized audit tools and practices at all RRHs
Percentage of sites that document and authorize waste disposal	40 percent	Conduct trainings with updated SOPs to institutionalize waste management processes

Summary of results and discussion

The waste management overall maturity scores range from 23 percent at the RRHs to 81 percent at JMS. Maturity scores are the lowest at the lower-level facilities and hospitals and highest at NMS, JMS, and the NDA. Looking at this result in depth, NMS, JMS, and the NDA all had 100 percent of the basic items in place, while none of the lower-level facilities had anywhere near this level of basic scores. While HCs and hospitals did not have high composite scores, 82 percent of HCs reported that unusable pharmaceutical products are stored separately. Also, 87 percent of GHs and 60 percent of RRHs indicated that the basic principles for proper waste management are there and can be expanded upon, particularly in documenting waste practices, as only 20 percent of HCs authorize and document their disposal events.

A look at the related KPIs for this module finds an alarming level of wastage for the first-line tuberculosis drug RHZE. As much as 14 percent (as a percentage of total stock on hand) of RHZE was allowed to expire at GHs. Different packaging formats for a shipment of RHZE and a lack of sensitization training possibly contributed to this stock situation. This suggests that better training is required for health workers and more care is needed during dispensing to avoid expiration, along with clear SOPs and guidelines to deal with this large quantity of unusable pharmaceuticals at GHs. Exhibit 40 indicates that GHs have poor waste management practices in general, with few having approved SOPs and documentation of disposal events. Addressing this gap should be a priority at this level of the supply chain.

Established SOPs and guidelines for waste management vary across facilities. Overall, coordinated waste management guidelines and associated implementation below the central level seem to be lacking. The CMM indicated a concerning absence of waste management protocol at the MOH. While an MOH unit is responsible for managing waste, national guidelines do not exist, and the MOH does not operate under approved guidelines. A total 35 percent of GHs and 42 percent of HCs had SOPs available for waste management; 27 percent of these GHs indicated SOPs are updated annually, and 30 percent responded SOPs are either not updated or the respondent was unclear on the frequency. Of the 13 percent of RRHs with waste management SOPs, the documents have never been updated. The NDA, JMS, and NMS, on the other hand, do have waste management protocols in place. NDA's national waste management guidelines include procedures for general waste, hazardous waste, infectious waste, and unusable medical pharmaceutical product (UMPP). SOPs for waste management at JMS are available and updated every two years, while NMS updates its waste management SOPs annually, or more often.

The NDA and JMS use best waste management practices, through regular KPI collection, internal and external audits, and onsite monitoring, which is integrated into their respective LMIS. A total 27 percent of RRHs also integrate waste management into their LMIS. While 79 percent of GHs do onsite monitoring of waste management practices, only 35 percent conduct internal or external audits. Only 13 percent of HCs have external audits for waste management. The MOH does not use software to track waste management; rather, it monitors through internal audit and collection of KPIs. The MOH does identify and track corrective actions; however, the process was not articulated by interviewees.

For UMPP, the NMS waste management process involves inertization or solidification, followed by landfill disposal of treated waste residues or engaging a third-party certified waste management company to pick up, transport, and dispose. At JMS, UMPP is taken to a higher-level government of Uganda facility or also handled by third-party disposal pick-up service. Disposal processes at both central-level warehouses are appropriately authorized and documented. At the GHs, 45 percent choose onsite incineration for expired

product, while 57 percent transport to a higher-level facility and 11 percent use the local landfill. For HCs, 65 percent reported transporting their unusable medical pharmaceutical products to a higher-level warehouse.

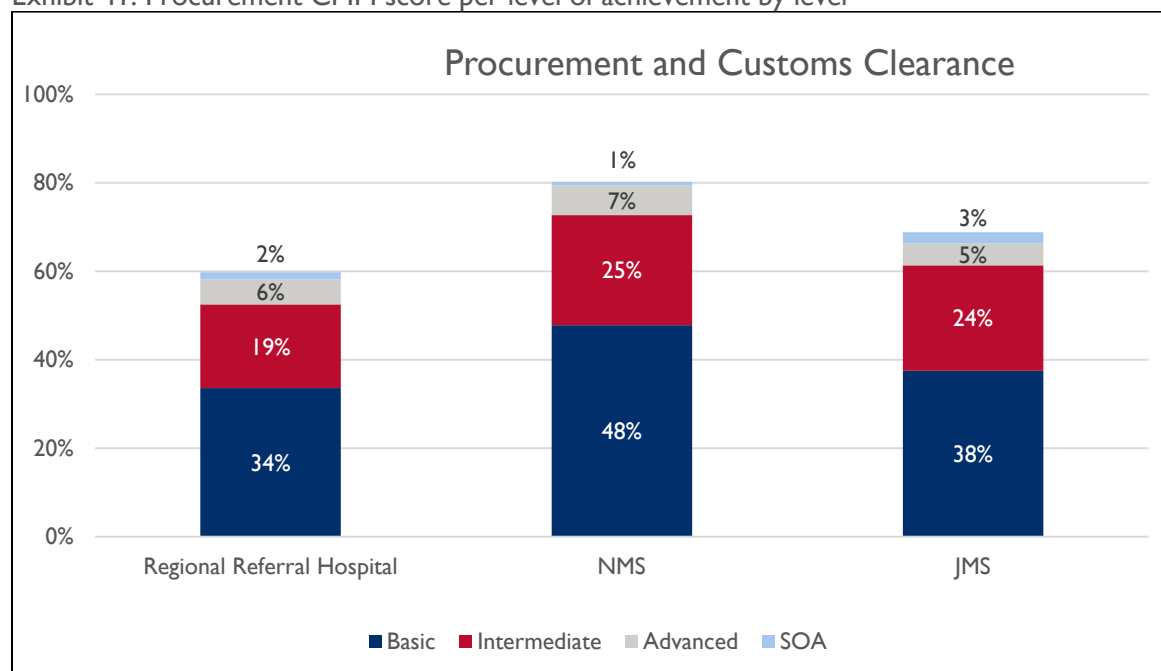
Recommendations

- Review waste management capabilities and processes for removal at lower-level HCs.
- Establish and publish clear waste management guidelines and SOPs for the MOH, as well as best practices for storing unusable and expired pharmaceutical products.
- Pay special attention to the lower-level HCs by setting up a waste management system.
- Update and redistribute SOPs for waste management practices and provide supportive training at all types of hospitals nationwide.

Procurement and Customs Clearance

The procurement and customs clearance section seeks to determine that procurements are done transparently and in accordance with best practices. Exhibits 41 and 42 show procurement and customs clearance results. Major areas that were factored into the scoring for this CMM module are transparent, auditable procurement systems governed by policies and procedures, active management of vendor performance, and well-functioning customs clearance processes. This module was designed with public-sector procurement systems in mind.

Exhibit 41. Procurement CMM score per level of achievement by level



Maximum score for Basic is 50 percent; for Intermediate, 30 percent; for Advanced, 15 percent; for State of the Art, 5 percent. For instance, if the Basic portion is 45 percent, it should be interpreted as 45/50. See Exhibit 9 for more detail on CMM scores.

Exhibit 42. Procurement, select KPIs

Indicators	NMS	JMS
Percentage of products procured that are on the Essential Medicines List (NEML)	84 percent	88 percent
Percent of international reference price paid (average of five tracer products)	83 percent	61 percent
Emergency orders as a percentage of total procurements	3.4 percent	---
Direct orders as a percentage of total procurements	---	1.32 percent

Summary of results and discussion

Procurement and Customs Clearance activities are conducted at RRHs, JMS, and NMS, which earned composite scores of 61 percent, 70 percent, and 81 percent, respectively. The overall maturity score for procurement is high at NMS, above the ideal 80 percent threshold, close to meeting the basic and intermediate maximum scores.

NMS performs all customs clearance in-house and reported that it typically takes three days to one week to get products out of the port of entry. During sourcing and bidding at NMS and JMS, standard treatment guidelines (STGs), the EML, and medical supplies list are consulted, and NMS further integrates forecasts. While 100 percent of RRHs reference EMLs during sourcing and procurement, only 56 percent reference forecasts. JMS has a documented process in place for identifying vendors, including an approved vendor list, which is appropriately managed by a database, and 100 percent of JMS procurements require vendor competition for tenders. In all, 100 percent of RRHs use price in their tender evaluation, and 78 percent use past performance and lead time. For the procurement process, 67 percent of RRHs use an electronic procurement and have staff trained to use the systems.

The GOU and development partners split the budget for procurement operations at NMS, which has internal procurement control mechanisms established for value thresholds, formally enforced order and approval protocols, contracts committee, separation of roles, and legal review. JMS also has similar procurement controls in place for authorized personnel, value thresholds, formally enforced order and approval mechanisms, contracts committee, separation of roles, and legal review. For 100 percent of RRHs, procurements are approved by authorized personnel.

NMS and JMS have strong performance on the selected procurement metrics. Both entities buy drugs well below the international reference price, with NMS and JMS scoring 83 percent and 61 percent, respectively, for five selected tracer products for which reference data could be obtained. Also, both entities adhere to the National EML with strong consistency, procuring 84 percent and 88 percent, respectively, of their products from it.

NMS and JMS have formal ethics governance bodies. NMS conducts external audits annually, using audit findings to create improvement plans. The procurement ethics commission at JMS conducts reviews annually or more often, while 100 percent of RRHs have formal external audits of the procurement system scheduled annually, or more often. SOPs are available for procurement and are updated every two years at JMS. Only 56 percent of RRHs have procurement guidelines, and none are updated more often than every three years. Nonuniformity in using SOPs, particularly at RRHs but generally across the procurement entities, can create a situation of nonstandardized procurement processes and workflows, leading to potential inefficiencies within the system and potential procurement bottlenecks.

Recommendations

- Initiate separate reviews at the RRHs to determine why they have scored low in procurement and customs clearance capabilities. These entities will likely need further technical assistance.
- Introduce through the GOU and MOH additional internal controls such as internal procurement audits to reduce risks at NMS.
- Develop SOPs, make them available at all procurement levels, and train and monitor RRH procurement staff on internal audits compliance issues.
- Strengthen value-for-money analysis coupled with benchmarking and price negotiations to obtain more savings that can be used to buy additional commodities.

By Level of Service: Overall CMM and KPI Results

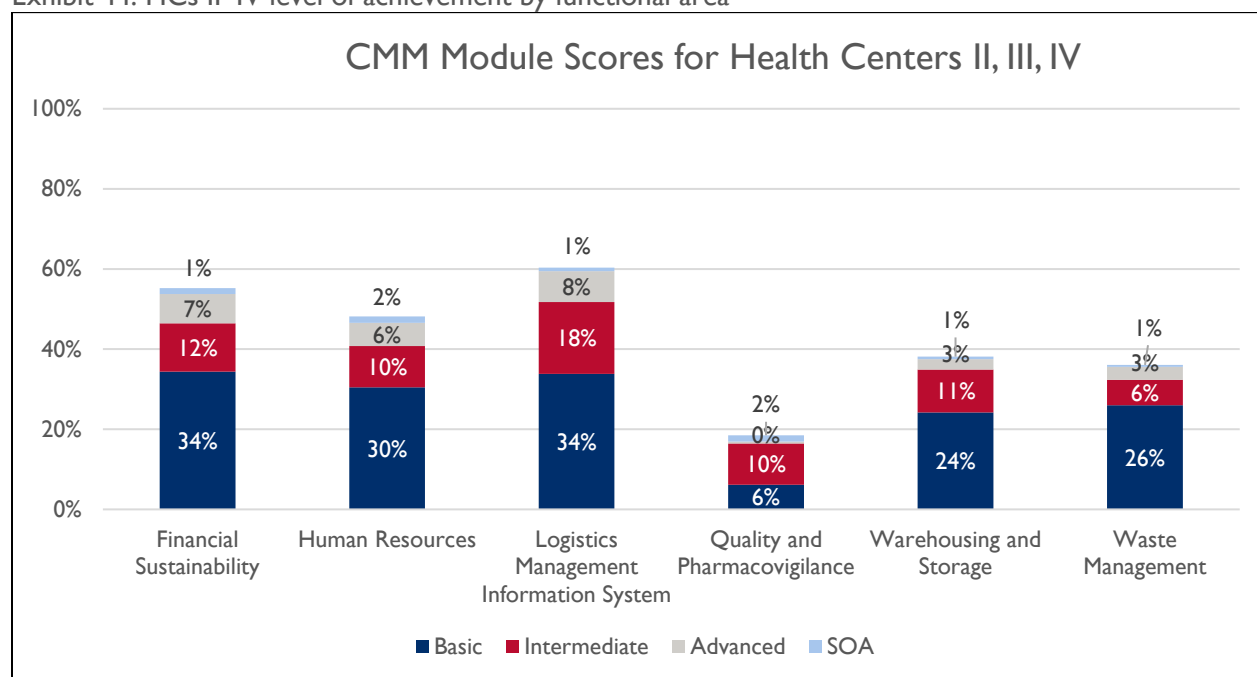
Assessment results were also analyzed by looking at the data from the perspective of the various service levels. The following provides key data results, followed by key capability achievements and key capability gaps (if the gaps and achievements findings were meaningful).

