

Rwanda National Supply Chain Assessment Report

Capability and Performance

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Acronyms

ACT	artemisinin-based combination therapy
ADR	adverse drug reaction
AL	artemether-lumefantrine
BUFMAR	Bureau de Formations Medicales Agreees du Rwanda (Office of Accredited Medical Trainings of Rwanda)
CMM	Capability Maturity Model
CMS	central medical store
COP	Country Operational Plan
CBHI	community-based health insurance
DH	district hospital
eLMIS	electronic logistics management information system
FASP	forecasting and supply planning
FDA	Rwanda Food & Drug Authority
FP	family planning
GHSC-PSM	Global Health Supply Chain-Procurement and Supply Management
HDI	human development index
HQ	headquarters
HR	human resources
LMIS	logistics management information system
LMO	Logistics Management Office
KPI	key performance indicator
MEDIASOL	Medical & Allied Service Solutions
MOH	Ministry of Health
NPSSP	National Pharmaceutical Sector Strategic Plan
NSCA	National Supply Chain Assessment
PPP	public-private partnership
RMS	Rwanda Medical Supply, Ltd.
RBC	Rwanda Biomedical Centre
SDP	service delivery point
SOA	state of the art
SOP	standard operating procedure
SOW	scope of work
SPM	strategic planning and management
TRMS	Transforming Rwanda Medical Supply Chain
UHC	universal health coverage

Executive Summary

The Ministry of Health (MOH), National Supply Chain Assessment (NSCA) Steering Committee, United States Agency for International Development (USAID), and USAID Global Health Supply Chain Program-Procurement and Supply Management (GHSC-PSM) project conducted fieldwork in Rwanda for the NSCA 2.0 from March 14 to April 7, 2022. The NSCA measures the capability, functionality, and performance of supply chain functions at all desired levels of a national health supply chain system. The assessment toolkit collects information through three primary methods: a supply chain system mapping exercise, the Capability Maturity Model (CMM) questionnaire, and the collection of key performance indicators. The 11 functional areas of effective supply chains assessed by the CMM survey are shown in Exhibit I.

Exhibit I. NSCA 2.0 CMM Functional Areas

Strategic Planning and Management

Policy and Governance

Human Resources (HR)

Financial Sustainability

Forecasting and Supply Planning

Procurement and Customs Clearance

Warehousing and Storage

Distribution

Logistics Management Information System (LMIS)

Quality and Pharmacovigilance

Waste Management

The primary objectives of this assessment were to:

- Analyze and measure the performance, operational capacity, and capability of the national public sector–financed health commodity supply chain
- Identify the performance gaps (bottlenecks, root causes, and opportunities for improvement) to guide system strengthening investments
- Assess the Government of Rwanda’s (GOR) progress to date in implementing reforms laid out in the National Pharmaceutical Sector Strategic Plan (NPSSP)
- Understand what impacts the establishment of Rwanda Medical Supply, Ltd. (RMS) has had on the supply chain

The assessment focused exclusively on the public-sector supply chain, or that which is directly financed by the GOR or public-sector funding. The NSCA sampled public facilities across multiple levels of the supply chain system—health posts, health centers, district hospitals, and referral hospitals. Also, it censused all, four provincial hospitals, and 30 RMS branch locations. Finally, at the central level, the MOH, Rwanda Food and Drug Authority (FDA), RMS Central, Office of Accredited Medical Trainings of Rwanda (BUFMAR), MEDIASOL, and Rwanda Biomedical Centre (vaccine central warehouse) were individually assessed on appropriate technical areas. The NSCA assessed a total 207 sites.

Results from the assessment are presented below by technical area, with additional cross-cutting and concluding analysis provided at the end. As the NPSSP (2018–2024) is a key driving document of supply chain reform in Rwanda, each section starts with identifying the prevailing priorities for reform within

each technical area. Results of this NSCA are then detailed in the context of these GOR priorities and by the structure of the NSCA tools (CMM and key performance indicators). Each section concludes with specific recommendations for addressing the findings detailed within the section to help bridge the gap between the current state and the goals in the strategic plan.

Overall, this assessment found widespread capabilities across all 11 supply chain technical areas assessed, particularly at the central level. Rwanda's public health supply chain benefits from a strong foundation of capabilities in strategic planning and policy. They will serve the system well as it continues to improve and refine the supply chain. Strong central-level capabilities are also found within forecasting, pharmacovigilance, and waste management with entities exceeding the NSCA 80 percent benchmark. The MOH and the Rwanda Food & Drug Authority have in place excellent capabilities—achievements that the GOR can be proud of and evidence of its continued commitment to improve the health supply chain.

These capabilities, however, have largely not trickled down to the peripheral levels of the supply chain. Scores for pharmacovigilance and waste management were low for last-mile facilities. Previous supply chain assessments have noted the disparity between rural and urban capability within the supply chain—a continued challenge for Rwanda, as evidenced by the wide range of capability maturity scores documented within each facility type assessed. The MOH needs to review its training and supportive supervision to ensure that the Ministry is allocating resources equitably so that poorly performing facilities receive extra focus and support.

A major question in implementing NSCA was understanding how the establishment of RMS has affected the state of the Rwandan supply chain. Reviewing stock availability across multiple product categories over a six-month period (September 2021–February 2022) has revealed that patients have continued to have access to lifesaving medicines across the country. Stockouts have been infrequent and generally resolved promptly when they do occur. RMS has demonstrated that it could get competitive pricing for its procurements and consistently deliver at 70 percent on-time delivery or greater to most facility types in the country. The institution will be an asset to the country as it continues to improve the supply chain. While the supply chain has averted stockouts, the system in general is running on low supply. Stocked according to plan rates at all RMS branches were low, with many commodities rarely within the expected minimum and maximum inventory levels. With a 48 percent fill rate to the service delivery point level and half of district hospital orders being unplanned during the six-month period assessed, the system is not fully satisfying the demand for medicines. These dynamics merit further investigation and are likely impacted by other areas of the supply chain.

The assessment has documented that the electronic logistics management information system (eLMIS) continues to face significant challenges related to the accuracy of the data within the system as well as general operations and use of the system. Looking at system operations, roughly half of health centers and hospitals had standard operating procedures (SOPs) available and responded affirmatively to having a standard process in place to review LMIS data. A similar proportion of those facilities reported including eLMIS as a portion of their operating budget. Also, 80 percent of district hospitals and 61 percent of health centers cited Internet connectivity as a major challenge for using eLMIS. Lack of time to do other tasks also ranked high on the list of challenges with eLMIS.

Using these challenges as context, accuracy of eLMIS records is understandably poor for program commodities and essential medicines alike. It was rare to find more than 50 percent of any facility type surveyed to have concordance between the eLMIS recorded balance and the actual stock on hand on the day of the visit for a tracer commodity included in the assessment. It is not surprising to see that RMS is having a difficult time maintaining appropriate stock levels in the system if the entity is operating

on poor-quality consumption data for its planning purposes. Any continued improvement to the supply chain will be limited until these two prevailing challenges are addressed.

Overall, the 2022 NSCA presents a detailed and updated understanding of the Rwandan health supply chain; providing the MOH with a keen understanding of how the initiation of RMS has impacted the supply chain overall as well as targeted areas for improvement to help drive the system forward. This NSCA demonstrates that progress has been made since the 2017 implementation but some of the historical challenges have not been addressed and remain as rate-limiting steps in realizing even greater gains in supply chain efficiency and effectiveness. The authors of this report are confident that with empowered leadership, strategic targeting of supply chain weaknesses, and a commitment to equity within the health system, Rwanda can implement appropriate reforms to further strengthen the supply chain in helping realize Rwanda's vision of universal access to high-quality health care.

Background

Rwanda's Public Health Context

The population in Rwanda has reached just over 13 million people (2021 estimate), with an annual population growth rate of 2.5 percent.¹ In 2019, the country scored 0.543 on the human development index (HDI), which places Rwanda at the high end of the low development category.² Since 1990, the country's HDI value has increased 119 percent, reflecting massive gains in health, education, and standard of living outcomes over the past three decades. In this period, Rwanda's life expectancy at birth increased by 35.6 years to 68 years, and gross national income per capita more than doubled to reach just under \$800 a year.

After the genocide against the Tutsi, the Government of Rwanda (GOR) has made massive strides to improve its general standings and economic prospects but also to improve the health of its citizens. The most notable initiative was implementing Mutuelle de Santé in 2005, the community-based health insurance (CBHI) scheme rolled out by the GOR to address major health concerns. The goal was to increase access to primary health care and reduce the financial burden related to health for the lowest economic populations in Rwanda.³ As a result of Mutuelle de Sante, more than 90 percent of Rwandans can access primary health care services locally in their villages.

The country has also made concerted efforts to improve its health care workforce. After the 1994 genocide, 80 percent of the health care workforce was displaced. In 2011, the country had less than nine health care professionals per 100,000 citizens. In response, the GOR launched its Human Resources for Health (HRH) initiative.⁴ Since the start of the initiative, the country has made significant progress in improving the number of health care workers but it still lags behind the suggested number of 44 per 10,000 citizens.

Communicable, maternal, neonatal, and nutritional diseases continue to be the leading cause of death in Rwanda, with lower respiratory infections and neonatal diseases being the most common. In the last 10 years, these have remained the top two causes of death in the country.⁵ However, great strides have been made in controlling the HIV/AIDS epidemic in Rwanda. From 2009 to 2019, HIV/AIDS has dropped to the eighth most common cause of death, marking a 52.8 percent decrease. The country has made marked improvements in its efforts to reach epidemic control. In 2019, Rwanda achieved the then-target from UNAIDS of 90-90-90 by achieving a 76 percent viral load suppression rate for people living with HIV (PLHIV).⁶

1 The World Bank (2022). The World Bank: Data, Rwanda, retrieved from <https://data.worldbank.org/country/rwanda>.

2 UNDP (2020). Human development indices and indicators: 2020 statistical update, Rwanda, retrieved from <https://hdr.undp.org/data-center/specific-country-data/#/countries/RWA> This is a summary measure for assessing long-term progress in three basic dimensions of human development: a long and healthy life, access to knowledge, and a decent standard of living.

3. Hartwig, Renate et al. "Mutual Health Insurance and the Contribution to Improvements in Child Health in Rwanda." (2012).

https://aec.afdb.org/sites/default/files/2019/12/04/mutual_health_insurance_and_the_contribution_to_improvements_in_child_health_in_rwanda.pdf

4. Kuehn, BM. Boosting Rwanda's Health Workforce. JAMA. 2020;323(15):1435. doi:10.1001/jama.2020.4035

5. Vos, T, Lim, S. S., Abbafati, C., Abbas, K. M., Abbasi, M., Abbasifard, M., Abbasi-Kangevari, M., Abbastabar, H., Abd-Allah, F., Abdelalim, A., Abdollahi, M., Abdollahpour, I., Abolhassani, H., Aboyans, V., Abrams, E. M., Abreu, L. G., Abrigo, M. R. M., Abu-Raddad, L. J., Abushouk, A. I., ... Murray, C. J. L. (2020). Global

In its most recent national strategic health sector plan, the GOR continues to commit to its 2015 National Health Policy, which said, “The first principle is that the health system ensures universal demand and access to affordable quality services.” To achieve this end, the government has detailed the need to focus on fully implementing various programs, strengthening all levels of service delivery, ensuring effective governance, and strengthening the various health system components, notably the health supply chain. The next section discusses the public supply chain context.

Rwanda’s Public Health Supply Chain

As a fundamental component of the overall health system, an effective and efficient public health supply chain ensures that quality-assured medicines and medical supplies are available when and where they need to be and in the right quantities to be effective in meeting the health needs of the population. Rwanda has acknowledged the importance of the supply chain in advancing the country’s vision of universal health coverage. This section details the country’s progress establishing, refining, and continuously improving the supply chain that supports the national health care system.

Rwanda’s public health system is organized in a vertically oriented hierarchy with centralized entities playing essential roles in strategic planning, governance, policy, and implementation. At the top is the Ministry of Health and its directorates, which are collectively responsible for setting all standard guidelines and operating procedures, directing actions, and coordinating and allocating resources. Regulatory oversight is provided by the Rwanda Food & Drug Authority, who is responsible for drug registration, pharmacovigilance, and more. Specifically, the entity’s mission is to “regulate medical products, processed foods, household products, and tobacco and tobacco products to ensure their quality and safety so as to protect the population of Rwanda from defective, falsified and substandard products.”⁷

While the MOH is responsible for setting strategic planning priorities, policies, operational guidance, and allocation of funding, the execution of core supply chain tasks such as procurement, customs clearance, warehousing, and distribution is implemented on their behalf by a set of four institutions that serve as a Central Medical Store (CMS). The first and largest entity is Rwanda Medical Supply Ltd. A corporation owned and created by the GOR, it is a parastatal agency whose mission is “to ensure the availability of quality and affordable pharmaceutical products, medical equipment, and consumables to the population of Rwanda.” Rwanda Medical Supplies Ltd. (RMS) has full financial, legal, and administrative autonomy in its work to procure, store, and distribute drugs, medical supplies, and consumables to be used in all public health facilities. RMS has 31 warehouses, with one central warehouse in Kigali and 30 warehouses located throughout Rwanda. (This report will refer to them as RMS branches.) RMS conducts integrated distribution of a variety of different commodity groups, including program commodities that are provided by international donor institutions. RMS was created in 2020 as a state-owned private company with mandate to ensure timely availability of affordable health products and technologies for the public. The Government of Rwanda has merged the former CMS named Medical Procurement and

burden of 369 diseases and injuries in 204 countries and territories, 1990–2019: a systematic analysis for the Global Burden of Disease Study 2019. In *The Lancet* (Vol. 396, Issue 10258, pp. 1204–1222). Elsevier BV. [https://doi.org/10.1016/s0140-6736\(20\)30925-](https://doi.org/10.1016/s0140-6736(20)30925-)

6 Nsanzimana, S., Rwibasira, G. N., Malamba, S. S., Musengimana, G., Kayirangwa, E., Jonnalagadda, S., Fazito Rezende, E., Eaton, J. W., Mugisha, V., Remera, E., Muhamed, S., Mulindabigwi, A., Omolo, J., Weisner, L., Moore, C., Patel, H., & Justman, J. E. (2022). HIV incidence and prevalence among adults aged 15–64 years in Rwanda: Results from the Rwanda Population-based HIV Impact Assessment (RPHIA) and District-level Modeling, 2019. In *International Journal of Infectious Diseases* (Vol. 116, pp. 245–254). Elsevier BV. <https://doi.org/10.1016/j.ijid.2022.01.032>

Production Division (MPPD) with 30 district pharmacies (DPs) to form RMS. The purpose of this reform is to address challenges related to procurement of health commodities and improve the entire supply chain management across the health system. Recently, USAID has extended its partnership with RMS through the project named Transforming Rwanda Medical Supply Chain (TRMS) for procurement of program-funded health commodities. RMS was awarded to boost health commodities supply chain and manage PEPFAR funds for procurement, storage, and distribution of HIV/AIDS-related health commodities.

The next CMS is Medical & Allied Service Solutions (MEDIASOL) is a group of private companies limited by shares categorized under Health Services. The company has two different private companies MEDIASOL Pharmacy Ltd and MEDIASOL Pharmaceutical Depot Ltd. The company has recently signed an agreement with the MOH to act as a CMS for key essential medicines that the country procures for its health system. The next CMS is the Office of Accredited Medical Trainings of Rwanda (BUFMAR), a non-governmental organization created in 1975 by Christian denominations working in Rwanda with approved health training. The entity's vision is to "be a Center of Excellence, financially autonomous, at the service of health establishments for the purchase, production and distribution of pharmaceutical products, and quality medical equipment and materials at a lower cost."⁴ BUFMAR also serves as a CMS institution for essential medicine products for the Rwandan health system. The final institution is the Rwanda Biomedical Centre (RBC), which runs the central vaccine warehouse. RBC's mission is to "promote high quality, affordable, and sustainable health care services to the population through evidence-based interventions and practices guided by ethics and professionalism." RBC is responsible for providing health care services in a variety of capacities but from the supply chain perspective, they operate the vaccine supply chain, including direct distribution to immunization sites all throughout Rwanda.

At the service delivery level, multiple types of health facilities provide decreasing levels of health services as you progress through the administrative layers. The primary health care facility types are health posts (the lowest level in the health system with approximately 830 facilities nationwide), health centers (also considered a last-mile facility but with more robust services offered with approximately 520 facilities nationwide), and district hospitals (the most common hospital type with 39 hospitals located throughout the country). At the referral level, four provincial hospitals and eight referral hospitals are placed strategically throughout the country. Private health care facilities exist in Rwanda as well with roughly 50 percent of those facilities located in an around Kigali

In 2012, Rwanda first initiated the process of strategic planning for the expressed purpose of strengthening the public health supply chain in support of Third Rwandan Health Sector Strategic Plan 2012–2018 (HSSP III). With the support of USAID and the USAID Supply Chain Management Systems (SCMS) and USAID DELIVER projects, the MOH instructed the recently created Logistics Management Office (LMO) to implement its first National Supply Chain Assessment (NSCA).

Using the 2013 NSCA findings as a basis, a workshop was convened to create the first National Pharmaceutical Strategic Sector Plan (NPSSP 2013–2018). It laid out six key summary objectives to focus on Summary Objectives:

- I. a) Operationalize the LMO as the designated coordinating institution, with the priority objective of ensuring the integration of SC stakeholders and activities.
- b) LMO to coordinate timely quantification, monitoring, and planning of all commodities including essential medicines.

⁴ BUFMAR: <http://bufmar.rw/>

2. By 2016, achieve a 100 percent level of capability for key functions of warehousing, transport and waste management using standardized business process best practices.
3. Streamline procurement processes to provide a timely and responsive procurement service, while complying with available and applicable procurement regulations and guidelines
4. Develop and monitor a tool/plan to ensure continuous availability of funds for health commodities and SC operations including planning for reduction in donor dependency where appropriate
5. Put in place a robust performance management and information system for key functional areas at each level of the supply chain to guide timely decision-making and continuous improvement.
6. Strengthen Pharmaceutical Quality Assurance system through the MOH, leveraging regional Systems

With its technical assistance partners, the MOH instituted a number of different reforms to the health supply chain within the intervening time. Specifically, the MOH created a performance management plan (PMP) to ensure proper implementation, performance monitoring and general improvement of the system. A fundamental component of the supply chain reforms was the development of the national electronic Logistics Management Information System (eLMIS). Rwanda was one of the first countries in the region to envision and deliver on an eLMIS that was rolled all the way down to the service delivery point (SDP) level. The elaboration of the 2015 National Pharmaceutical Policy was also a key policy and governance effort that codified the rational use of medicines within the health system as well defining what improving access to medicines means; the correct medication, in the appropriate dosage, located where the patients are, at an affordable price, and available in a timely manner.

As a testament to the country's commitment to continual improvement, the MOH implemented another NSCA in 2017 as its first NPSSP's timeframe was coming to a close. This assessment validated many of the achievements that MOH had been focused on. Specifically, it identified strong, transparent procurement processes in place, well-established forecasting and supply planning processes, and significant central-level storage capabilities. Several deficiencies were also identified: nascent capability in key supply chain areas at peripheral levels of the supply chain, an overdependence on emergency orders and inability to maintain appropriate stock levels throughout the system, and concerns over the reliability of information in the eLMIS. These items directly informed development of the country's second NPSSP.

The NPSSP is a key supply chain document in the current context. It details major challenges and lays out vision and priority objectives for the future. The NPSSP is pillared on 10 strategic objectives:

- Ensure safe and quality of medicines are available in public and private markets
- Enforce the compliance of prescription and dispensing practices to evidence-based guidelines
- Curb and control the impact of antimicrobial resistance in Rwanda
- Increase per capita spending on medicines while equitably reaching more citizens with needed medicines
- Reduce stockouts and increase availability of medicines and health technologies in the public sector
- Leverage collaboration and engagement of private sector partners in the pharmaceutical sector to achieve NPSSP target outcomes
- Promote the increase of pharmaceutical industry in Rwanda
- Promote the specialized roles pharmacy professionals
- Support operational research and development

- Ensure a functional pharmaceutical information system and platform to facilitate the functions of the sector

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

Overview of the Supply Chain Assessment Activity

Under MOH leadership, the NSCA Steering Committee, RMS, BUFMAR, MEDIASOL, RBC, USAID, UNFPA, and GHSC-PSM provided support for the requisite fieldwork for the NSCA in Rwanda from March 14 to April 7, 2022. The assessment had four primary objectives:

1. Analyze and measure the performance, operational capacity, and capability of the national public sector-financed health commodity supply chain
2. Identify the performance gaps (bottlenecks, root causes, and opportunities for improvement) to guide system strengthening investments
3. Assess GOR progress to date in implementing reforms laid out in the NPSSP
4. Understand what impact the establishment of RMS has had on the supply chain

The NSCA 2.0 includes three distinct elements:

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

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

The NSCA focused on those parts of the Rwandan health supply chain directly financed or directed by the GOR. The assessment team collected capability and performance metrics on the Ministry of Health, the various institutions serving as a Central Medical Store (CMS), the branch locations of Rwanda Medical Supply Ltd., hospitals, health centers, and health posts. Donors play a key role in Rwanda's public health system, especially in procuring key commodities, and their actions certainly affect the public system. However, to the extent that donors feature in the NSCA, it is to assess how Rwanda's public health actors effectively manage relations with them, rather than to assess donor capabilities or performance directly. Similarly, the private health market is an influential actor in Rwanda's health system, but one that remained mostly outside the scope of this assessment. Future assessments on donor effectiveness and the private health market would certainly be welcome complements to the NSCA. As is, the NSCA's value is in focusing on the public dimensions, across 11 technical areas and multiple levels, to inform future public system strengthening.

The following discussion offers interpretations of the capability and performance results and translates them into recommendations for future supply chain interventions. The Summary of Findings and Conclusions section highlight key takeaways and suggestions for future analysis. The report annexes, provided in a second volume, provide the complete assessment tools and other detailed information.

Methodology

Over nine months, from October 2021 to June 2022, the assessment team engaged relevant in-country stakeholders to define the scope of work (SOW), determine the tracer commodities for the assessment, and assemble and train data collection teams. This approach simultaneously aimed to strengthen buy-in and investment in the exercise from the MOH, the NSCA Steering Committee, USAID, and other key supply chain stakeholders. The team used the NSCA 2.0 toolkit to guide planning, data collection, and analysis. This section describes in greater detail this process and the assessment's methodology.

The National Supply Chain Assessment Toolkit

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

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

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

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

Scope of Work

The SOW required the assessment team to conduct a comprehensive assessment of Rwanda's public health system across levels: central, provincial, and service delivery. Also, the assessment disaggregates data across multiple facility types: health posts, health centers, district hospitals, provincial hospitals, referral hospitals, and RMS branches. At the central level, the team carried out assessments at the MOH, Rwanda FDA, RMS Central, MEDIASOL, BUFMAR, and the RBC vaccine warehouse. Exhibit 2 in the following section lists all sites where data were collected in March 2022. The complete SOW is attached to this report in the Annex.

Sampling

The NSCA 2.0 was designed to assess country-level supply chain infrastructure, with disaggregation at the level of facility type. Some facility types were lumped together to account for similarities in size and capability and to reduce overall sample size. In Rwanda, the sample frame consisted of all public health facilities across the country for which the national government has a census of sites.

The sampling frame thus consisted of 834 health posts, 532 health centers, 39 district hospitals, four provincial hospitals, eight referral hospitals, and 30 RMS branches. The Ministry of Health, Rwanda Food & Drug Authority, RMS, MEDIASOL, BUFMAR, and Rwanda Biomedical Centre were also included. The sample frame excluded fully private facilities, as this assessment focused on public-sector entities.