HCs II–IV

Exhibit 43. Health center CMM score by module (average score and range) (n=33)

Module	Average percent
Human Resources	48 percent (12–73 percent)
Logistics Management Information System	60 percent (36–89 percent)
Quality and Pharmacovigilance	18 percent (0–64 percent)
Warehousing and Storage	38 percent (26–59 percent)
Waste Management	36 percent (4–75 percent)

Exhibit 44. HCs II–IV level of achievement by functional area



Maximum score for Basic is 50 percent; for Intermediate, 30 percent; for Advanced, 15 percent; for State of the Art, 5 percent. For instance, if the Basic portion is 45 percent, it should be interpreted as 45/50. See Exhibit 9 for more detail on CMM scores.

Exhibit 45. Select key capability achievements, HCs II–I4

Indicator	Percent achieved
Percentage of facilities with at least some supply chain staff receiving supportive supervision visits within the last year	81 percent

Exhibit 46. Select key capability gaps, HCs II–IV

Indicator	Percent achieved	Possible solutions
Percentage of facilities that stop issuance of a product based on an ADR	15 percent	Implement sensitization trainings to reinforce the importance of issuing safe products and proper ADR reporting
Percentage of facilities that had a budget shortfall for health commodities	42 percent	Advocate for larger budgets at the central government level to ensure proper funding for facilities

Exhibit 47. Select KPI results, HCs II–IV

Indicator	Result
Average no. of days per month with stockouts (overall for tracer commodities)	6.4 (2.1–13.9)
Percent of tracer commodities, out-of-stock on day of visit (overall)	22 percent (8–46 percent)
Percent of facilities SATP (overall for tracer commodities)	25 percent (13–36 percent)
Percent of facilities with 100 percent stockcard accuracy	55 percent (34–81 percent)

Summary of results and discussion

Overall composite maturity scores for the health facilities were generally below desired levels with a range of 18–60 percent; QPV scored the lowest (18 percent) and LMIS the highest (60 percent). While the composite LMIS score is 60 percent, nearly all HCs II–IV (91 percent) use a paper-based LMIS system for reporting, ordering, and recording supplies, which may contribute to the 55 percent average stockcard accuracy. While Uganda's health-care delivery model engages public and private participants, the MOH sets policy and strategic direction while the Ministry of Local Government (MOLG) engages in service delivery. Given this decentralized approach, the two biggest challenges identified by health facilities in last-mile delivery are uncertainty of delivery arrival and partial fulfillment of quantities requested. Upon receipt of inbound shipments, the most common actions HCs take are checks on quantity, remaining shelf life, and ordering forms. Nearly all (97 percent) maintain paper forms as proof of delivery, and 98 percent of facilities use a first expired, first out (FEFO) inventory management approach.

A review of warehousing and inventory management KPIs finds that HCs experienced an average of 6.4 days of stockout per month, translating to about one week per month where HCs had less than adequate inventory to offer patients. About 22 percent of tracer commodities were stocked out on the day of the assessment. KPI results revealed that just over half of the facilities (55 percent) maintained stockcards with 100 percent accuracy, with a range of 34–81 percent across facilities. Also related to patient product delivery, the top three barriers reported by SDPs to HR capacity are finances, workload, and training materials, which contributes to the 48 percent composite HR score across HCs II–IV. The low maturity scores across all capabilities negatively impact adequate service delivery at the HCs.

This is evidenced by the low average scores of KPIs on stockouts at HCs. It indicates a need to attend to all the supply chain areas at this facility level to ensure improvement in capability and performance.

Recommendations

- Address budget gaps. A total 64 percent of HCs have at least 51 percent of their budget covered by the government or cost recovery, with half of those facilities fully covering their operations with cost recovery. Although 92 percent of SDPs reported preparing budgets annually or more often, the gap of 49 percent budget coverage must be addressed for health facilities to move forward to improved financial management.
- Initiate improvements to reduce the number of days out of stock of the tracer commodities and the percentage of commodities that have stocked out within six months. Further analyze to understand the adverse impacts on patient care and service delivery.
- Conduct further analysis to identify how the FEFO practice relates to poor KPI stock data at the HCs, noting that the central-level facilities maintain commodity minimum-maximum inventory thresholds of two and eight months. Since SDPs report receiving commodities about to expire, focus more attention on the central-level distributors.
- Develop a comprehensive supply chain management policy, along with staff capacity building for all supply chain staff at all service levels. These initiatives will help increase supply chain skills and competencies. Give special attention to forecasting, pharmacovigilance, and national treatment guidelines.

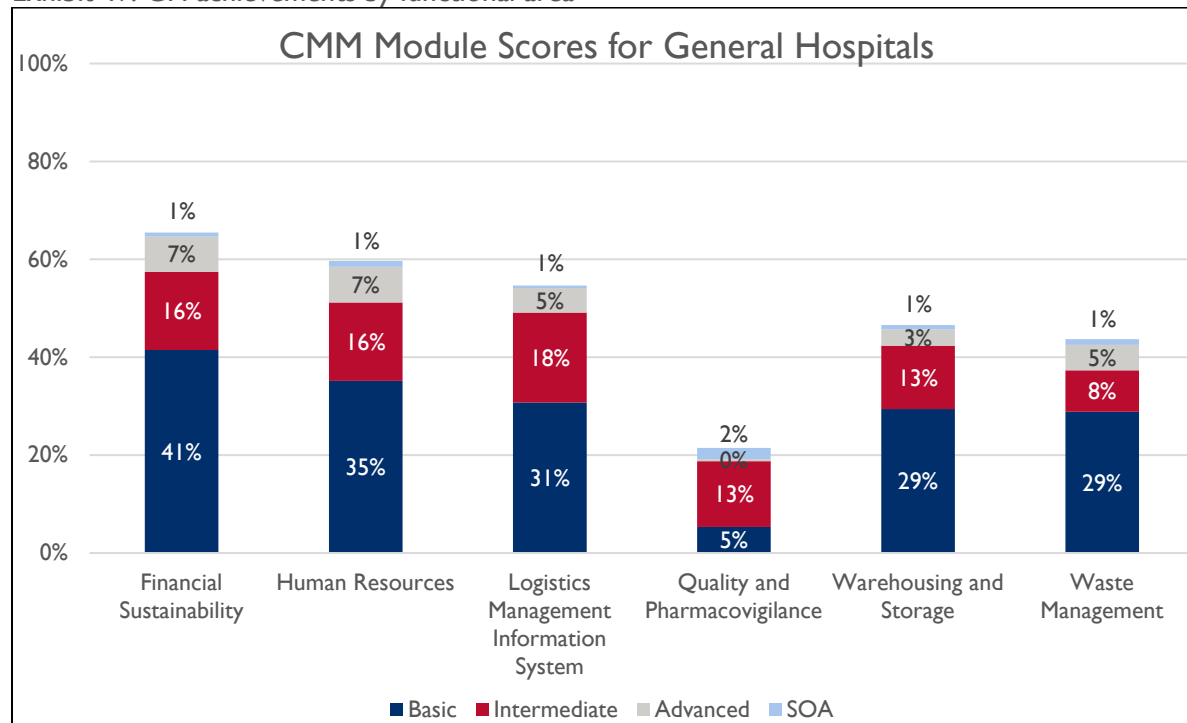
General Hospitals

Exhibits 48–50 show results for general hospitals.

Exhibit 48. GH CMM score by module (average score and range) (n=17)

Module	Average percent
Financial Sustainability	65 percent (13–82 percent)
Human Resources	60 percent (12–73 percent)
LMIS	55 percent (36–89 percent)
Quality and Pharmacovigilance	21 percent (0–64 percent)
Warehousing and Storage	47 percent (29–61 percent)
Waste Management	44 percent (4–75 percent)

Exhibit 49. GH achievements by functional area



Maximum score for Basic is 50 percent; for Intermediate, 30 percent; for Advanced, 15 percent; for State of the Art, 5 percent. For instance, if the Basic portion is 45 percent, it should be interpreted as 45/50. See Exhibit 9 for more detail on CMM scores.

Exhibit 50. Select KPI results, GHs

Indicator	Result
Average no. of days per month with stockouts (overall for tracer commodities)	4.3
Percent of tracer commodities, out-of-stock on day of visit (overall)	11 percent
Stockout days for 182-day period (Nov. '17 to April '18)	9.8
Percent of facilities with 100 percent stockcard accuracy	65 percent
Percent of facilities with 100 percent eLMIS record accuracy	21 percent
Percent of emergency orders, out of all orders	3 percent

Exhibit 51. Select key capability achievements and gaps, GHs

Indicator	Result
<i>Achievements</i>	
Percentage of facilities that store expired products separately from usable product	87 percent
Percentage of facilities that have at least some supply chain staff receive supportive supervision within the last year	100 percent
<i>Gaps</i>	
Percentage of facilities conducting internal data quality assessments	27 percent
<i>Potential solutions</i>	
Update and implement updated DQA policy in coordination with appropriate training opportunities and tools	

Summary of results and discussion

Overall maturity scores at the GHs ranged from 21 percent to 65 percent. Quality and pharmacovigilance (21 percent) had the lowest score, and financial sustainability (65 percent), followed by human resources (60 percent), had the highest composite scores, although still below preferred levels. For GHs, 67 percent have tools available for pharmacovigilance, but 46 percent, or less than half, have action-oriented protocols based on PV results. Further, a look at possible action steps to take for an adverse drug reaction finds that only 21 percent of GHs identified halting issue of products after a reported adverse drug event (ADE), and only 46 percent identified notifying the NDA.

On a positive note, 100 percent of GHs default to best practices, having reported checking all inbound shipments for quantity and shelf life remaining. Further, 100 percent of GHs notify the warehouse or supplier when an order has an issue, and 97 percent fill out a discrepancy form. Challenges include partial deliveries (63 percent) and receipt of near-expiry drugs (41 percent). Considering this challenge, 100 percent adhere to FEFO requirements. In all, 100 percent of GHs have an LMIS, but only 16 percent are fully electronic; 45 percent are still paper based, and 39 percent use a mix of both. Unsurprisingly, the lack

of internet connectivity was cited by 100 percent of GHs as a barrier to using eLMIS, while 85 percent say insufficient staff capacity poses an additional challenge.

KPI stock indicators at the GH level reveal positive differences when compared with HCs II–IV. The average number of days per month with stockouts over all tracer commodities was 4.3. Over a six-month period, 9.8 stockout days were recorded. A total 65 percent of facilities maintain 100 percent stockcard accuracy, and on the day of the facility visit, enumerators recorded 11 percent of tracer commodities out-of-stock over all GHs. Further, the 3 percent emergency orders out of all orders placed metric may be misleading. Many facilities rely on a kit system for ordering commodities, with specific quantities requested by each district, and generally do not have the resources available to pay for the cost of placing an additional order.