The assessment team determined the minimum sample size using the hypergeometric sample size formula, assuming a margin of error of ± 10 percent, and a 90 percent level of confidence as the NSCA 2.0 guidance suggests. The team used a randomized two-stage sampling process to select health centers. The sample size was initially calculated for the number of districts, and later calculated for the number of health facilities needed, based on the above parameters and assuming a design effect of 1.6. The design effect used is based on post-assessment analysis of NSCA 2.0 pilots. Districts were selected with the probability of inclusion in the assessment proportional to the number of health facilities in each district. Within each selected district, four health posts and four health centers were selected at random, and the district hospital for that district was also selected. Also, all provincial hospitals, referral hospitals, RMS branches, and central medical stores were selected because of their outsized importance in the supply chain.

The final sample is detailed below along with the full sample frame (see Exhibit 3). We assessed a total of 207 sites. The full list of selected sites is provided in the annex.

Exhibit 3. NSCA Sampling Frame and Selected Sample		
Facility Type	Population	Sample
Health posts	834	71
Health centers	532	72
District hospitals	39	17
Provincial hospitals*	4	4
Referral hospitals	8	7
RMS branches*	30	30
Central medical stores*	4	4
Central-level entities*	2	2
Total	5,405	207

*Denotes that this facility type was censused

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

assessment. Conversely, in smaller facilities, individual staff members (e.g., the lead pharmacist) often played multiple supply chain roles and thus answered multiple modules within the assessment.

Team Composition and Training

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

At the subcentral sites, 17 two-person teams (34 members total) traveled to 253 sites over 13 days to collect data. Senior supply chain professionals, pharmacists, and supply chain managers were nominated by the MOH to participate as data collectors in this national assessment. Selection was based on a set of outlined skills and credentials, including deep understanding of key health care commodities, comfort with diverse supply chain functional areas, experience with large assessments, high levels of professionalism, and significant autonomy. All data collectors participated in an intensive four-day training on the assessment tools, SurveyCTO, tracer commodities, and best practices in survey methods. On the fourth day of training, participants conducted pilot assessments of 10 health facilities in greater Kigali. The pilot served as a practice exercise for data collectors, a low-stakes chance to troubleshoot technology, and a final opportunity to provide targeted feedback to the assessment team to further refine the survey to the Rwandan context.

Procedures

Four weeks before the start of data collection, MOH-endorsed letters were sent to provincial administration units to inform them that facilities in their respective province had been randomly selected to participate in a national assessment of the health supply chain system. Provincial administration units were responsible for communicating the exercise to the main points of contact at each health center under their oversight. Data collectors also carried with them a copy of the notification signed by the MOH, in case of communication failure, and were trained to explain or further reinforce the purpose and value of the assessment upon arrival.

Subcentral data were collected from March 21 to April 7. On average, teams spent one full day assessing health posts and health centers; one to one-and-a-half days at hospitals; two days at provincial hospitals, referral hospitals, and warehouses; with travel days in between. One team member would lead the CMM survey interviews, while the other collected KPI data. If one team member completed their respective interview early (usually the CMM lead), data collectors would support the team member. In a handful of cases, teams included a third member to support KPI data collection at large and predictably difficult sites.

The central-level team collected data from multiple department officials within the MOH and FDA, including vertical program leads and senior finance, human resource, FDA, warehousing, procurement, customs, and regulatory officials. Access was facilitated with scheduling support by key MOH representatives and the GHSC-PSM staff, and reflected relationships developed throughout the planning process with key stakeholders in the MOH. Central-level interviews were conducted over a three-week period, from March 21 to April 7. A total of 21 interviews were conducted with senior central officials across central-level institutions and departments.

The Capability Maturity Model (CMM) questionnaire measures the level of capability and functionality present in the supply chain across 11 functional areas, including storage and warehousing, distribution, financial sustainability, waste management, and human resources. Only relevant modules were assessed

at specific sites, depending on their facility level. For example, health facilities were not assessed on their capabilities in forecasting and supply planning. Relevance was determined by consultations with Rwandan counterparts to understand what supply chain functions were expected at different facility types throughout the system.

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

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

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

Exhibit 4. CMM Functional Area by Level in the Rwanda Supply Chain System—Noncentral Levels						
#	FUNCTIONAL MODULES ASSESSED	Health posts	Health centers	District hospitals	Provincial and referral hospitals	RMS branches
1	Strategic Planning and Management				✓	✓
2	Human Resources	✓	✓	✓	✓	✓
3	Financial Sustainability	✓	✓	✓	✓	✓
4	Policy and Governance				✓	✓
5	Quality and Pharmacovigilance	✓	✓	✓	✓	✓
6	Forecasting and Supply Planning (FASP)				✓	✓
7	Procurement and Customs Clearance				✓	
8	Warehousing and Storage	✓	✓	✓	✓	✓
9	Distribution					✓
10	Logistics Management Information Systems	✓	✓	✓	✓	✓
11	Waste Management	✓	✓	✓	✓	✓

Exhibit 5. CMM Functional Area by Level in the Rwanda Supply Chain System—Central Level

FUNCTIONAL MODULES ASSESSED	MOH	FDA	RMS Central	BUFMAR	MEDIASOL	Rwanda Biomedical Centre
Strategic Planning and Management	✓		✓	✓	✓	✓
Human Resources	✓		✓	✓	✓	✓
Financial Sustainability	✓		✓	✓	✓	✓
Policy and Governance	✓		✓	✓	✓	✓
Quality and Pharmacovigilance		✓	✓	✓	✓	✓
Forecasting and Supply Planning	✓		✓	✓	✓	✓
Procurement and Customs Clearance			✓	✓	✓	
Warehousing and Storage			✓	✓	✓	✓
Distribution			✓	✓	✓	✓
Logistics Management Information Systems	✓		✓	✓	✓	✓
Waste Management	✓		✓	✓	✓	✓

Key Performance Indicators

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

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

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

#	Key performance indicators	MOH	CMS	RMS branches	Referral hospitals	Provincial hospitals	District hospitals	Health centers	Health posts
1	Stock data		✓	✓	✓	✓	✓	✓	✓
2	Delivery data		✓	✓	✓	✓	✓	✓	✓
3	Human resource	✓	✓	✓	✓	✓	✓	✓	✓
4	Facility reporting rates				✓	✓	✓	✓	✓
5	Temperature excursions		✓	✓	✓	✓	✓	✓	✓
6	Forecast accuracy	✓							

7	Supply plan accuracy	✓			
8	Source of funds data	✓			
9	Prices paid	✓	✓	✓	

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

Exhibit 7. Tracer Commodities			
#	PRODUCT NAME	DOSAGE	PRODUCT CATEGORY
1	RHZE (rifampin/isoniazid, pyrazinamide, and ethambutol)	(150mg/75mg/400mg/275mg)	TB
2	Jadelle (two-rod implant)	Two-rod implant	Family planning (FP)/reproductive health (RH)
3	DMPA (depot medroxyprogesterone acetate) IM	150mg vial/IM	FP/RH
4	Insulin long acting	100 UI/ml	NCD
5	Salbutamol inhaler	250mcg	NCD
6	Rapid diagnostic test–malaria	One test	Malaria
7	Artemether/lumefantrine	6 x 4 tab	Malaria
8	Amoxicillin	250mg	Essential meds
9	Paracetamol	500mg	Essential meds
10	Lamivudine/tenofovir/dolutegravir (90-count)	300/300/50	HIV/AIDS
11	HIV rapid test kit	One test	HIV/AIDS
12	Oxytocin IM/IV	100,000 UI	Maternal, newborn, and child health
13	Powdered gloves	Size 7.5	Medical consumable
14	Zinc DT	10mg	Community health
15	Pentavalent (DTwP-Hep B-Hib) vaccine	0.5 ml	Immunization

Data Management

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

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

Limitations

Comparison to NSCA 2017 Results

The MOH of Rwanda conducted an NSCA with the support of USAID and Axios international in 2017. At the time, the NSCA 2.0 methodology was in the process of being finalized and codified to disseminate as a toolkit for use in other contexts and settings. Findings from the implementation experience in Rwanda were used as inputs for finalizing the toolkit. As a result of changes made to the NSCA 2.0 methodology after this report was published, variations are found across the CMM and KPI questionnaires from the 2017 version and the final version that was used during this 2022 implementation. This means that direct comparison of CMM module scores from the 2017 assessment and the 2022 assessment are not strictly appropriate, as the methodologies (number of questions, nature of questions, etc.) varied. To circumvent this issue for analyzing the current state of the supply chain in Rwanda, the authors of this report used comparisons at the question level rather than the module level. For example, instead of drawing a comparison by saying that district hospitals scored higher on the LMIS module in 2022 than in 2017, the report details more granular comparisons like 80 percent of district hospitals reported using LMIS reports to inform ordering and inventory management, an increase from 50 percent in 2017. This statement is illustrative and does not represent the actual situation in 2017 or 2022 for district hospitals.

RMS Central Warehouse Access

During the data collection period in March and April, RMS experienced catastrophic flooding at its main warehouse location. To save the commodities and medical products that were being stored there, all products were moved to a temporary warehouse. Considering the urgency of the situation, the products were not organized in a manner that was conducive to allow the NSCA data collection team to conduct physical counts for any of the tracer commodities. For example, when attempting to start the process for amoxicillin, it was discovered that this product alone had 200 bin cards and they were located throughout the temporary facility and in pathways that were physically blocked by other pallets of medicines. Due to these extraordinary circumstances, the NSCA team agreed that collecting KPI information at RMS Central was simply not possible and was abandoned for this assessment. While physical access to the commodities was not possible, the data collection team was able to successfully execute all scheduled interviews needed to inform collection of the CMM questionnaires. All data were collected, documents physically verified, and respondents interviewed as per NSCA methodology to ensure accuracy and validity of the CMM scores.

Comparing CMM and KPI Scores

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

While individual scores are meaningful, comparisons between two facility types for any CMM score or KPI are more challenging. Without calculated errors, any differences less than 20 percent (assuming the

maximum possible error of ± 10 percent) cannot be stated with complete confidence. Therefore, to err on the side of caution, this report will not attempt to interpret differences between facility types within a CMM module, unless the computed difference is greater than 20 percent. Each KPI will be examined individually, by facility type, within the context of that facility type, rather than drawing comparisons across the supply chain. For facility types that were censused (provincial hospitals, referral hospitals, RMS branches, CMS, and central-level entities), no error is associated with those scores.

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

Summary Results

Overall, we collected data from 207 sites across all levels of the Rwandan public health supply chain system, including:

- Central level (n=6), including the MOH, FDA, RMS, BUFMAR, MEDIASOL, and RBC.
- Regional level, including RMS branches (n=30) and referral hospitals (n=7)
- Service delivery points, including health posts (n=71), health centers (n=72), district hospitals (n=17), and provincial hospitals (n=4)