Waste and stock management raise additional concerns. GHs had 14 percent of their total RHZE (first-line tuberculosis medication) supplies rendered unusable from expiry, damage, or theft. Considering the current state of waste management practices at GHs, these medicines could be disposed of in a way that would be unsafe for the hospital and surrounding community.

Recommendations

- Create SOPs for quality and pharmacovigilance, including actions to be taken in an ADR, and key notification points of contact at the NDA to ensure the information is being relayed and proper measures are taken.
- Operationalize PV, guided by appropriate policies from which strict guidelines and SOPs are developed to influence activities, such as ADR procedure and reporting protocol. Once these policies are operationalized at the central level, GHs should develop appropriate SOPs for the system.
- Strengthen inventory management and control through training, supportive supervision, mentoring, and data quality reviews.
- Investigate what caused such a large wastage of RHZE, develop and implement appropriate policies to avoid such waste in the future, and implement an appropriate waste management plan to safely dispose of the expired products.

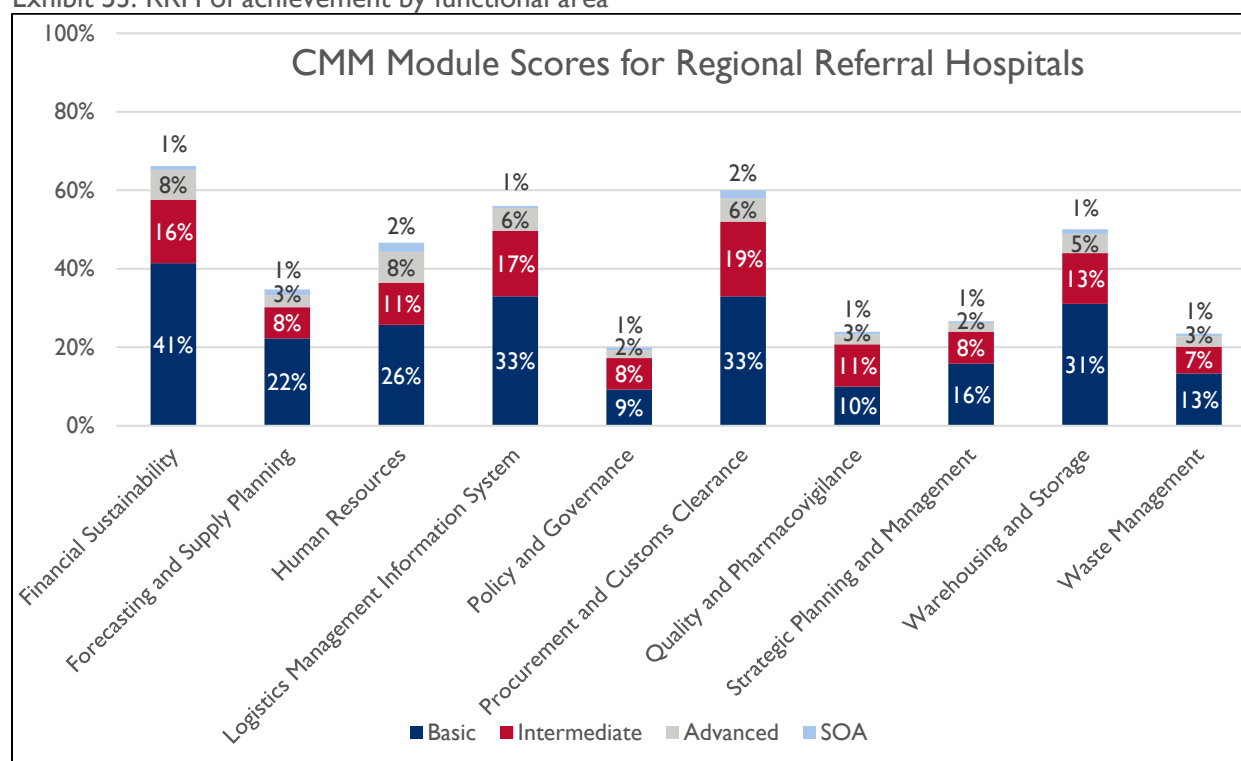
RRHs

Exhibits 52–55 show results for RRHs.

Exhibit 52. RRH CMM score by module (average score and range) (n=6)

Module	Average percent
Financial Sustainability	66 percent (51–79 percent)
Forecasting and Supply Planning	35 percent (26–44 percent)
Human Resources	47 percent (23–62 percent)
LMIS	56 percent (40–77 percent)
Policy and Governance	20 percent (6–83 percent)
Procurement and Customs Clearance	60 percent (39–75 percent)
Quality and Pharmacovigilance	24 percent (4–45 percent)
Strategic Planning and Management	27 percent (0–60 percent)
Warehousing and Storage	50 percent (44–55 percent)

Exhibit 53. RRH of achievement by functional area



Maximum score for Basic is 50 percent; for Intermediate, 30 percent; for Advanced, 15 percent; for State of the Art, 5 percent. For instance, if the Basic portion is 45 percent, it should be interpreted as 45/50. See Exhibit 9 for more detail on CMM scores.

Exhibit 54. Select key capability achievements and gaps, RRHs

Indicator	Percent achieved
<i>Achievements</i>	
Percentage of facilities that have annual external audits of the procurement system	100 percent
<i>Gaps</i>	
Percentage of facilities conducting internal data quality assessments	13 percent
Percentage of facilities that collect KPI data on waste management	0 percent
<i>Possible solutions</i>	
Implement updated DQA policy in coordination with appropriate training opportunities and tools	
Develop and implement sensitization training around the importance of continual, active monitoring of waste management practices and performance	

Exhibit 55. Select KPI results for RRHs

Indicator	Result
Average no. of days per month with stockouts (overall for tracer commodities)	6.3
Percent of tracer commodities, out-of-stock on day of visit (overall)	11 percent (0–31 percent)
Stockout days for a 182-day period (Nov. '17 to April '18)	16.1
Percent of facilities with 100 percent stockcard accuracy	41 percent
Percent of facilities with 100 percent eLMIS record accuracy	19 percent
Percent of emergency orders, out of all orders	1 percent

Summary of results and discussion

The RRHs did not score above 80 percent in any of the modules in which they were assessed. The highest score was for financial sustainability, at 66 percent, followed by procurement and clearance system (60 percent), and LMIS at 56 percent. They scored the lowest in policy and governance (20 percent), waste management (23 percent), and quality and pharmacovigilance (24 percent). Similar results were reflected in the KPIs; respondents at the RRHs reported an average of 6.3 days per month of stockouts for the selected tracer commodities. On the day of the assessment, an average of 11 percent of the tracer commodities were stocked out at the RRHs, and for 16.1 days over the course of six months before the assessment. Less than half (41 percent) of the RRHs accurately maintained stockcards, one of the key forms for tracking movement of stock and proper inventory management. Furthermore, only 19 percent of the RRHs assessed maintained 100 percent eLMIS accuracy. Accurate reporting through eLMIS is critical

to ensure correct quantities of health commodities available at the sites are reported to the higher level, and similarly, correct quantities are resupplied to the RRHs. Only 1 percent of the total orders from the RRHs were emergency orders.

All (100 percent) RRHs identified the GOU as the source of funding for supply chain operations. Similarly, all RRHs prepare and update their budgets annually or more often. However, 40 percent of RRH staff interviewed noted a budget shortfall for the purchase of commodities in the last year, which can have a detrimental impact on the RRHs' ability to procure lifesaving commodities and serve their patient population. Of the total respondents from the RRHs, only 40 percent have a copy of the approved NPSSP, and even fewer (27 percent) have formally documented management policies or guidelines for their supply chain system. Only 13 percent of RRHs had M&E components in their strategic plans, and even more concerning, none of them (0 percent) reported having LMIS as part of their strategic plan. Only 13 percent of RRHs claim that strategic supply chain reforms identified in their plans are being implemented, and 67 percent of RRHs report supply chain risks are never assessed for their facility. These results could possibly explain overall low CMM scores at the RRHs. Further root-cause analysis can help identify reasons for poor performance at the RRHs.

RRHs received a composite score of 47 percent in human resources; none of the RRH respondents reported having a staff recruitment policy for supply chain positions, and only 33 percent noted a general recruitment policy that is applied to supply chain positions. None of the RRHs identified the following supply chain functions as part of the personnel job descriptions: forecasting and quantification, procurement, storage and inventory management, LMIS, ordering and reporting, waste management, and quality and pharmacovigilance. However, 87 percent of RRHs noted receiving training on SOPs as part of their capacity-building programs. All the RRH respondents (100 percent) noted that finance was a critical barrier to supply chain management capacity-building programs. These results underpin the poor results in human resources — without funding for supply chain positions, a staff recruitment policy, or inclusion of essential supply chain functions in staff job descriptions, staff are unlikely to perform routine supply chain functions effectively.

RRHs received one of the lowest scores (24 percent) for quality and pharmacovigilance. The results show that only 13 percent of RRHs have SOPs for product quality assurance/quality control available; furthermore, only 27 percent of RRHs have action protocols based on pharmacovigilance results, indicating that results from the quality checks and action protocols are often ignored and can lead to dispensing of poor-quality medicines and adverse drug reactions.

Although 100 percent of RRHs assessed reported forecasting their health commodity requirements and using consumption data for forecasting, only 13 percent involve the MOH forecasting and supply planning unit and only 20 percent involve the NMS.

RRHs received the second-highest score in procurement and customs clearance (60 percent). To highlight some of their achievements, all (100 percent) RRHs get their procurements approved by authorized personnel, all RRHs reported having formal external audits of the procurement system take place annually or more often and referencing EMLs during sourcing and procurement. However, a little over half (56 percent) reference their annual forecasts for their procurements. Conducting forecasting exercises but not using the data for making procurement decisions undermines the forecasting and quantification process and can likely result in inaccurate quantities procured.

Over half (60 percent) of the RRHs have warehousing and inventory management SOPs available; all RRHs receive a distribution schedule in advance from the issuing warehouse or supplier, informing the RRH staff of an upcoming delivery. However, in complying with proper storage guidelines, none of the RRHs (0 percent) had spill kits available; only 13 percent had a fire extinguisher, and less than half (47 percent) have an insulated and leak-free ceiling in their storerooms. These small changes can help ensure that health commodities are stored properly and maintain their quality and integrity.

Maintaining accurate records for stock keeping, reporting, and ordering resupplies is the backbone of good inventory management. All RRHs use either a paper-based LMIS or an eLMIS for stock management. An estimated 67 percent of the RRHs reported using eLMIS and paper-based LMIS, and 33 percent reported using only a paper-based LMIS. All (100 percent) of the RRHs also reported using LMIS data for informing M&E activities, reporting and ordering, and managing inventory. However, 80 percent of RRHs identified not having sufficient staff and data quality/data entry errors as challenges to using paper-based systems. Similarly, 80 percent of RRH staff interviewed also identified poor internet connectivity and lack of time due to other tasks as challenges to using the eLMIS. Use of multiple forms and registers creates an additional layer of work on already overstretched staff and leads to further system inefficiencies; over half (60 percent) of RRHs maintain anywhere from four to six different types of dispensing registers. RRHs scored only 23 percent for the waste management module. Only 13 percent of RRHs have SOPs available for waste management, which have never been updated, thereby providing no guidance and posing a serious challenge for RRHs staff in using safe and effective waste management practices. However, despite the lack of SOPs, 87 percent of RRHs send their waste to a higher-level government facility for disposal.

Recommendations

- Regional referral hospitals should put in place practices to monitor their own performance internally on a more regular basis.
- Conduct a deep-dive analysis to identify the root cause impacting policy and governance, waste management, and quality and pharmacovigilance.
- Standardize training to improve inventory management at the RRH level, which should include training on proper stock-keeping records and reports and for ensuring accuracy in LMIS reporting.

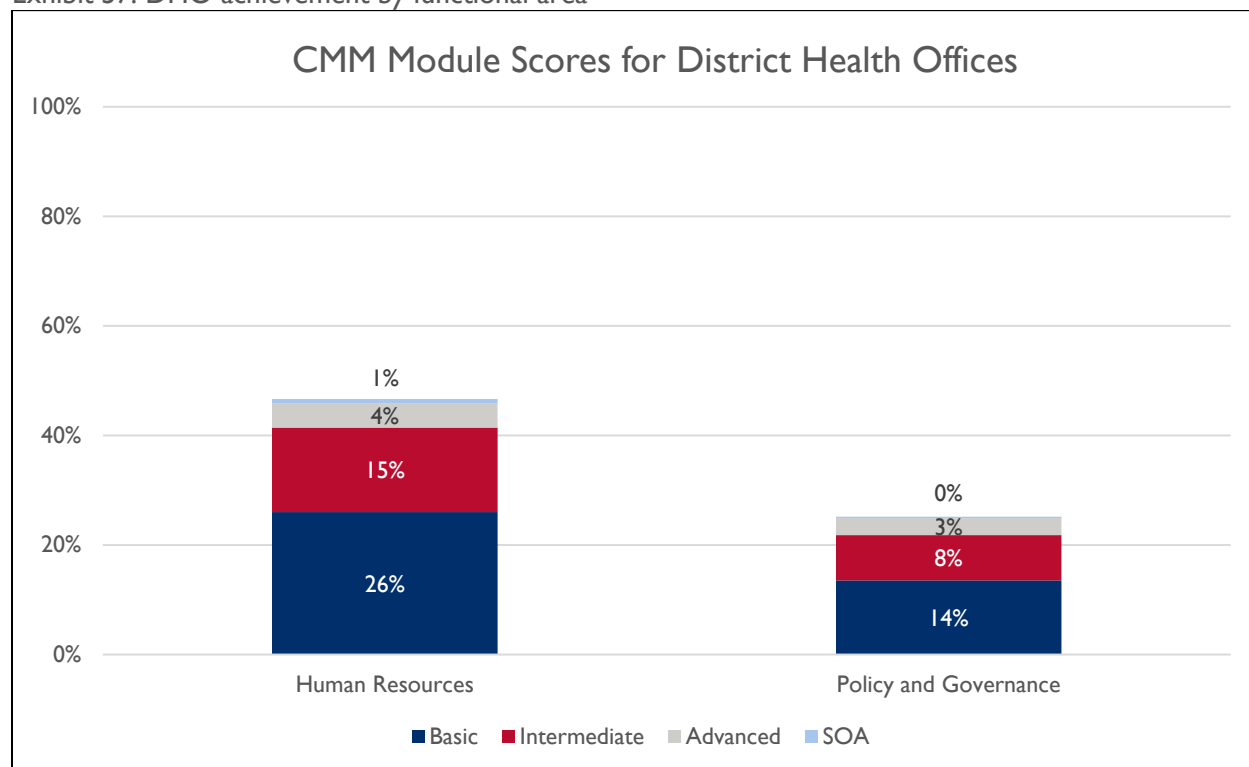
DHOs

Exhibits 56 and 57 show results for DHOs.

Exhibit 56. DHO CMM score by module (average core and range) (n=1)

Module	Average percent	Module	Average percent
Policy and Governance	25 percent	Human Resources	47 percent

Exhibit 57. DHO achievement by functional area



Maximum score for Basic is 50 percent; for Intermediate, 30 percent; for Advanced, 15 percent; for State of the Art, 5 percent. For instance, if the Basic portion is 45 percent, it should be interpreted as 45/50. See Exhibit 9 for more detail on CMM scores.

Summary of results and discussion

Since the DHO is an administrative unit at the district level, and not an SDP where services are rendered, only human resources and policy and governance modules are relevant. The DHO received a poor composite score of 25 percent for policy and governance. It received 14 percent for the basic elements. Only 13 percent of DHOs know if there is a publicly available list of registered health commodities, and only 25 percent of DHOs know if there are formally documented management guidelines for the supply chain system. However, 90 percent of DHOs did have STGs available. Nevertheless, the DHOs are not responsible for creating policies, but rather implement nationally established guidelines and policies. Most

of the questions in the module focus on availability of National Medicines Policy, frequency of revision of the policies, and inclusion of the various supply chain components in the policy. As the results reflect, many of these questions were not applicable to the DHO level in Uganda.

DHO also received a low capability score for human resources (46 percent). Only 29 percent of the DHOs have a generic staff recruitment policy, with no provisions or considerations for recruiting supply chain staff; the remaining 71 percent have no recruitment policy whatsoever in place. Almost all (91 percent) of the DHOs have a budget line item for supply chain personnel included in their government budget, with 43 percent having their entire budget requirement covered by the GOU budget, and 27 percent, with little of their budget covered by the GOU. Although 91 percent of DHOs received training on ordering and reporting, only 33 percent attended training that covered changes in national policy. Three-quarters of DHOs (73 percent) reported receiving a supportive supervision visit from the MOH, but only 33 percent have guidelines that include supervision visits for supply chain personnel. Proportion of staff participation in capacity-building programs varies widely; about a quarter of DHOs reported that more than half of their staff participated in capacity-building activities, while another third reported that 25 percent or fewer percentage of their staff participated in capacity building.

Recommendations

- Ensure widespread dissemination and implementation of the National Medicines Policy and STGs across all districts in Uganda. This can be achieved through sensitization workshops where staff are trained on the key components of the National Medicines Guidelines and the STGs.
- Develop a comprehensive human resource strategy based on an in-depth analysis for recruitment, training, and retention of supply chain staff across all supply chain levels.
- Provide technical assistance to DHOs to help improve the district budget planning, execution, and monitoring process to bolsters advocacy to GOU and efficient use of budget allocations.
- Ensure funding (or explore options for funding) for routine supportive supervision visits from the MOH to the DHOs.

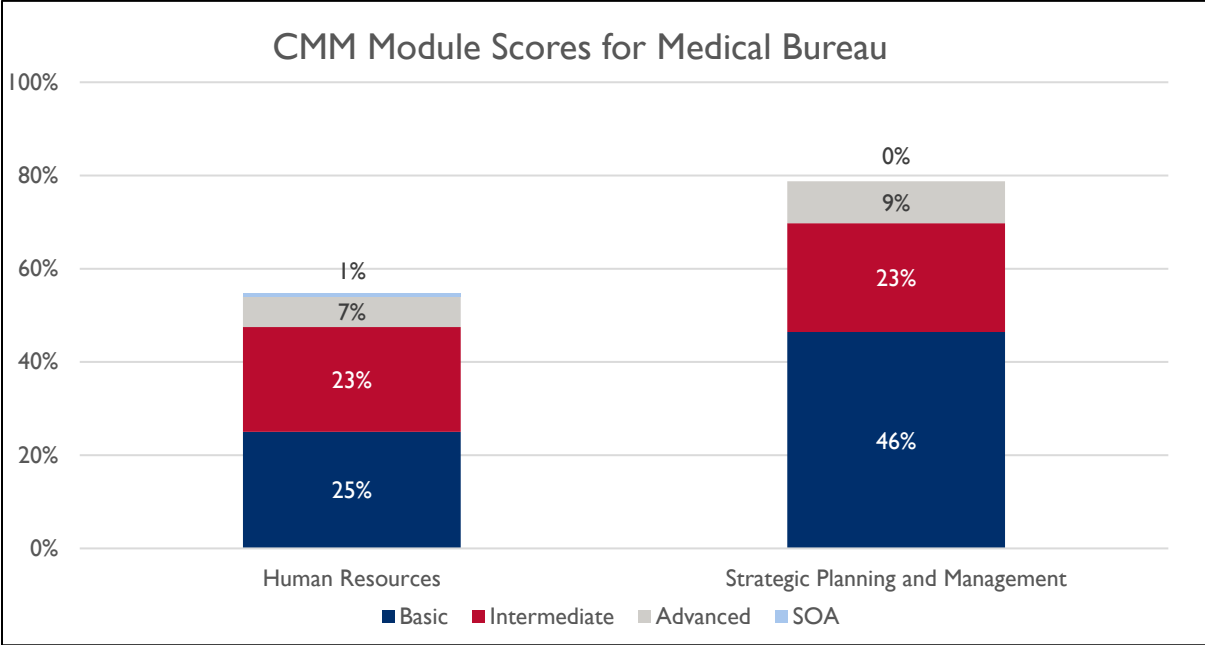
Medical Bureaus

Exhibits 58 and 59 show results for medical bureaus.

Exhibit 58. Medical bureau CMM score by module (average score) (n=2)

Module	Average percent	Module	Average percent
Strategic Planning and Management	79 percent	Human Resources	55 percent

Exhibit 59. Medical bureau achievement by functional area



Maximum score for Basic is 50 percent; for Intermediate, 30 percent; for Advanced, 15 percent; for State of the Art, 5 percent. For instance, if the Basic portion is 45 percent, it should be interpreted as 45/50. See Exhibit 9 for more detail on CMM scores.

Summary of results and discussion

Only human resources and strategic planning and management were assessed at the medical bureaus. They received an average score of 56 percent for human resources and a high score of 78 percent for strategic planning and management. The medical bureaus are registered faith-based nongovernmental organizations with the mandate of providing health services to the underserved population of Uganda. JMS was formed as a joint venture between the Uganda Catholic Medical Bureau and the Uganda Protestant Medical Bureau to ensure availability of quality medicines, and as such, they do not focus specifically on strengthening in-country supply chains.

JMS has since become an independent entity. Therefore, many of the questions in the human resources module were not applicable, as they pertain to human resources focused specifically on public health supply chains. For example, while the medical bureaus do have a medicine management supervisor on

staff, they do not have a separate recruitment or performance evaluation process for supply chain staff; all their staff follow the broader human resources policies. Similarly, for strategic planning, no supply chain strategy documents are specific to the bureaus. Understandably so, they have referenced JMS supply chain strategy documents when answering questions for strategic planning modules. However, they do have a formal strategy for engaging in public-private partnerships.

Recommendations

- Implement capacity-building efforts specifically on supply chain systems strengthening to build bureau staff capacity.

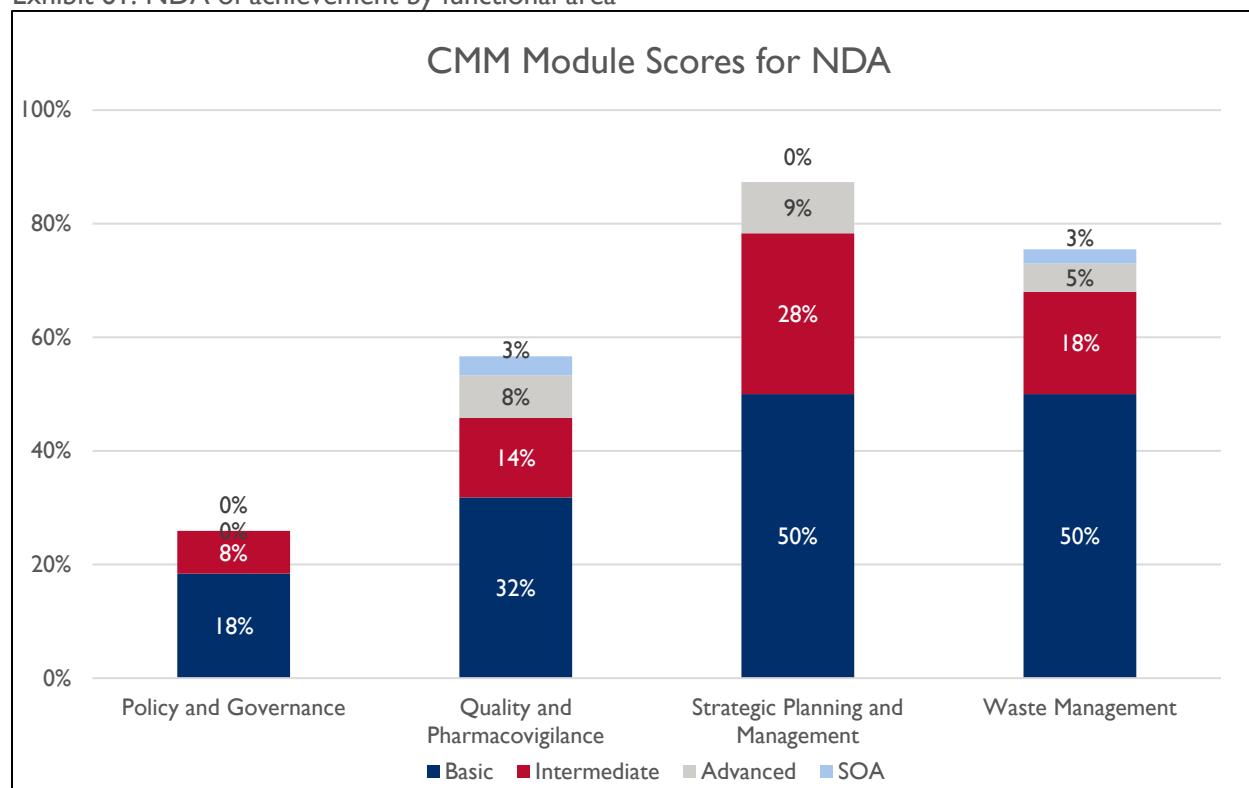
National Drug Authority

Exhibits 60 and 61 show results for the NDA.