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

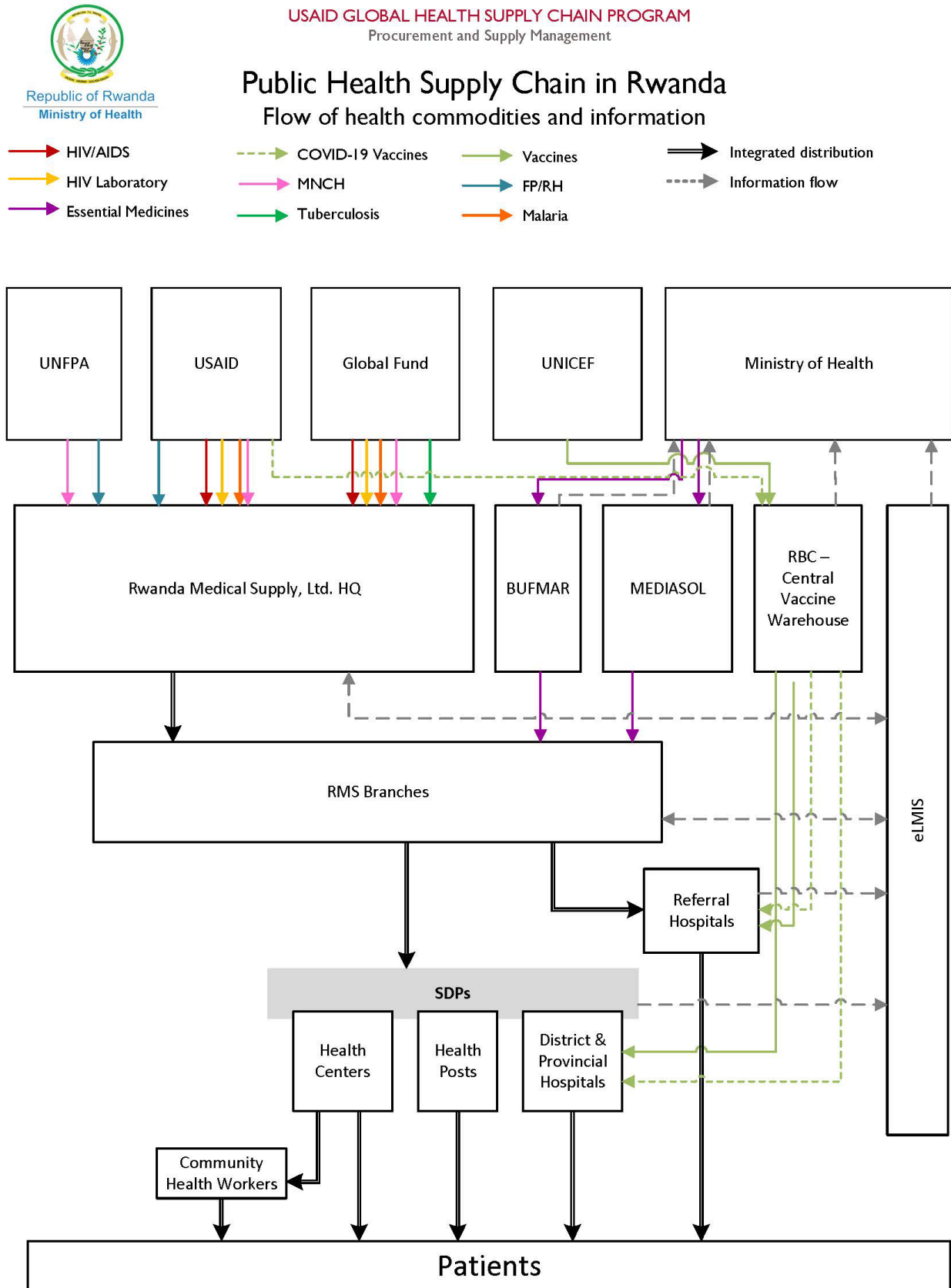
Supply Chain Maps: Commodity and Information Flows

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

On March 14, 20 participants convened for the one-day supply chain mapping workshop in Kigali, Rwanda. Participants included representatives from the MOH and GHS NSCA TWG multiple, the vertical programs, supply chain partners, and invited professionals (see report annex for the workshop slides, agenda, and final participant list). Participants were organized by their expertise into four working groups based on salient vertical programs, and each team was asked to produce a comprehensive map of commodity and information flows from procurement to service delivery. After the workshop, the assessment team integrated these maps into an illustration of the Rwandan public health supply chain with the goal of illuminating bottlenecks, inefficiencies, and opportunities for improvement.

Exhibits 8 and 9 illustrate the organization and elements within the Rwandan supply chain as well as the flow of commodities and information through the system. The final versions presented here have been reviewed and endorsed by the TWG.

Exhibit 8. Map of Commodity Flow



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

- **Integration of the distribution system.** Commodity distribution becomes increasingly integrated as one moves down the supply chain system. Multiple entities procure health commodities for storage at four main central stores: RMS, BUFMAR, MEDIASOL, and the Rwanda Biomedical Centre-Main Vaccine Warehouse. Commodities are bundled at each storage site for distribution to RMS branches. At the RMS branch level, commodities are further integrated for collective distribution to SDPs. Exhibit 8 makes clear the exceptions to this path—vaccine commodities—and the opportunity for increased coordination at higher levels, especially between RMS headquarters (HQ), BUFMAR, and MEDIASOL.
- **Large number of procurers.** Multiple entities—governmental and donor—are procuring health commodities for Rwanda’s public health system, typically with multiple procurers per program area. While increasing the funds available for commodities, this also complicates coordination, as entities procure products on separate timelines.
- **Central role of RMS branches.** Mapping connections also calls attention to the central role of the RMS branch locations in warehousing and distribution of almost all the commodities used in the Rwanda health system. Any future efforts to improve the availability of commodities need to consider these actors and the opportunity for them to play catalytic roles for change if sufficiently engaged and supported.

Understanding the CMM Results

A review of the CMM results presented below must consider how 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 SOA scores. An overall maturity score for intermediate, then, does not necessarily indicate that every aspect of that function has achieved that level of maturity.

Exhibit 9. Definitions of Level of Maturity and Contribution to the Overall CMM Score		
Level of maturity	Definition	Maximum contribution to the CMM score
Basic	Must-have policies, structures, processes, procedures, tools, indicators, reports, and resources to operate a supply chain system (e.g., a stock card as a tool for inventory management).	50%
Intermediate	Not must-haves but intermediate -level policies, structures, processes, procedures, tools, indicators (e.g., Excel).	30%
Advanced	Nice-to-have policies, structures, processes, procedures, tools, indicators, reports, and resources to operate a supply chain system (e.g., Rx solution, a stock management electronic tool).	15%
State of the art	Nonessential, SOA policies, structures, processes, procedures, tools, indicators, reports, and resources for a supply chain system (e.g., an enterprise resource planning system for stock management and control).	5%

Benchmarks in the NSCA

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

The logic behind this 80 percent benchmark is simple; to achieve such a score, most points must be in the basic and intermediate levels to mathematically reach 80 percent. If your supply chain has demonstrated capabilities across the basic and intermediate levels for a particular technical area, then most likely you do not need to prioritize this technical area for improvement in your next strategic planning process. Achieving 80 percent is certainly possible without completely filling basic and intermediate capabilities. This gap becomes a recommendation to focus on for that technical area. Overall, this benchmark's main purposes is to help separate technical areas that are relatively more advanced than others and allow for pragmatic prioritization in improving the public health supply chain.

Capability Maturity Model: Summary Tables

Exhibits 10 to 16 present a summary of key data findings for capability maturity metrics across the 11 technical areas and seven facility sampling disaggregation types.

Exhibit 10. Noncentral-Level CMM Scores, Average, and Ranges Presented by Level of Facility for Each Functional Module

	Health posts	Health centers	District hospitals	Provincial hospitals	Referral hospitals	RMS branches
	71	72	17	4	7	30
Strategic Planning and Management	--	--	--	65% (33–89%)	48% (15–74%)	34% (0–84%)
Policy and Governance	--	--	--	83% (47–100%)	74% (6–100%)	46% (0–93%)
Human Resources	24% (6–53%)	62% (32–85%)	72% (35–93%)	70% (63–80%)	56% (38–70%)	51% (26–76%)
Financial Sustainability	51% (3–78%)	73% (38–94%)	75% (47–91%)	82% (71–92%)	78% (63–86%)	53% (16–90%)
Forecasting and Supply Planning	--	--	--	22% (0–33%)	40% (0–62%)	24% (0–67%)
Procurement and Customs Clearance	--	--	--	77% (77–77%)	59% (36–73%)	--
Warehousing and Storage	23% (7–40%)	48% (28–65%)	58% (48–72%)	58% (53–65%)	63% (50–75%)	49% (37–70%)
Distribution	--	--	--	--	--	41% (20–68%)
Logistics Management Information System	29% (0–64%)	53% (31–75%)	56% (40–69%)	56% (42–66%)	45% (10–63%)	46% (28–67%)
Quality and Pharmacovigilance	1% (0–20%)	9% (0–50%)	30% (10–76%)	23% (8–38%)	36% (8–68%)	22% (0–53%)
Waste Management	10% (0–37%)	31% (0%–61%)	46% (16–88%)	55% (29–73%)	56% (24–86%)	40% (3–63%)

Exhibit 11. Central-Level CMM Scores, Averages, and Ranges for Each Functional Module

	RMS Central	BUFMAR	MEDIASOL	RBC	MOH
	n = 1	n = 1	n = 1	n = 1	n = 1
Strategic Planning and Management	74%	38%	18%	74%	86%
Policy and Governance	85%	81%	85%	57%	52%
Human Resources	49%	35%	32%	48%	66%
Financial Sustainability	82%	67%	75%	45%	88%
Forecasting and Supply Planning	62%	54%	35%	42%	83%
Procurement and Customs Clearance	57%	63%	61%	--	--
Warehousing and Storage	68%	62%	56%	50%	--
Distribution	55%	52%	41%	56%	--
Logistics Management Information System	45%	33%	40%	39%	57%
Quality and Pharmacovigilance	64%	57%	63%	--	80%**
Waste Management	81%	57%	44%	51%	79%

** Denotes that this score is for the Rwanda FDA, which is the central-level entity responsible for pharmacovigilance.

Exhibit 12. Heat Map, Capability Maturity Model, Non-Central Facility Levels

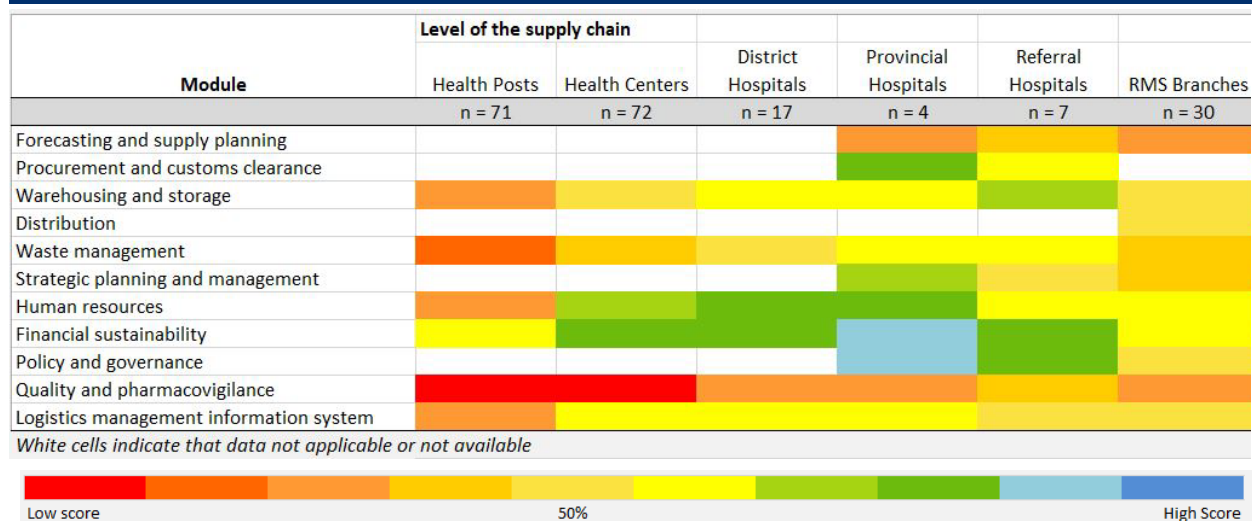
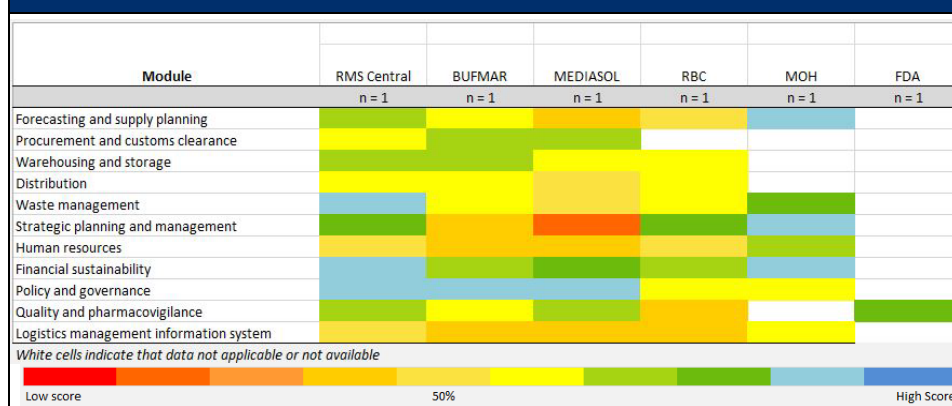