Exhibit 60. NDA CMM score by module (n=1)

Module	Average percent
Policy and Governance	26 percent
Quality and Pharmacovigilance	57 percent
Strategic Planning and Management	87 percent
Waste Management	76 percent

Exhibit 61. NDA of achievement by functional area



Maximum score for Basic is 50 percent; for Intermediate, 30 percent; for Advanced, 15 percent; for State of the Art, 5 percent. For instance, if the Basic portion is 45 percent, it should be interpreted as 45/50. See Exhibit 9 for more detail on CMM scores.

Summary of results and discussion

The overall scores for NDA ranged from 26 percent for policy and governance to 87 percent for strategic planning and management. The low score for policy and governance is because many of the questions in this section were not applicable to the NDA.

The central-level assessment team noted these observations during the interview. NDA is not the responsible entity for establishing supply chain policies and guidance. This mandate is the responsibility of the MOH. No formally documented guidelines or policies are in place for any of the supply chain functions at the NDA, nor a formal, high-level committee that provides oversight and governance for the supply chain.

NDA scored 57 percent for quality and pharmacovigilance, with 32 percent of the 50 percent of the basic elements in place. Some of the accomplishments of the NDA include: 1) a formal product quality assurance strategy and QA approval guidelines are in place and 2) QA testing is conducted, either at an in-house lab or at an outsourced private sector lab. However, it takes about two weeks to a month to receive the results. SOPs for QA were not available on the day of the visit, but NDA staff interviewed stated a renewal of the guidelines every three years.

NDA received the impressive score of 87 percent in strategic planning and management, meeting all the basic requirements. Score contributions include: 1) having the national pharmaceutical sector strategic plan, 2) availability of a supply chain operational plan, which is monitored quarterly, and 3) a formal strategy for engaging with the private sector to improve supply chain performance. NDA also received a relatively high score of 76 percent for waste management, with a maximum possible score of 50 percent from the basic elements. NDA has in place approved national waste management guidelines and SOPs that are updated every three years. Waste management practices are monitored through regular KPI collection, internal/external audits, and onsite monitoring.

Recommendations

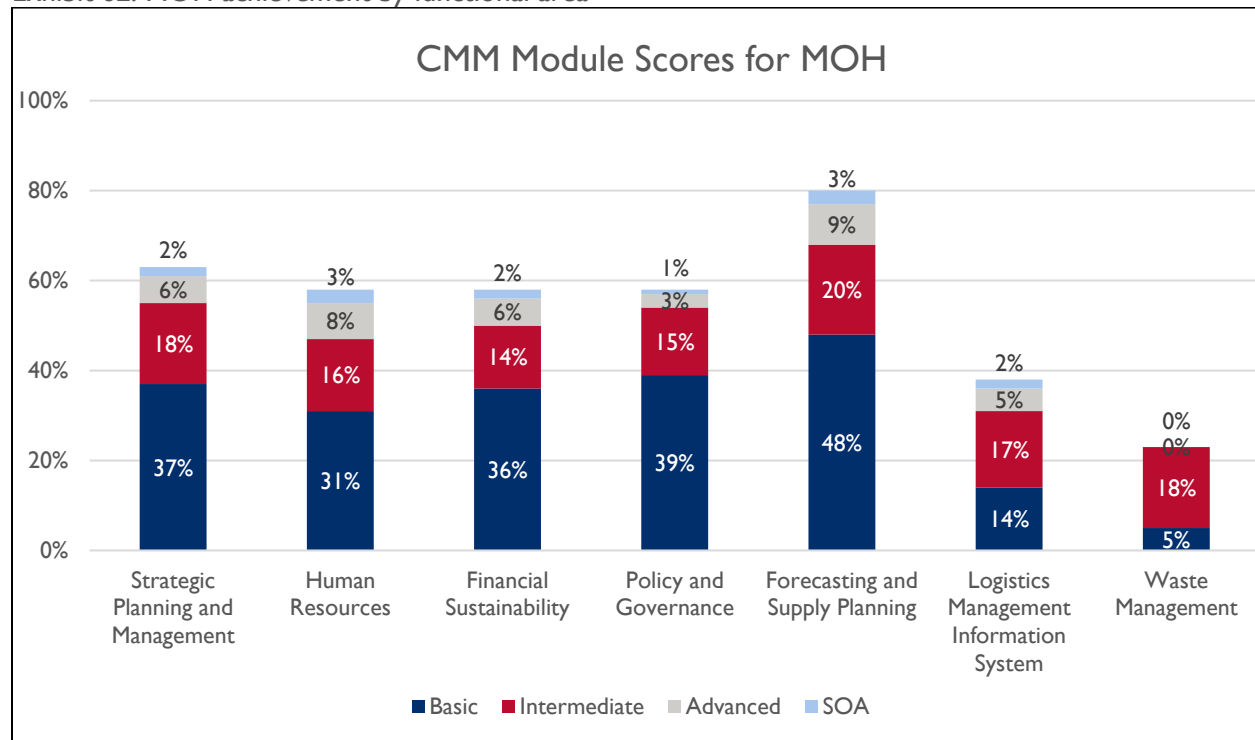
The NDA should:

- Capitalize on the opportunity presented by the unsatisfactory level of PV reporting at the facility level. Revise guidelines, currently updated every three years, and provide refresher training to facilities on reporting ADRs and other PV information.
- Update guidelines and conduct sensitization trainings to help reinforce the importance of safe disposal of expired pharmaceuticals and good pharmaceutical waste management at health facilities.
- Develop formal guidelines to ensure the NDA's supply chain responsibilities are codified.

Ministry of Health

Exhibits 62 and 63 show results for the MOH.

Exhibit 62. MOH achievement by functional area



Maximum score for Basic is 50 percent; for Intermediate, 30 percent; for Advanced, 15 percent; for State of the Art, 5 percent. For instance, if the Basic portion is 45 percent, it should be interpreted as 45/50. See Exhibit 9 for more detail on CMM scores.

Exhibit 63. MOH CMM score by module (n=1)

Module	Score percent
Strategic Planning and Management	66 percent
Human Resources	56 percent
Financial Sustainability	56 percent
Policy and Governance	57 percent
Forecasting and Supply Planning	77 percent
Logistics Management Information System	37 percent
Waste Management	23 percent

Summary of results and discussion

CMM performance at the MOH ranged from 23 percent for waste management to 77 percent for FASP. The basic-level score for FASP was 48 percent, while for strategic planning, human resources, financial sustainability, and governance, it ranged anywhere from low to high 30s. LMIS scored poorly for the basic level (14 percent) and overall (37 percent). Waste management had the lowest basic-level score of only 5 percent, but with an intermediate score of 18 percent out of the possible 30 percent. A reason for the low scores for waste management is that developing guidelines for waste management is not considered the responsibility of the MOH. Other gaps identified in waste management include lack of national guidelines, lack of SOPs, and whether they were updated was unclear, and no software program is used to track waste management. However, waste management is monitored by an internal audit and collection of KPIs.

Commodities and supply chain operations are funded by the development partners and the GOU. However, the GOU only partially funds supply chain operations; budget shortfalls are addressed through budget cuts, internal reallocation of funds, and funding donor in-kind donations from development partners. The MOH has a National Medicines Policy, updated every five years, that includes the supply chain. It also has the approved NPSSP, and a supply chain implementation plan, which is monitored quarterly. An oversight governing body is in place for the supply chain whose members are exclusively appointed by the central government. STGs are available and revised every three years. Although a formal process for registering new drugs exists, it can take more than a year to complete registration.

The MOH has a performance monitoring plan in place, and it is regularly reviewed by the oversight board. Respondents identified some of the supply chain risks, which include finance, operations, and technology. Although HR received a composite score of 56 percent, the MOH does have an HR workforce plan in place, and all positions at the MOH level are have some level of funding allocated through the GOU. A generic recruitment policy is in place. Some of the positions funded and staffed at the MOH for completing supply chain functions include FASP, distribution, and product selection. Most of the staff (51–99 percent) reported receiving some type of supply chain training in the past year. Barriers to attending SCM training at the MOH include staff workload, lack of skilled trainers, lack of interest, and lack of time.

The MOH uses the paper-based LMIS and eLMIS for recording, reporting, and ordering commodities. Reporting has been harmonized across various levels and programs. Paper reports are submitted monthly, while the eLMIS reports are done weekly. However, using the eLMIS reports presents challenges, which include internet connectivity, central system failure, lack of skilled staff, data loss, and data analysis. Though the MOH uses an eLMIS, it does not capture some of the key logistics data including adjustments, losses and expiries, issues and receipts, and expiry dates. Furthermore, paper-based LMIS captures only a few of the key logistics data required for decision making. SOPs for the eLMIS are available but are updated every three years. The MOH does not track KPIs for timeliness, completeness, or accuracy of reports submitted. The GOU has minimal funding in the budget for LMIS.

With a 77 percent composite score, the MOH scored the highest for FASP. Achievements include the dedicated QPPU, which leads the forecasting exercise and also includes other stakeholders, such as other MOH staff, NMS staff, development partners, vertical disease program representatives, consultants, and lower-level facility staff in completing one-, two-, or three-year forecasts; forecasting and supply planning are conducted using all available and relevant data; supply plans are built and monitored monthly; and

forecast accuracy is assessed each year. Standard forecasting software is used for the forecasting and supply planning exercise. The MOH receives technical support through staff secondments. The MOH should review staffing structures to ensure this support is sustainable internally when the secondments cease.

Recommendations

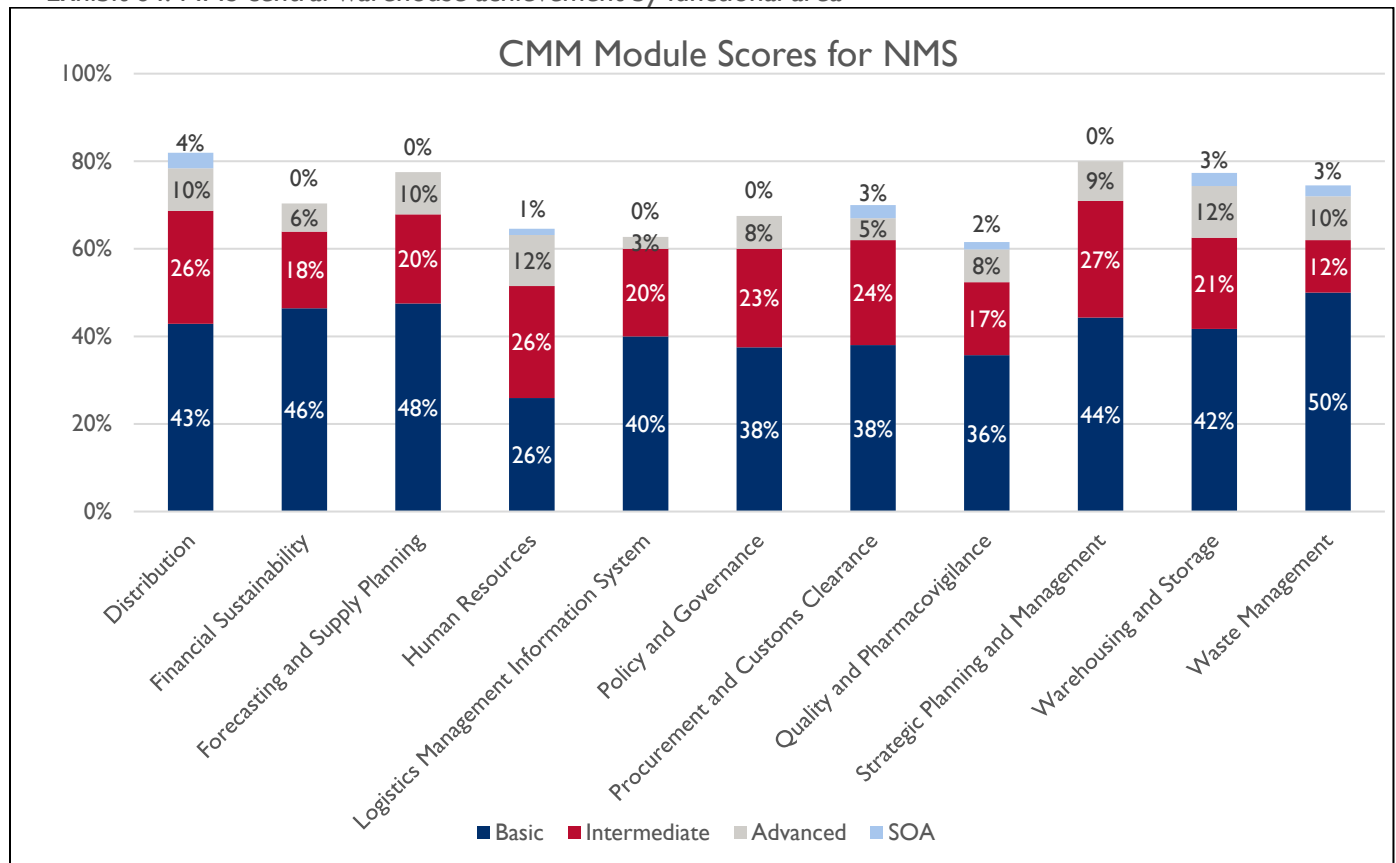
The MOH should:

- Conduct a root-cause analysis to better understand the underlying reasons for poor scores and lack of appropriate systems, guidelines, and SOPs for ensuring proper waste management at the MOH.
- Prioritize improving eLMIS accessibility and usability. This can include increased investments in technology infrastructure, staff training on eLMIS, and additional staff to support data quality and analysis.
- Include in its budget specific line items for improvements/enhancements in eLMIS and paper-based LMIS. Assess original eLMIS and paper-based LMIS to identify missing logistics data points from the paper-based LMIS and the eLMIS.
- Explore innovative financing mechanisms to sustain its operations. This may include collaborating with other private sector partners as part of public-private partnerships. Conversely, the MOH should assess its operations and highlight efficiency gaps; these gaps should inform strategies for leaner operations, cost savings, and enhanced financial sustainability.
- Have as a main priority a comprehensive human resources and workforce development strategy for recruiting, training, and retaining supply chain personnel at all health system levels.
- Support the MOH in reviewing the health sector supply chain management structure with a view of strengthening commodity management at all levels.

National Medical Stores

Exhibits 64–67 show results for NMS.

Exhibit 64. NMS central warehouse achievement by functional area



Maximum score for Basic is 50 percent; for Intermediate, 30 percent; for Advanced, 15 percent; for State of the Art, 5 percent. For instance, if the Basic portion is 45 percent, it should be interpreted as 45/50. See Exhibit 9 for more detail on CMM scores.

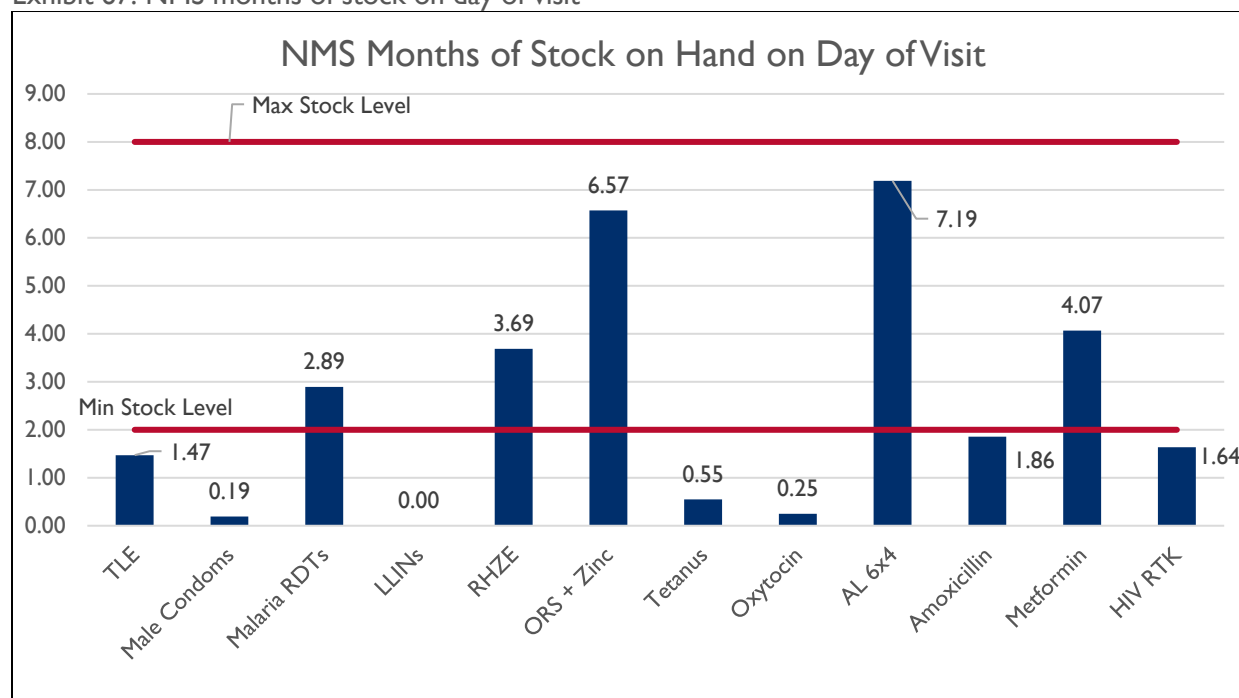
Exhibit 65. Select KPI results of NMS

Indicators	NMS
Percent of international reference price paid (average of five tracer products)	83 percent
Average supply plan accuracy	100 percent
Forecast accuracy	94 percent
eLMIS record accuracy	97 percent
Percent of time experiencing temperature excursion in 182-day period	5.99 percent
Percent of products procured that are on the NEML	84 percent
Average turnaround time for downstream order	20.95 days
Vendor OTD rate (+/-0 days of promised delivery date)	3 percent
Downstream facilities submitting a full report	97 percent
Downstream facilities submitting a full report, on time	94 percent
Stockout for any tracer commodities on the day of the visit	0 percent
SATP	60 percent

Exhibit 66. Source of funds for operations and products for NMS

Source	Percent
Government of Uganda	26 percent
Global Fund	32 percent
Gavi and other vaccine donors	18 percent
U.S. government	1 percent
Vector Control/MOH	16 percent
Other donors	6 percent

Exhibit 67. NMS months of stock on day of visit



Summary of results and discussion

NMS scored the highest in distribution (82 percent), followed by strategic planning and management (80 percent). Meanwhile, it scored the lowest in quality and pharmacovigilance (62 percent), followed by LMIS (63 percent). In waste management, NMS scored the maximum for basic elements, at 50 percent.

The individual questions within each supply chain module highlight many NMS achievements. For example, NMS has a strategic plan with all the critical components of supply chain management, including HR, M&E, warehousing, LMIS, finance, and policy and governance. The only exception was waste management, which was not included in the plan — the omission of waste management considerations is a theme throughout the Ugandan health commodity supply chain. The strategic plan is updated every three years. NMS also has a supply chain implementation plan, which is monitored annually. Based on results of the plan, the following actions are taken: mobilizing finances and resources, promoting supply chain efficiencies, improving supply chain management and leadership, and enhancing partnerships and collaborations. While SOPs and guidelines at NMS are formally documented, one gap identified is missing some of the key components of supply chain management sections, including the LMIS, financing, and human resources. Also, there is a lack of civil society organizations and regional/local government personnel on the governance body.

NMS received a composite score of 65 percent in HR, with only 26 percent for the basic elements; however, it received 26 percent of 30 percent for intermediate, and 12 percent of the possible 15 percent for advanced. Some of the reasons for a high intermediate and advanced score are existence of an HR

plan, with budget for supply chain personnel; 100 percent of the supply chain positions funded through the GOU; and existence of job descriptions for all supply chain staff that include all the relevant supply chain components except for waste management. Staff receive training; however, capacity-building programs offered by development partners and other stakeholders are not aligned with those offered by NMS. The GOU budget or facility revenue/cost recovery contributes 100 percent to the recurring human resource costs.

In financial sustainability, most of the basic elements are in place (46 percent). The government budget or facility revenue/cost recovery contributes only some of the total supply chain operations budget. Last year, NMS reported a budget shortfall for supply chain operations. NMS prepares its budget annually and relies on the GOU, donors, and in-kind donor support to fill funding gaps. In quality and pharmacovigilance, a key achievement noted is that 100 percent of Certificates of Analysis and Certificates of Conformance are recorded for medicines received from international and domestic sources.

NMS has in place 48 percent of all the basic elements for FASP. The KPI results further validate the CMM results: the results show an average of 100 percent supply plan accuracy and 87 percent forecast accuracy rate. The QPPU at the MOH leads the forecasting efforts annually for NMS in collaboration with other MOH staff, including representatives from the vertical disease program, NMS, development partners, and other supply chain staff from warehouses and SDPs. All data sources (morbidity, consumption, demographic, and service statistics) are used, and the supply plan is shared with external partners. Logistics data including stock on hand, consumption, shipment, financial cycles, and lead times are considered when completing the forecast. For procurement and customs clearance, some of the achievements include the presence of all internal controls, procurement documents for bidding and sourcing, and a formal ethics governance body to ensure effective procurement. Customs clearance is all done in-house; it typically takes three days to a week to get products out of the port of entry. NMS checks all commodities for quality, shelf life, and carton and pallet count, and ensures relevant documentation is in place. It also practices FEFO when issuing commodities.

In the six months before the assessment, NMS experienced a temperature excursion only about 6 percent of the time (see Exhibit 65 above). An accomplishment for warehousing is the use of a warehouse management system (WMS), used to track and manage inventory. Exhibit 67 and the KPI results above show five out of the 10 commodities stored at NMS were stocked below the established minimum-maximum inventory control level; none were stocked above the maximum, and no stockouts were noted on the day of the visit. However, oxytocin, tetanus, and male condoms had a half month or less of stock on hand.

With a composite score of 82 percent for distribution, NMS is above the benchmark in performance of 80 percent and has many of the advanced and SOA elements in place. NMS has an approved distribution plan, and distribution routes are reviewed annually. The GOU covers 100 percent of the distribution budget. Distribution SOPs are also available. Distribution is integrated across various programs and partners to streamline and make more efficient use of transportation. The truck capacity and geographic location are considered when planning distribution routes. Transportation data are captured daily or in real time. RFID tags are used as a security measure as well as GPS, barcode scanning, unannounced inspections, and partnerships with local police precincts. While NMS has a strong distribution system in place, 33 percent of health centers, 41 percent of general hospitals, and 67 percent of regional referral

hospitals identified delivery of near-expiry commodities as a challenge faced in last-mile delivery of commodities. This challenge should be carefully investigated to understand the effect of current distribution practices.