Exhibit 13. Heat Map, Capability Maturity Model, Central-Level Facilities



Select KPIs: Summary Tables

Exhibit 14. Select Key Performance Indicators, Average, and Ranges Presented by Level of Facility

	Health posts	Health centers	District hospitals	Provincial hospitals	Referral hospitals	RMS branches
	n = 71	n = 72	n = 17	n = 4	n = 7	n = 30
Stocked according to plan (tracer commodities)	45% (15%–100%)	29% (16%–48%)	27% (15–40%)	28% (0%–67%)	32% (7%–67%)	17% (5%–38%)
Stockout on day of assessment	24%	14%	16%	13%	19%	15%
Average number of stockout days for 181-day period*	46.3 days (27%)	12.6 days (7%)	16.3 days (10%)	8.1 days (4%)	15.5 days (9%)	17 days (10%)
Average number of days per month with stockouts, given that there was a stockout	10.2 days	5.1 days	6.6 days	5.1 days	5.1 days	5.9 days
Stock card accuracy: percentage of facilities at 100 percent accuracy	63%	66%	88%	87%	75%	64%
Stock card accuracy: average deviation from 100 percent accuracy across facilities (no deviance = 0)**	34%–159%	47%–516%	13%–940%	2%–900%	0%–589%	7%–3383%
eLMIS record accuracy: percentage of facilities at 100 percent accuracy	5%	21%	37%	42%	33%	49%
eLMIS record accuracy: average deviation from 100 percent accuracy across facilities (no deviance = 0)	26%–202%	158%–2238%	49%–409%	92%–5000%	0%–1042%	55%–1562%
Waste from damage, theft, and expiry: damaged, lost, and expired stock as a percentage of the total stock available	2%	0%	2%	1%	1%	0%
Staff turnover ratio	22%	13%	19%	11%	0%	5%

* The first number in this table refers to the average number of days the commodity was out of stock on average across the facilities during the six months of September 2021 through February 2022. This period included 180 days. The number in parentheses is the percentage of days the commodity was out of stock, on average. Thus, $46.3/180 = 27$ percent.

**This indicator compares the stock quantity on a stock card and/or in an inventory management software with the quantity of a physical inventory conducted during a site visit. Care needs to be taken when interpreting this indicator. Results close to zero indicate good relative accuracy, while results far from zero indicate poor relative accuracy, but do not necessarily imply large inaccuracies in absolute volume terms.

Analysis, by Functional Module: Capability Maturity and KPI Results

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

Strategic Planning and Management

Strategic planning and management ensure that supply chain priorities are identified, roles and responsibilities clarified, goals and changes directed, and frameworks for monitoring progress and performance established. Strategic planning and management are the purview of the MOH, but all health system levels are responsible for understanding their role in the strategic plans. Major areas that were factored into the scoring for this CMM module are the existence of strategic plans; appropriate monitoring mechanisms, such as formal oversight committees that have broad stakeholder inclusions; and clear plans for private-sector engagement (see Exhibit 15).

Exhibit 15. Examples of Scored Strategic Planning and Management Capabilities

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

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

The National Pharmaceutical Strategic Plan 2018–2024 established the foundation around 12 strategic objectives on how to achieve the GOR stated national health outcome goals. The strategy revolves around 110 key interventions and a USD 18 million investment during this time period. The following points are of special significance for the NSCA:

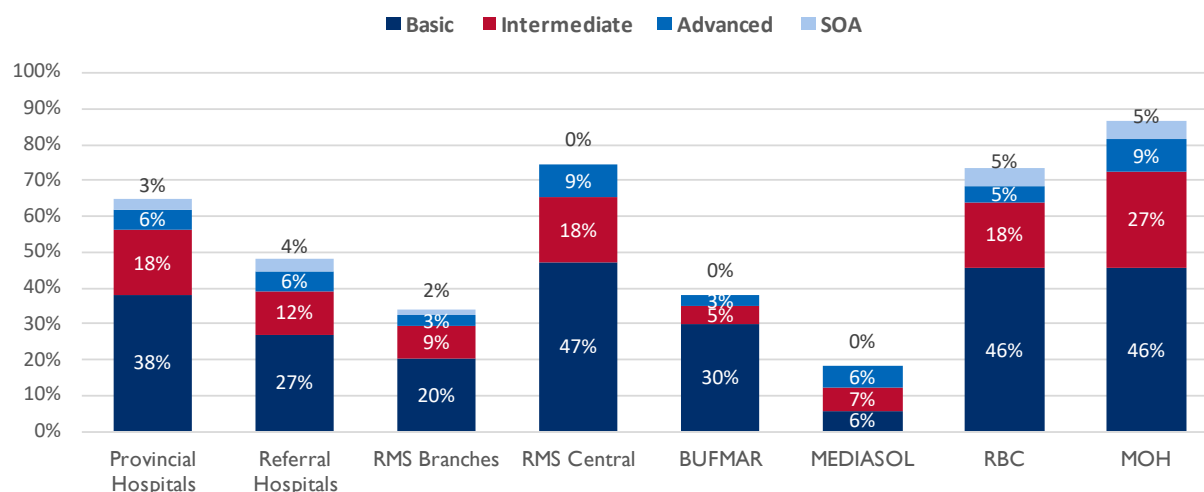
- Ensure safe and quality medicines are available in public and private markets.
- Enforce the compliance of prescription and dispensing practices to evidence-based guidelines.
- Curb and control the impact of antimicrobial resistance in Rwanda.
- Increase per capita spending on medicines while equitably reaching more citizens with needed medicines.
- Reduce stockouts and increase availability of medicines and health technologies in the public sector.
- Leverage collaboration and engagement of private-sector partners in the pharmaceutical sector to achieve target outcomes.

- Promote the increased use of the pharmaceutical industry in Rwanda.
- Promote the specialized roles of pharmacy professionals.
- Support operational research and development.
- Ensure a functional pharmaceutical information system and platform to facilitate the functions of the sector.

The document also defines the roles and responsibilities of sector stakeholders in achieving the high-level outcomes above, as well as highlights the implementation and monitoring approach that will be used by the GOR.

2022 NSCA Findings and Analysis

Exhibit 16. Strategic Planning and Management Capability



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

Strategic planning and management capabilities were assessed at five central-level facilities (MOH, Rwanda Biomedical Center, BUFMAR, MEDIASOL, and RMS Central) and selected regional-level sites (referral hospitals, provincial hospitals, and the RMSs). The capability maturity scores and illustrative responses on select capability questions are presented in Exhibits 16 and 17. Most central-level entities had robust capabilities, but with BUFMAR scoring at 38 percent and MEDIASOL scoring at 18 percent, these were lower than expected. The non-central-level strategic planning and management capabilities are low in all entities as an average, but with significant variations in between entities of the same category. For instance, average capabilities for provincial hospitals are 65 percent; out of the four provincial hospitals visited the lowest score was 33 percent, with the highest 89 percent. This same phenomenon is verified at referral hospitals and RMS branches, pointing to large geographical disparities between centers at the same level.

For strategic planning and management, responses from peripheral entities (RMS branches and all hospitals) should be interpreted as their **awareness** of the existence of these strategic plans, how they fit into those plans, and what their relevant responsibilities are.

Exhibit 17. Strategic Planning and Management Capabilities Maturity Scores and Select Question Responses

	RMS branches	RMS	BUFMAR	MEDIASOL	Rwanda Biomedical	MOH
n =	30	1	1	1	1	1
Overall maturity score (range)	34% (0–84%)	74%	38%	18%	74%	86%
Presence of an approved supply chain strategic plan	40%	✓	✓	X	✓	✓
Is the supply chain strategic plan updated yearly or more often?	7%	✓	X	X	X	X
Stakeholder mapping exercise	23%	X	X	X	✓	✓
Presence of a supply chain implementation plan	17%	✓ (1 year or less)	✓ (1 year or less)	X	✓ (1 year or less)	✓ (4 or 5 years)
Supply chain implementation plan is monitored (timeframe)	40%	✓ (Quarterly)	X	X	✓ (Quarterly)	✓ (Quarterly)
Supply chain reforms are being implemented	17%	X	X	X	X	✓
Formal structure exists to monitor supply chain performance at this level	27%	✓	X	X	✓	✓
Existence of performance monitoring plan tracking supply chain performance	37%	✓	X	✓	X	✓
Existence of a risk management and mitigation/prevention plan	27%	✓	X	X	X	✓
Coordination or engagement with private-sector companies	67%	Formal	Formal	Formal	No	Formal

Strategic planning capabilities. MOH, RMS Central, and Rwanda Biomedical Centre have robust strategic planning capabilities, all with over 90 percent of basic items in place. This contrasts with BUFMAR and MEDIASOL, as well as RMS branches having low overall scores and low percentages of basic items in place. This may be related to the relatively recent allocation into new roles for these entities and how those roles have been delineated. Also symptomatic of the low priority given to strategic alignment are the facts that a fairly small number of entities reported having a budget to implement the strategy, or performed a stakeholder mapping exercise, with (respectively) only 25 percent of provincial hospitals; 29 percent of referral hospitals; and 23 percent of RMS branches. Also conspicuous, given their salient supply chain role, was the fact that RMS had not performed such an exercise. On a more positive note, the Rwanda Biomedical Centre did have a budget in place to implement its strategy.

Supply chain plans. A subsection of this technical area focuses on the presence, implementation, and monitoring of supply chain plans. With the exception of MEDIASOL, all central-level entities have a supply chain plan. The RMS branches, while not expected to have their own plan, should be aware of the RMS Central's strategic plan, its components, and how they fit into it. However, only 40 percent of the RMS branches report being aware of RMS Central's plans. While the strategic supply chain plans were not updated yearly (or more often) in any of these entities, their supply chain implementation plans were updated yearly for RMS Central, BUFMAR, and Rwanda Biomedical Centre, and every four or five years at MOH. However, even fewer entities reported the presence of performance monitoring plans or monitoring frameworks for tracking supply chain performance, these being just RMS Central, Rwanda Biomedical Centre, and MOH. Conversely, at lower levels, 71 percent of referral hospitals and 100 percent of provincial hospitals had supply chain plans, and their implementation was monitored in 57–60 percent, respectively, although the NSCA assumes that such capabilities are useful at regional- or referral-level entities to support efficient and effective public health supply chains.

Public-private partnership. Public-private partnerships (PPPs) are considered a key feature to strategically engage and manage robust public health supply chain systems. The optimal role for the private actors within Rwanda's public supply chain system continues to evolve. With the recent designation of MEDIASOL to function as one of four CMS institutions, it's clear that more needs to be done to ensure that their strategic planning processes align correctly with the GOR's (at least for the portion of their operations that are focused on public-sector facilities). Except for the Rwanda Biomedical Centre, all central-level entities reported not only having formal engagements with the private sector but also having had meetings with private-sector actors in the last year.

Supply Chain Risks. Finally, at the central level, only MOH and RMS Central reported having a risk mitigation plan at the central level, but the RMS Central plan had never been updated. Interestingly, 75 percent of provincial hospitals and an encouraging 86 percent of referral hospitals reported having one; in both cases the plan was continuously updated. Exhibit 18 presents perceptions of the top risks as reported by key informants interviewed at each site. The most reported supply chain risks flagged were financial, human resource, and operational.

Exhibit 18. Top Risks Experienced in the Supply Chain

	Provincial hospitals	Referral hospitals	RMS branches	RMS Central	BUFMAR	MEDIASOL	Rwanda Biomedical	MOH
n =	4	7	30	1	1	1	1	1
Financial	75%	86%	33%	0%	100%	100%	0%	0%
Human resources	100%	71%	73%	100%	100%	100%	0%	100%
Technology	50%	29%	27%	100%	0%	0%	0%	100%
Operational	25%	71%	53%	100%	0%	0%	0%	100%
Economic (e.g., exchange rate)	50%	29%	7%	0%	100%	100%	0%	0%

Recommendations

The National Pharmaceutical Strategic Plan 2018–2024 established clear expectations following the recommendations of the 2017 NSCA. However, the finding from the 2022 assessment suggests its guidance was implemented unequally, with MOH, Rwanda Biomedical Centre, and RMS Central showing good capabilities, but with BUFMAR and MEDIASOL seriously lagging behind, as well as most RMS branches. With the entrance of new central-level actors, more consistent coordination is needed across the various CMS institutions to ensure that all are held to the same level of expectations and engage in strategic planning with the same rigor, cadence, and priorities. To this end, several recommendations are offered:

- Establish a process for creating, implementing, and harmonizing strategic plans across central-level entities of RMS, BUFMAR, MEDIASOL, and RBC.
- Ensure that these strategic plans are fully funded, and a formal monitoring and oversight process is in place so that efforts are not duplicated, and awareness is shared across institutions.
- Include the formal assessment of supply chain risk, as the multiplicity of central-level actors can create blind spots in perceived allocation of responsibility.
- Ensure RMS Central coordinates with the RMS branches more closely on strategic planning. As the branches take direction from RMS Central on all things strategic planning and management (SPM), the head office needs to ensure they are aware of how they fit into the RMS five-year strategic plan.