NMS received one of the lowest scores in the LMIS module (63 percent). Although the SOPs for the paper-based and eLMIS are available and both are used, many challenges impede the use of the eLMIS, including internet connectivity, system failure, availability of computers, limited staff skilled in eLMIS, data quality or data entry errors. LMIS data are used to inform ordering and reporting, FASP, procurement, reverse logistics, inventory management, and budgeting. For waste management, NMS updates its SOPs annually, and all disposals are authorized, documented, and completed according to established procedure. UMPP is disposed of by inertization or solidification followed by disposing of treated waste residues by landfill or through contracting with a certified third-party waste management company in charge of pick-up and disposal.

Recommendations

NMS should:

- Conduct a root-cause analysis to understand the impacts of the minimum and maximum stock-on-hand ranges. Conduct additional investigations to see if there are potentially more appropriate thresholds to set by product.
- Align development partner capacity-building efforts for supply chain staff with those of the MOH.
- Investigate more innovative financing mechanisms with the private sector to address the budget shortfall for supply chain operations at NMS. The current approach to fill the gaps with a mix of government, development partner, and in-kind support is not sustainable long term.
- Conduct a root-cause analysis to understand what impact NMS warehousing and distribution practices has on the delivery of near-expiry drugs to service-level facilities and recommend appropriate changes to adjust practices.
- Revise and incorporate the missing components of the supply chain functions into their SOPs. These include LMIS, financing, and human resources.
- Explore solutions to address the challenges faced with the use of the eLMIS. These can include provision of computers for staff using the eLMIS; capacity building, including on-the-job training for staff requiring training; and instituting quality checks to ensure data accuracy.
- Conduct a thorough review of the quality and pharmacovigilance and develop an improvement plan to increase NMS's score from 63 percent to at least 80 percent.

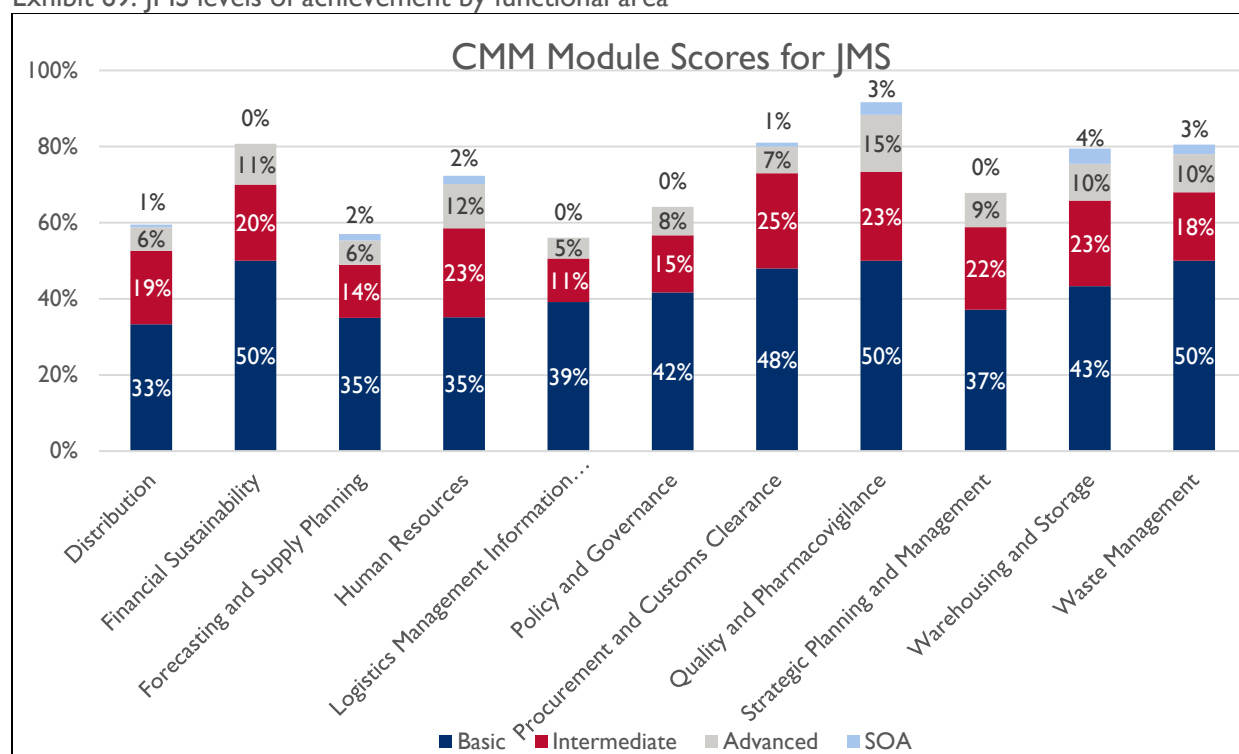
Joint Medical Stores

Exhibits 68–72 show results for JMS.

Exhibit 68. JMS CMM score by module

Module	Score percent
Distribution	60 percent
Financial Sustainability	81 percent
Forecasting and Supply Planning	57 percent
Human Resources	72 percent
LMIS	56 percent
Policy and Governance	64 percent
Procurement and Customs Clearance	81 percent
Quality and Pharmacovigilance	92 percent
Strategic Planning and Management	68 percent
Warehousing and Storage	79 percent
Waste Management	81 percent

Exhibit 69. JMS levels of achievement by functional area



Maximum score for Basic is 50 percent; for Intermediate, 30 percent; for Advanced, 15 percent; for State of the Art, 5 percent. For instance, if the Basic portion is 45 percent, it should be interpreted as 45/50. See Exhibit 9 for more detail on CMM scores.

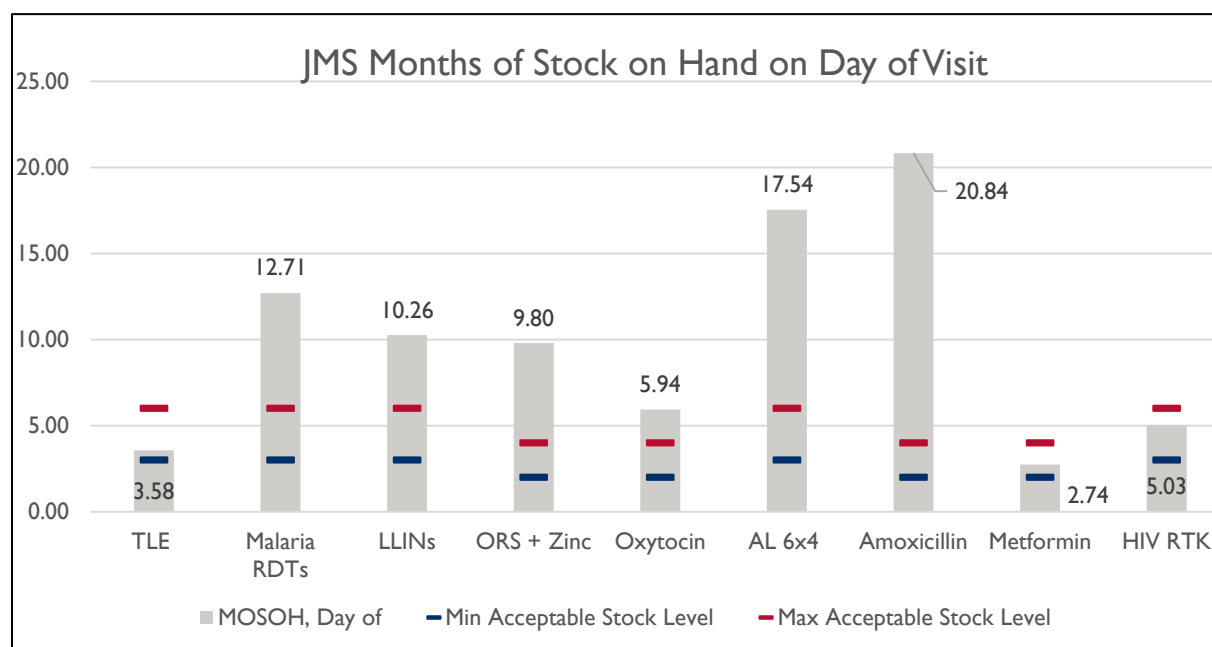
Exhibit 70. Select KPI results for JMS

Indicators	Percent
Percent of international reference price paid (average of five tracer products)	61 percent
Average supply plan accuracy	88 percent
eLMIS record accuracy	119 percent
Forecast accuracy	96 percent
Percent of time experiencing temperature excursion in a 182-day period	0.12 percent
Percent of products procured that are on the NEML	88 percent
Average turnaround time for downstream order	16.35 days
Vendor OTD rate (+/- 0 days of promised delivery date)	0 percent
Downstream facilities submitting a full report	68 percent
Downstream facilities submitting a full report, on time	58 percent
Stockout for any tracer commodities on the day of the visit	0 percent
SATP	33 percent

Exhibit 71. Source of funds for operations and products for JMS

Source	Percent
U.S. government	68 percent
Cost Recovery JMS	27 percent
Global Fund The AIDS Support Organization	2 percent
Government of Uganda	2 percent

Exhibit 72. JMS months of stock on hand on the day of the visit



Summary of results and discussion

JMS scored above 80 percent in four modules: financial sustainability, procurement and customs clearance, quality and pharmacovigilance, and waste management. Overall, most scores ranged between 57 percent (FASP) and 92 percent (quality and pharmacovigilance).

JMS has an approved national pharmaceutical sector strategic plan, updated annually, that includes all relevant supply chain components except quality assurance, quality control, and waste management. JMS also prepares an annual supply chain operational plan. For financial sustainability, JMS has all the basic elements in place, with a maximum possible score of 50 percent. Cost recovery and facility revenue contribute to most (51–99 percent) of the total supply chain operations budget. Since JMS is privately owned, it has its own governance body, comprised of shareholders. None of the supply chain positions receive funding from the government budget, either at the national or subnational level. A general

recruitment policy is in place that is applied to supply chain positions, but it is not specific to the supply chain.

JMS leads its own annual forecasting exercise for essential medicines and health supplies, using only consumption data that factor wastage and missed demand. Before procuring, JMS uses forecasts to inform ordering and mobilize resources from outside entities, but no formal process is in place to update supply plans, and changes are not communicated to downstream facilities. Also, it does not seek input from the MOH, other programs, or development partners — a practice that can likely result in inaccurate or incomplete forecasts as evidenced from the results in the KPI scores in Exhibit 71 above. JMS scored an 88 percent supply plan accuracy, indicating that 88 percent of the time, JMS procures the quantities as stated in its supply plans. For forecasting accuracy, JMS scored 96 percent, signifying that its forecasts are relatively in line with its anticipated need. This result is discordant with the months of stock data in Exhibit 70 and the KPI indicators above, which show that 67 percent of the tracer commodities are stocked either below or above their maximum inventory control parameters of two and eight months, respectively. Although none of the tracer commodities were stocked out on the day of visit, results of Exhibit 72 show that most of the tracer commodities are overstocked, with up to 21 months of stock for amoxicillin and 17.5 months of stock on hand (MOSOH) for AL 6x4.

For warehousing and inventory management, JMS had a composite score of 79 percent. With its primary mandate to store and manage inventory of health commodities, JMS has established SOPs that are used for efficient inventory management; it also meets all the basic requirements for appropriate storage, including availability of pallets, vents, proper cold chain maintenance, and regular temperature monitoring. JMS uses a WMS to track and manage inventory. Although JMS has an approved distribution plan, with pre-planned routes, it does not consider truck capacity, product volumes, or geographic locations. As a security measure, JMS uses integrated audit procedures, which include barcode scanning and unannounced inspections. JMS scored the lowest in the LMIS module (56 percent), even though it has a robust WMS, which is used to track and manage inventory. However, it doesn't seem to translate to the use of LMIS or the eLMIS. Insufficient use of eLMIS or LMIS might be one reason for the forecast accuracy score of 96 percent.

JMS uses a paper-based LMIS and an eLMIS, with SOPs in place that are updated annually. LMIS tools are standardized across the various supply chain levels, which track completeness and timeliness of reporting by lower-level facilities. The biggest challenges to eLMIS use are Internet connectivity, lack of time, insufficient human resources, and data quality.

A key accomplishment at JMS is the existence of formally documented policies that cover all essential areas of the supply chain, with one major exception of FASP — a critical gap in its policies. Some other notable accomplishments include putting in place quality control and quality assurance mechanisms, which include conducting quarterly or testing pharmaceutical products more often at accredited laboratories and recording Certificates of Analysis and Certificates of Conformance for all medicines received from domestic and international sources. Also, procurement at JMS is done based on established control mechanisms and documented processes as outlined in the SOPs. Proper waste management is prioritized at JMS; SOPs are updated every two years, the waste disposal process is well documented and integrated into the WMS, and any UMPP is stored separately.

Recommendations

- Because the low score in forecasting and supply management may be driven partly by the low score in LMIS, conduct a deep-dive analysis to identify root-cause issues followed by an improvement plan, including training JMS supply chain staff in proper LMIS use.
- Review procurement and stock management practices, as several commodities had more than one year of stock on hand over the maximum acceptable stock level. Conduct a root-cause analysis to understand how to adjust procurement, storage, and distribution practices to avoid this situation in the future.
- Ensure JMS includes various stakeholders and partners when conducting its forecasting and supply planning exercises. Include key logistics data from different partners in building forecasting assumptions to avoid procuring more than needed and to prevent overstocks and expiries.
- Because there is a possible connection resulting in low scores for policy and governance and strategic planning and management, conduct a high-level review of JMS strategy design and policy adherence to ensure these items are improved.

Areas for Further Investigation

Central-Level Stock Thresholds

In visits to the central level, the team found that NMS and JMS had stock levels far outside of the established minimum and maximum levels. For example, JMS had more 20 MOSOH of amoxicillin and 17.54 MOSOH of the ACT AL 6x4. Root-cause analysis is needed to understand how this is occurring. NMS has established minimum and maximum levels that are uniform across all products. However, since each product has a unique demand profile, understanding and applying appropriate thresholds would increase efficiency and reduce waste. A wide range of MOSOH at the central level could be leading to the issues observed downstream, where HCs report receiving commodities about to expire. Further analysis should be conducted on how to strengthen application of the FEFO practice to improve poor KPI stock data at the HCs. Root-cause analysis is required to disentangle the effects of NMS's obligatory six-month minimum and maximum levels and overstocking commodities that had adequate shelf life, but no demand. This obligatory stocking-level policy could potentially be having an impact on a broad range of issues downstream.

RRHs

As the most advanced service delivery facility, RRHs are performing worse than lower-level counterparts, from a supply chain perspective. They typically performed the worst across all areas (KPIs and CMMs). Capacity improvements and investment are needed in eLMIS, waste management, quality assurance and pharmacovigilance, stock management, and human resources. With eLMIS and stock management, of the RRHs:

- 13 percent had strategic plans with M&E components in them
- None (0 percent) reported having LMIS as part of their strategic plan
- 19 percent had 100 percent eLMIS record accuracy
- 41 percent had 100 percent stockcard accuracy

RRHs also had commodities SATP only 24 percent of the time, on average, with 9 percent of the 182-day period measured with a stockout. With 27 percent of positions vacant at RRHs and the lowest human resource CMM score of any facility type, RRHs have significant room for improvement in recruiting, managing, and supporting supply chain staff in these facilities. Root-cause analysis of these issues would help in understanding how best to improve performance.

Human Resources

A consistent finding, below the central level, is insufficient staffing levels for supply chain. Across Uganda, RRHs, GHs, and HCs have concerning levels of vacancy. There is an urgent and pressing need to lobby GOU to ensure that these positions are funded, and supply chain-specific recruitment policies are developed and used to hire and retain staff in these important positions. These concerns also influence the workloads of central-level entities. For example, JMS must hand-compile consumption and stock management reports from lower-tier facilities, as the HCs are simply unable to enter the LMIS data themselves. This creates a twofold problem: HCs seem less understaffed than they are, and JMS staff have less time to focus on high-level supply chain issues. A recommitment to ensuring adequate staffing at public and PNFP sites will be critical to realizing any sustained improvements to the Ugandan PHSC.

Waste Management

Overall, a focus on waste management and how it affects Uganda's supply chain is lacking. While waste management CMM scores were high at the central level, they were poor at service delivery points. Gaps for waste management at the central level that could help catalyze a cascade of effects downstream include:

- Determining which entity is responsible for health-care waste management
- Including waste management in the National Supply Chain Strategic Plan
- Updating waste management SOPs disseminated nationally along with implementing a regional training strategy
- Updating waste management tools and incorporating a review of waste management practices in supportive supervision visits to all service delivery levels

These activities could bolster the clarity of expectations and the efficacy of operations throughout the supply chain in waste management. General hospitals may have challenges in appropriately managing the significant stocks of expired first-line tuberculosis drugs, a finding captured as a KPI. This concern needs to be addressed to develop a plan for safe and effective removal of these products.

LMIS

Throughout the analysis of data from the assessment, LMIS has continued to appear as a weaker area that is potentially affecting other parts of the supply chain system. The CMM module facility averages indicate a large range of capability (34–63 percent) and even greater variation within each facility type. Low CMM scores, coupled with poor KPI performance, suggest issues that require a root-cause analysis (and potentially internal audits) with LMIS in the supply chain. Consistent use of LMIS at all supply chain levels is key to making informed resupply, forecasting, and procurement decisions, the importance and benefit of which cannot be understated.

Summary of Findings and Recommendations

The assessment shows a complete, point-in-time snapshot of the Ugandan PHSC. Where CMM and performance scores are low, this report identifies items that contribute to these scores. However, it is not the mandate of the NSCA 2.0 to identify the underlying causes of the deficiencies. Where this report identifies gaps, a deeper dive is recommended, focused on interpreting the root cause so that targeted operational improvement programs can be developed to address these gaps. Any comparisons between KPIs and CMM scores are reported simply as findings of measurement tools applied thoughtfully to a purpose-specific context. The assessment has sought to maximize collaborative efforts at every step to leverage investment around one transformational plan, helping guide the Ugandan PHSC forward to strong, sustained performance and resilience.

KPI Findings

Stockouts and poor stock management have been documented throughout the system; more than 90 percent of SDPs have experienced a stockout of tracer products in the last six months and no entity, not even central-level entities, has been SATP more than 60 percent of the time in the same period. Encouragingly, central-level entities had no stockouts on the day of the visit and only 11 percent of either hospital type had any type of stockout on the day of the visit. There is a concern that the wide range of acceptable MOSOH at NMS and the high levels of MOSOH of several tracer products with low demand at JMS indicate that stock management practices need to be reviewed and adjusted at both entities. Wastage rates overall were low, with most facilities indicating less than 1 percent of any tracer stock deemed unusable. The notable outlier was RHZE, which had 14 percent wastage in general hospitals, 6 percent at health centers, and 5 percent at NMS. To address the immediate issue, a reverse logistics waste removal plan must be developed. To avoid such occurrences in the future, a careful review of stock management practices for TB commodities should be conducted.

For LMIS, record accuracy is poor across the board with no lower-level facility type having 100 percent stockcard accuracy at more than 65 percent of facilities and 100 percent eLMIS record accuracy at more than 33 percent of facilities. Strengthening data collection procedures and data quality reviews is critical, with an emphasis on improving SOPs and training responsible staff.

CMM Findings

Overall, CMM scores at central-level entities were much higher than at lower-level facilities. While this may have been anticipated, it only increases the importance of providing technical assistance and support at the downstream facilities to ensure drugs reach the intended recipients. The best-performing functional areas of the CMM (in no particular order) were:

- Strategic Planning and Management
- Financial Sustainability
- Forecasting and Supply Planning

- Distribution

These are positive findings, as they indicate that the leadership at the top of the supply chain has vision and sets strategic priorities beyond the near term. This will be a strength moving forward as improvement plans are drafted. Development of strategic plans with comprehensive inclusion of key supply chain areas and consistent monitoring were common throughout central-level entities. The only notable exception was strategic plans at RRHs. Looking at financial sustainability, there was also encouraging news. While many facilities do experience a budget shortfall, they have strong financial management skills; developing of annual budgets with regular monitoring, quantifying supply chain–related financial need, and having the flexibility within budgets to address shortfalls.

Underperforming areas of the CMM (in no particular order) were:

- Policy and Governance
- LMIS
- Waste Management
- Quality and Pharmacovigilance
- Human Resources

Waste management does not have a national strategy, and guidelines are not consistent and ubiquitous throughout the system. Applications of waste management SOPs are poor, and documentation of waste disposal events is inconsistent. This can lead to UMPP clogging up storage space and holding back the system from strong performance. Special emphasis should be placed on ensuring the waste makes it out of the system as safely and efficiently as possible. A focus on implementing FEFO dispensing practices will also help to ensure the wastage does not continue to build up.

Pharmacovigilance CMM scores were particularly low in service delivery facility types. A concerning finding was how few facilities could identify possible solutions in the occurrence of an ADR, such as notifying the NDA or stopping issuance of products. Only 15 percent of health centers and 21 percent of general hospitals identified stopping issuance of products as a possible action to take in response to an ADR. Also, only 28 percent of HCs and 46 percent of GHs identified notifying the NDA as a possible action step. Disseminating PV SOPs and policies is an important and low-cost action item that should be implemented soon.

Human Resources CMM scores, while not the lowest, still provided important findings that need to be addressed. No lower-level facility type has HR strategies that specifically consider supply chain positions. Supply chain skills and competencies are also poorly represented on job descriptions throughout the system. Policies for recruiting and retaining supply chain staff are crucial to fill the numerous supply chain vacancies that were found throughout the system.

The Global Fund has indicated that it is prepared to follow up on some areas of the downstream supply chain where performance can be improved. It has a structured and systematic method for supply chain transformation, and this NSCA 2.0 has provided the data and analysis needed to establish where root-cause deep dives will pinpoint the items that will contribute the most significant potential for improvement.

Conclusions

Under the leadership of the MOH, USAID, The Global Fund, and GHSC-PSM the NSCA 2.0 was implemented in Uganda with the intention to:

- Measure PHSC performance and capability
- Analyze the overall PHSC operational capacity and performance, identifying bottlenecks and opportunities for improvement
- Identify focus areas of opportunity for MOH planning and stakeholder coordination to inform development of transformational plan(s) to guide future system strengthening investments

Overall, a general trend indicates stronger capability in the central levels, particularly the stores, and weaker capability scores as the health commodities proceed downstream through to the hospitals and health facilities. Exhibit 10a clearly shows that most low CMM scores are observed at the RRHs and health facilities. This may be the result of an initial plan to fix upstream activities first and then work down the tiers. However, more MOH and GOU attention and root-cause analysis must be performed at the lower levels where most Ugandans are accessing services.

There is cause not only to focus on maintaining and improving the central level but also to drive forward with a well-structured program to raise the capabilities of the hospitals and especially the health centers.

National health product supply chain transformation requires strong ownership from the MOH and is also enhanced with the support of the MOPFED and the MOLG. A partnership between the GOU and key financiers, which also include the private sector, can be a powerful instrument in strengthening Uganda's public health supply chain. It is recommended that a steering committee be formed with these parties.

A natural next step would be to move the data collection and output analysis to a full understanding of the current state by follow-up root-cause investigation. When this is completed, the steering committee may consider the appropriate activities, costs, timing, and benefits associated with the improvement projects recommended. These projects would require continuous monitoring to ensure that deliverables are achieved on time and within budget while also ensuring the objectives are achieved.

With the findings and recommendations of this report, a clear list of priorities for investigation and potential investment emerges. With careful root-cause analysis and thoughtful planning and investment, the potential is great to transform aspects of the Ugandan public health supply chain into a more robust and well-functioning system.