Supplemental Exhibit

Exhibit 19. SPM: Distribution of Questions and Assignment of Weight Across Capability and Facility Levels								
MODULE	BASIC (50%)		INTERMEDIATE (30%)		ADVANCED (15%)		SOA (5%)	
	# of Qs	WEIGHT	# of Qs	WEIGHT	# of Qs	WEIGHT	# of Qs	WEIGHT
Provincial hospitals (4)	30	1.7%	18	1.7%	9	1.7%	2	2.5%
Referral hospitals (7)	30	1.7%	18	1.7%	9	1.7%	2	2.5%
RMS branches (30)	36	1.4%	13	1.2%	6	2.5%	1	5.0%
RMS HQ (1)	36	1.4%	13	1.2%	6	2.5%	1	5.0%
MEDIASOL (1)	36	1.4%	13	1.2%	6	2.5%	1	5.0%
BUFMAR (1)	36	1.4%	13	1.2%	6	2.5%	1	5.0%
RBC (1)	36	1.4%	13	1.2%	6	2.5%	1	5.0%
MOH (1)	36	1.4%	21	1.4%	10	1.5%	1	5.0%

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

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

Policy and Governance

Clear policies, guidelines, and oversight are important to ensuring that public health systems are procuring essential medicines, practicing effective medicine, and revising policies to reflect changing best practices and onboarding new technologies. For the supply chain, national policies and governance should inform the full system, from procurement to patient treatment, ensuring that all actors operate based on standardized guidance. Major areas that were factored into the policy and governance capabilities scoring in this assessment are outlined in Exhibit 20, including the existence of a national medicines policy with supply chain components, an active oversight committee with broad representation from all levels of government and civil society, drug registration lead times, and Standard Treatment Guidelines (STGs).

Exhibit 20. Examples of Scored Policy and Governance Capabilities

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

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

The National Pharmaceutical Strategic Plan 2018–2024 explicitly mentioned as a near-term objective addressing gaps in policy or legislation frameworks to support the GOR and its health sector’s goals toward 2024. Examples included reviewing pharmacy-sector policies and laws to adequately promote universal health coverage (UHC) targets and to define how larger segments of the population, and particularly the underserved, could gain needed access to vital medicines. Policies and guidelines for cost-effective use of modern pharmaceutical products and health technologies in Rwanda were included in this mandate, as well as policies involving third-party payers (such as CBHI) and access through private pharmacy outlets at regulated prices

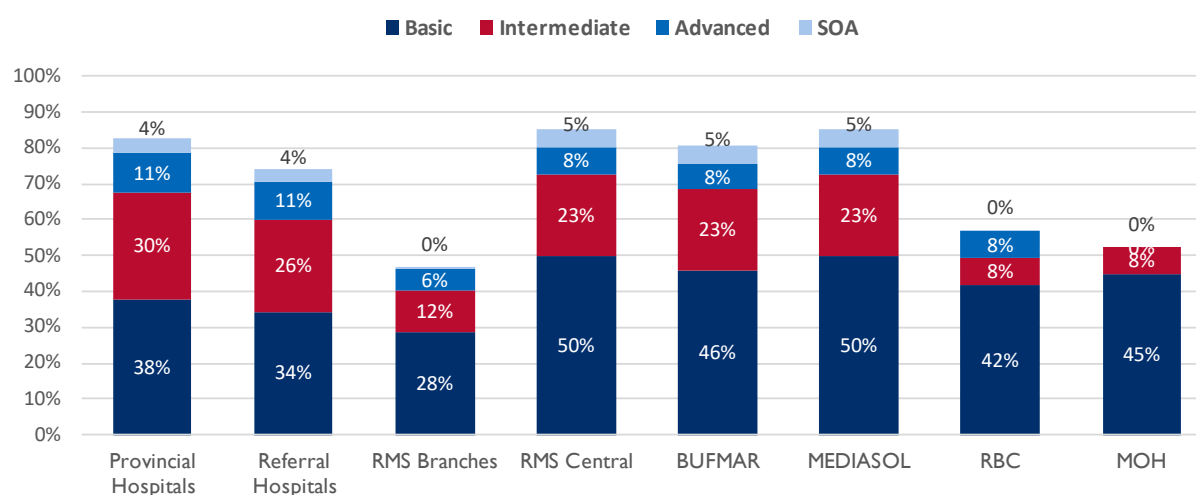
The above-mentioned Strategic Plan highlighted the need for effective and efficient alignment and engagement of all stakeholders (from local manufacturers, to suppliers and supply system, to regulators, prescribers, dispensers, payers, from private to public and faith-based organizations) and the MOH to foster progress toward UHC goals. Critical issues to ensure this alignment are (NPSSP excerpt):

1. Need for clear governance and accountability structures for systems that are dependent on multiple stakeholders, such as national eLMIS and pharmaceutical information systems, systems to uphold rational use of medicines
2. Need to clarify the place and role of district pharmacy at the district level
3. Need to strengthen governance and oversight capability at decentralized district levels
4. Review of policies and guidelines to promote UHC goals, access to broader quality medicines
5. Pharmaceutical services not standardized

2022 NSCA Findings and Analysis

Exhibits 21 and 22 show the NSCA results assessing the policy and governance capabilities extant in Rwanda's public health supply chain. The presence of policy and governance capabilities at the central level is unequal, with RMS Central, BUFMAR, and MEDIASOL all clearing the NSCA 80 percent overall capability benchmark, but MOH and Rwanda Biomedical Center failing to reach 60 percent. At the non-central level, only provincial hospitals (83 percent) meet the NSCA benchmark, while referral hospitals, at 74 percent, and RMS branches (46 percent), do not. As seen in other examples in this assessment, the average does represent a wide variation in capabilities across the same category of entity in different geographical locations, with the (30) RMS branches individually scoring from 0 percent to 93 percent, and both the (seven) referral and (four) provincial hospitals scores ranging from 47 percent to 100 percent, indicating potential regional capability disparities.

Exhibit 21. Policy and Governance Capability



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

Exhibit 22. Policy and Governance Capability Scores and Basic Items in Place

	Provincial hospitals	Referral hospitals	RMS branches	RMS Central	BUFMAR	MEDIASOL	Rwanda Biomedical Center	MOH
n =	4	7	30	1	1	1	1	1
Overall maturity score (range)	83% (47–100%)	74% (6–100%)	46% (0–93%)	85%	85%	81%	57%	52%
Percent of basic items in place (range)	75% (33–100%)	68% (11–100%)	57% (0–100%)	100%	92%	100%	83%	89%

Exhibit 23. Key Central-Level Policy and Governance Capabilities and Gaps

MOH establishment of a National Pharmaceutical Policy	✓
Formal body that provides oversight and governance for the supply chain	✓
Frequency of governance body meetings	Quarterly (exc. Rwanda FDA annually)
Existence of national STGs	✓
Adaptation of STGs from the universal clinical guidelines	✓
Frequency of revision of national STGs	Every 4 years
Process for registering new drugs, products, and technologies	✓
Time it takes to register a new drug on average	6–12 months (Rwanda FDA)
Public list of registered products	MOH: ✓ FDA: ✓

Existence of policies and guidelines. Rwanda's supply chain benefits from the existence of a broad range of formal policies important for a public health supply chain. According to the responses given to the NSCA questionnaire at each entity, all entities have formally documented management policies or guidelines except RMS Central, MEDIASOL, and 43 percent of RMS branches. Furthermore, a formal, high-level body or committee provides oversight and governance for the supply chain and at RMS Central, BUFMAR, MEDIASOL, Rwanda Biomedical Centre, and Rwanda FDA, but not at MOH. Of the RMS branches, 77 percent acknowledged awareness of this committee at RMS Central. A powerful indicator of the effectiveness in implementing national policies is the wide availability of updated STGs at the service delivery points, and in Rwanda we verified the physical presence of these documents in all referral hospitals, all provincial hospitals, and predictably given their much more limited scope, in one third of all sampled health posts.

Exhibit 24. Supply Chain System Guidelines and SOPs Available

	Provincial hospitals	Referral hospitals	RMS branches	RMS central	BUFMAR	MEDIASOL	Rwanda Biomedical Center	MOH
n =	4	7	30	1	1	1	1	1
Guidelines or SOPs for the supply chain system exist, covering:	100%	86%	57%	✓	✓	No	No	✓
Storage	100%	86%	67%	✓	✓	No	✓	✓
Inventory management	100%	71%	70%	✓	✓	No	✓	✓
LMIS	75%	57%	67%	✓	✓	No	No	✓
Quality assurance	75%	86%	63%	✓	No	No	✓	✓
Forecasting and quantification	75%	71%	57%	✓	✓	No	✓	✓
Supply planning	75%	71%	57%	✓	✓	No	✓	✓
Waste management	75%	86%	63%	✓	✓	No	✓	✓
Procurement	75%	57%	50%	✓	✓	No	✓	✓
Financing	50%	43%	43%	✓	✓	No	✓	✓
Human resources	50%	29%	43%	No	✓	No	✓	✓
None of the above			3%	No	No	No	No	No

Dissemination of policies. Dissemination of policies is good at the hospital level of the public health systems, as shown in Exhibit 25.

Exhibit 25. Availability of National STGs									
	Provincial hospitals	Referral hospitals	RMS branches	RMS Central	BUFMAR	MEDIASOL	Rwanda Biomedical Center	MOH	Rwanda FDA
n =	4	7	30	1	1	1	1	1	1
STGs available at site (physically verified)	75%	100%	N/A	N/A	N/A	N/A	N/A	✓	No

Caveat on implementation. One caveat to this section is important. This portion of the NSCA assessed policy and governance capabilities by determining the existence of fundamental building blocks—policies, laws, and regulations along with institutions and formal process to support them. This section of the assessment does not, however, attempt to measure the level of implementation nor effectiveness of these planning and governance policies, laws, and regulations in Rwanda. However, existence cannot be automatically equated with effective implementation.

Recommendations

For policy and governance, maturity scores range between 52 and 84 percent at the central level, but with a high percentage of items in place. At lower levels of the supply chain, we see an expected decline between 46 and 74 percent, but following a trend seen in other areas, these average maturity scores hide a wild variation in capabilities between entities at the same level in different locations, with the scores for individual hospitals ranging from 0 to 100 percent. To that end, the authors of this report offer the following recommendations:

- Ensure that the protocols and procedures in place are adhered to in every entity, regardless of the geographical location, and that encompass ensuring not only that STGs and protocols are updated but also that staff are trained in their use and mechanisms are in place to monitor adherence.
- Update STGs annually or bi-annually instead of every four years to support the above recommendation.
- Address the fact that RMS branches continue to score poorly on high-level functions. If they are not responsible for carrying out this function themselves, then RMS HQ needs to do a more consistent job at helping them understand the policies and their roles within them and expectations for their performance.

Supplemental Exhibit

Exhibit 26. Policy and Governance, Distribution of Questions, and Assignment of Weight Across Capability and Facility Levels								
MODULE	BASIC (50%)		INTERMEDIATE (30%)		ADVANCED (15%)		SOA (5%)	
	# of Qs	WEIGHT	# of Qs	WEIGHT	# of Qs	WEIGHT	# of Qs	WEIGHT
Provincial hospitals (four)	9	5.6%	1	30.0%	1	15.0%	1	5.0%
Referral hospitals (seven)	9	5.6%	1	30.0%	1	15.0%	1	5.0%
RMS branches (30)	12	4.2%	4	7.5%	2	7.5%	1	5.0%
RMS HQ (one)	12	4.2%	4	7.5%	2	7.5%	1	5.0%

MEDIASOL (one)	12	4.2%	4	7.5%	2	7.5%	1	5.0%
BUFMAR (1)	12	4.2%	4	7.5%	2	7.5%	1	5.0%
RBC (1)	12	4.2%	4	7.5%	2	7.5%	1	5.0%
MOH and GHS (2)	19	2.6%	8	3.8%	5	3.0%	1	5.0%

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

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

Human Resources

Effective supply chains require significant human resources across a wide range of technical areas, all levels of the health care system, and all geographic areas of the country to ensure that quality health commodities are distributed safely and promptly. The NSCA outlines core HR supply chain capabilities and performance metrics to assess the extent to which facilities have the needed resources, supply chain functions have formally allocated responsibilities, and staff have the necessary training, knowledge capacity, time, and scope to support supply chain operations. Major areas that were factored into the scoring for this CMM module are the presence of appropriate supply chain functions in job descriptions, regular capacity-building efforts for staff, and mechanisms for supportive supervision and performance improvement (see Exhibit 27).

Exhibit 27. Examples of Scored Human Resource Capabilities

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

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

The NPSSP 2018–2024 outlines several important priorities for human resources for the supply chain in Rwanda. Specifically, the plan details several strategic outcomes for HR, including but not limited to:

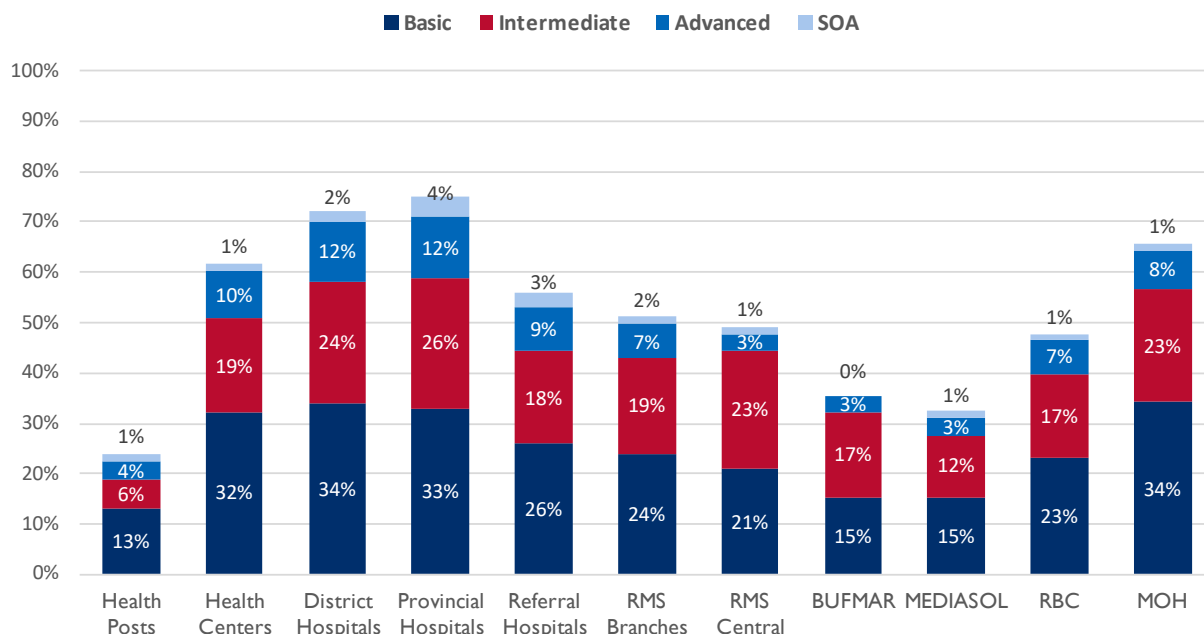
1. Develop and standardize the scope of pharmaceutical services performed at all levels of the health care system

2. Review and implement pharmaceutical schemes of service to attract and retain appropriate HR for the pharmaceutical services
3. Develop and implement a national pharmaceutical HR development plan to train, attract, and retain personnel, as an integral part of the overall national human resources for health development plan
4. Strengthen collaboration and cooperation with training institutions in training a sufficient number of competent pharmacy professionals

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In Rwanda, Human Resource capabilities vary across the facility types assessed and do not follow the trend observed elsewhere that central-level capabilities are strongest. Rather, the highest-scoring facilities in this assessment were district and provincial hospitals. Among facilities included in the assessment, scores ranged anywhere from 24 percent to 73 percent, indicating a wide range of capabilities. A similar range of capability scores and dynamic of score distributions was found during the 2017 NSCA as well. Exhibits 28 and 29 detail HR capability scores as well as select KPIs. Generally, scores were strong at the district and provincial hospital levels, and at the MOH.

Exhibit 28. Human Resources Capability Maturity Model Scores



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

Exhibit 29. Human Resources KPIs, Maturity Score, and Basic Capabilities in Place

	Health posts	Health centers	District hospitals	Provincial hospitals	Referral hospitals	RMS branches	RMS Central	BUFMAR	MEDIASOL	RBC	MOH
n =	71	72	17	4	7	30	1	1	1	1	1
Overall maturity score (range)	24% (6–53%)	62% (32–85%)	72% (35–93%)	71% (63–80%)	56% (38–70%)	51% (26–76%)	49%	35%	32%	48%	66%
Percent of basic items in place (range)	26% (6–50%)	64% (33–89%)	67% (22–89%)	66% (58–75%)	52% (38–71%)	48% (31–77%)	42%	31%	31%	46%	68%
Staff turnover ratio	22%	13%	19%	11%	0%	5%	2%	0%	10%	--	--

Central Medical Stores. Typically, capabilities are strongest at the central level and decrease at the lower levels of the supply chain. It was therefore surprising to see strong capacity scores at SDPs and low scores at certain CMS institutions. Examining the scores of CMS institutions more closely, a picture emerges of extant capability gaps. Exhibit 30 highlights key strengths and gaps found among CMS HR capabilities assessed. For example, of all four CMS institutions assessed, BUFMAR was the only facility to report having an HR workforce plan that projects future needs for supply chain personnel. RMS Central and RMS branches report not having any staff recruitment policy in place, be it generic or specific to supply chain. However, BUFMAR and MEDIASOL both lack a unified supply chain capacity-building plan for their staff. Furthermore, MEDIASOL reported less than 25 percent of staff participated in a staff capacity-building session within the last year. Across the four institutions that serve a CMS function for the supply chain, all necessary HR capabilities are in place in at least one facility, but not all. The MOH should help encourage collaboration across institutions to share best practices and ensure consistency of HR strengthening approaches across the four facilities.

Exhibit 30. Select Supply Chain Human Resource Capabilities at CMS Institutions

	RMS branches	RMS Central	BUFMAR	MEDIASOL	RBC
Existence of HR workforce plan that projects future needs for supply chain personnel	3%	X	✓	X	X
Existence of general staff recruitment policies that are applied to supply chain personnel	X	X	✓	✓	X
Existence of unified supply chain capacity-building plan or staff development plan for current employees	13%	✓	X	X	X
Most (51–99%) of staff have participated in a capacity-building session within the last year	30%	X	✓	X	X

Dedicated Supply Chain Staff. Results from the 2022 NSCA reveal that the definition of supply chain functions and responsibilities in the job descriptions of last-mile facility staff is still inadequate. For example, effectively no staff at the health post level have any of the fundamental supply chain functions as part of their job responsibility. Inventory management, LMIS, waste management, and quality assurance were listed in job descriptions 2 percent of the time or less for all the above functions. At the center level, representation of these functions does increase but still none of those core functions is listed

more than 50 percent of the time in job descriptions. Staff cannot be held accountable for work that is officially not part of their job description. Ensuring that staff understand the supply chain functions they are responsible for and allocating sufficient staff to complete those tasks are essential steps if supply chain operational capacity is to be strengthened at last-mile health facilities.

Exhibit 31. Supply Chain Functions and Job Descriptions						
Supply chain functions are included in the job descriptions for at least one site personnel, including:	Percent of facilities reporting:					
	Health posts	Health centers	District hospitals	Provincial hospitals	Referral hospitals	RMS branches
Forecasting and quantification	--	--	--	100%	71%	77%
Procurement	--	--	--	100%	43%	53%
Storage and inventory management	2%	50%	90%	100%	71%	97%
LMIS	2%	46%	85%	100%	71%	83%
Waste management	0%	30%	71%	75%	43%	77%
Quality and/or pharmacovigilance	0%	23%	90%	50%	43%	70%

The first strategic outcome of the NPSSP is to “develop and standardize scope of pharmaceutical services performed at all levels health care system.” While coverage of essential supply chain functions in job descriptions is more commonplace in hospitals, renewed focus is needed to ensure this is completed down to last-mile facilities and staff are aware of their responsibilities.

Supply chain capacity-building training. The NPSSP explicitly defines a strategic objective for human resources to “Develop and implement a national pharmaceutical human resources development plan to train, attract and retain personnel, as an integral part of the overall national human resources for health development plan.” An essential component of that objective is building the capacity of current staff to bolster skills and retain them in the workforce. Exhibit 32 details the capacity-building opportunities that staff have had within the last year across essential supply functions. In 2017, the NSCA identified that 96 percent of health centers did not have a capacity-building plan that covered ordering and reporting. The 2022 assessment found that 39 percent of health centers had not received capacity building in ordering and reporting in the last year. The MOH has made significant strides in five years to increase the proportion of health centers receiving this support. However, this capacity-building opportunity is much scarcer at the health-post level. Across all relevant supply chain functions, four-fifths (79) of health posts report receiving no capacity-building sessions of any kind in the last year. Coverage of capacity-building opportunities across the three types of hospitals is markedly better than at last-mile facilities. Coverage of inventory management, LMIS, and treatment guidelines was particularly strong.

Exhibit 32. Areas Covered in Capacity-Building Sessions in the Last Year						
	Percent of facilities reporting:					
	Health posts	Health centers	District hospitals	Provincial hospitals	Referral hospitals	RMS branches
Warehousing and inventory management	7%	62%	83%	75%	100%	53%
LMIS	10%	73%	87%	100%	71%	77%
Ordering and reporting	10%	61%	65%	75%	57%	63%
Waste management	3%	38%	42%	--	--	--

Medicine quality assurance	2%	22%	51%	50%	43%	40%
Treatment guidelines	6%	44%	75%	75%	57%	50%
Forecasting and quantification	--	--	--	75%	71%	53%
Procurement	--	--	--	50%	57%	40%
Distribution	--	--	--	75%	71%	53%
None of the above	79%	26%	5%	0%	0%	10%

Presenting opportunities for capacity building does not solve the problem alone. Rather, staff must be encouraged and allowed to defer work responsibilities to participate. Exhibit 33 details the proportion of staff from each assessed facility type that could participate in capacity-building sessions. At the hospital level, the most common response was some (25–50 percent) or most (51–99 percent) of staff could participate. At the health center level, the most common response was some staff (25–50 percent) could participate in capacity building. However, the health-post level again reported a significant lack of opportunity with the most common response, at 77 percent of facilities nationally, that no one from the facility could participate in capacity building. Structural changes need to be implemented to allow staff at last-mile facilities to participate more regularly in capacity-building opportunities.

Digging into the challenges a bit more, several barriers are limiting participation. Exhibit 34 details the critical barriers to supply chain management capacity-building programs. Respondents identified as many challenges as applied to their situation. The most common responses were finances and workloads, although lack of materials and access to skilled trainers were also commonly cited issues across facility types. Understanding these challenges and lack of opportunities, it is not surprising to see staff turnover rates as high as 22 percent at the health-post level and 20 percent at the district-hospital level. The MOH needs to make the appropriate structural changes to enable staff to build their skills so they remain motivated in the jobs.

Exhibit 33. Proportion of Staff Participating in Capacity Building Sessions in the Last Year

	Percent of facilities reporting:					
	Health posts	Health centers	District hospitals	Provincial hospitals	Referral hospitals	RMS branches
None	77%	4%	10%	0%	0%	7%
Minimal (1–25%)	15%	19%	22%	50%	29%	27%
Some (26–50%)	1%	36%	18%	25%	43%	27%
Most (51–99%)	2%	27%	33%	25%	14%	30%
All (100%)	5%	14%	16%	0%	14%	10%

Exhibit 34. Critical Barriers to Supply Chain Management Capacity-building Programs

	Percent of facilities reporting:					
	Health posts	Health centers	District hospitals	Provincial hospitals	Referral hospitals	RMS branches
Finances	61%	61%	80%	100%	71%	27%
Workload	25%	61%	57%	75%	71%	70%
Materials	36%	21%	24%	25%	43%	13%
Skilled trainers	25%	24%	38%	75%	14%	7%

Lack of interest	24%	44%	5%	0%	57%	43%
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Supervision. Encouragement and support are crucial enabling factors to ensure the success of the supply chain workforce in carrying out their mission. Exhibit 35 details the prevalence of supportive supervision across the SDP facility types assessed. It is encouraging to see a high degree of coverage of supportive supervision across Rwanda. This demonstrates the MOH's commitment to ensuring that staff feel supported in their roles and know the methods for accessing assistance and guidance. With such strong coverage of supportive supervision, the MOH should use these touchpoints as a method for better understanding challenges facing their health facility staff so they can develop policies and programs to help address these issues.

Exhibit 35. Supportive Supervision						
	Percent of facilities reporting:					
	Health posts	Health centers	District hospitals	Provincial hospitals	Referral hospitals	RMS branches
Supply chain staff received supportive supervision in the last year	66%	96%	84%	100%	57%	87%
Staff received immediate feedback after supportive visits	65%	96%	79%	100%	57%	87%
Corrective actions are taken following supervision visits	63%	93%	79%	100%	57%	83%

Recommendations

Although significant strides have been made in some areas, Rwanda has yet to fully achieve the NPSSP human resource objective to “Strengthen the pharmaceutical sector human resource capacities to meet long term needs.” While evidence is found of significant focus and efforts in this area, particularly in nationwide supportive supervision and capacity building within all types of hospitals, focus on last-mile facilities is still needed. The MOH needs to strategically deploy programmatic and financial support to fill this gap. To this end, the NSCA findings point to the following recommendations:

- Incorporate supply chain functions into formal job descriptions at all levels but especially at health posts and health centers, ensuring that responsibilities for all basic supply chain functions are designated to at least one site personnel. Simultaneously, ensure appropriate funding, capacity training, and performance measurement (within existing supportive supervision processes) are allocated to empower designated personnel to assume and execute supply chain roles.
- Leverage the extensive extant supportive supervision to review and discuss revised supply chain job description roles and responsibilities, ensuring staff are aware of the supply chain functions they are responsible for, evaluate them on their performance, and support them with training and monitoring feedback.
- Revisit staffing norms and capacity-building budgets for last-mile facilities. Workload and finances continue to be barriers to further strengthening supply chain capabilities at the last mile.

Supplemental Exhibit

Exhibit 36. Human Resources: Distribution of Questions and Assignment of Weight Across Capability and Facility Levels								
MODULE	BASIC (50%)		INTERMEDIATE (30%)		ADVANCED (15%)		SOA (5%)	
	# of Qs	WEIGHT	# of Qs	WEIGHT	# of Qs	WEIGHT	# of Qs	WEIGHT
Health posts (n=71)	18	2.8%	14	2.1%	7	2.1%	3	1.7%
Health centers (72)	18	2.8%	14	2.1%	7	2.1%	3	1.7%
District hospitals (17)	18	2.8%	14	2.1%	7	2.1%	3	1.7%
Provincial hospitals (4)	21	2.4%	17	1.8%	8	1.9%	3	1.7%
Referral hospitals (7)	21	2.4%	17	1.8%	8	1.9%	3	1.7%
RMS branches (30)	23	2.2%	27	1.1%	10	1.5%	6	0.8%
RMS central (1)	23	2.2%	27	1.1%	10	1.5%	6	0.8%
BUFMAR (1)	23	2.2%	27	1.1%	10	1.5%	6	0.8%
MEDIASOL (1)	23	2.2%	27	1.1%	10	1.5%	6	0.8%
RBC (1)	23	2.2%	27	1.1%	10	1.5%	6	0.8%
MOH (1)	16	3.1%	24	1.3%	9	1.7%	6	0.8%

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

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

Financial Sustainability

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

Exhibit 37. Examples of Scored Financial Sustainability Capabilities

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

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

For the publication of the Rwanda Health Sector Strategic Plan 2018–2024 it was not possible to undertake a financial sustainability assessment, as it was not part of the scope of work and data were unavailable. Nevertheless, for the feasibility of implementing the recommendations in the strategic plan it was critical to determine the affordability of the plan and to assess the need for resource mobilization strategies. Main points highlighted included the following:

- Ensure financial sustainability of the health sector (increase budget, optimization, efficiency, collaboration with the private sector and PPP)
- Promote new innovative financing mechanisms for high-impact interventions and emerging diseases
- Ensure periodic revision of the health insurance package

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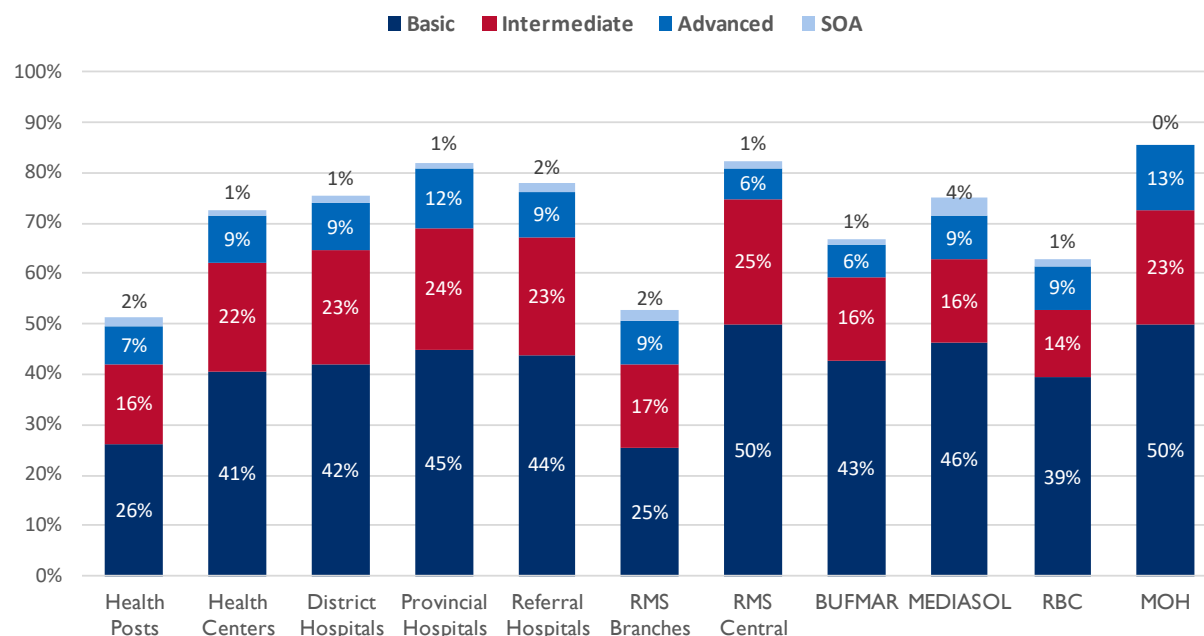
Financial sustainability results for maturity model scores and the percentage of facilities reporting key capabilities are displayed in Exhibits 38 and 39. With a capability maturity score of 88 percent, the MOH surpassed the NSCA's recommended goal of 80 percent. The reported presence of capabilities to financially manage the public health supply chain at the central level was generally consistent with the high capabilities present at MOH. RMS Central also scores a high 84 percent, with MEDIASOL at 75 percent, and BUFMAR at 67 percent being the only central-level entity missing the 80 percent benchmark by a significant margin.

On average, all facility types had most basic items in place, although the assessment found significant variation in available financial capabilities within facility types. At the non-central level, except for referral hospitals at 80 percent (71–92 percent) and provincial hospitals at 82 percent (71–92 percent) where capability is consistently high, there is a wide range of variability between sampled facilities at the health center level at 73 percent (38–94 percent); the two types of facilities with concerning levels of underperformance were the health posts at 51 percent (3–78 percent) but also, surprisingly, the RMS branches at 33 percent (16–90 percent). District health officers support—and some perform—many of the financial responsibilities of sites within their jurisdictions, although the level and type of support provided also vary considerably among DHAs.

Before highlighting key findings, it is important to reiterate that the capability maturity scores in this assessment mostly reflect the presence of financial management tools and best practices with a focus on supply chain activities. It is not, again, a measure of the fiscal health or solvency of the public health supply chain at large. The high percentage of facilities across all levels of the public health system that

reported budget shortfalls for health commodities and/or delays in reimbursements from insurance suggest rather that financial solvency remains a significant challenge of Rwanda's public health supply chain system, independent of the simultaneous presence of key financial management capabilities.

Exhibit 38. Financial Sustainability Capability Maturity Model Scores



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

Exhibit 39. Central-Level Financial Sustainability KPIs, Maturity Score, and Percentage of Facilities with Key Capabilities Related to Supply Chain Management in Place

	RMS branches	RMS Central	BUFMAR	MEDIASOL	Rwanda Biomedical Research	MOH
n =	30	1	1	1	1	1
Overall maturity score	53%	82%	67%	75%	45%	88%
Percent of basic items in place	51%	100%	86%	93%	79%	100 %
Budgets are prepared or updated annually	✓	✓	✓	✓	✓	✓
Budgets include miscellaneous funds for unexpected issues	13%	Yes	No	No	No	No
Supply chain costs explicitly are recorded and records maintained	53%	✓	✓	✓	✓	✓

Funding strategy that explicitly includes supply chain costs exists	10%	✓	✓	✓	✓	✓
Source of funds for supply chain operations	Government 60%; donors 37%; facility revenue 77%	Donors; facility revenue	Donors; facility revenue	Facility revenue	Government; donors	Government; donors
Government and/or facility contribution towards supply chain operations budget	"All" (47%) "Most" (43%)	"Some" (25%–50%)	"All" (100%)	"All" (100%)	"Minimal" (<20%)	"Most" (25%–50%)
Source of funds for health commodities	Government 83%; donors 50%; facility revenue 80%	Government; donors; facility revenue	Facility revenue	Facility revenue	Government; donors	Government; donors;
In past year, was there a health commodities budget shortfall?	Yes (60%)	No	No	No	Yes	No

Exhibit 40. Non-Central Level Financial Sustainability KPIs, Maturity Score, and Percentage of Facilities with Key Capabilities in Place						
	Health post	Health center	District hospitals	Provincial hospitals	Referral hospitals	RMS branches
n =	71	72	17	4	7	30
Overall maturity score (range)	51% (3–78%)	73% (38–94%)	75% (47–91%)	82% (71–92%)	78% (63–86%)	53% (16–90%)
Percent of basic items in place (range)	53% (0–86%)	81% (43–100%)	84% (71–100%)	89% (71–100%)	88% (71–86%)	51% (21–100%)

Presence of financial management best practices. Exhibit 39 shows the MOH entities' capabilities understood by the NSCA as key for financial sustainability, including most basic items. Budgets are prepared and updated annually, supply chain costs are explicitly recorded, and the government contributes to supply chain and health commodity costs. The table also points out places where the GOR might adopt best practices for supply chain financial management, including budgeting miscellaneous funds for unexpected issues and explicitly incorporating supply chain costs into the broader funding strategy. There is more opportunity for improving fiscal management within BUFMAR, where several basic capabilities were reported missing.

Exhibit 41 also demonstrates that significant financial management capabilities exist lower in the supply chain, with the exception of health posts and unexpectedly some RMS branches. Given the central procurement role played by RMS in Rwanda's public health system, it is important and valuable that RMS Central averaged high-capability maturing scores and mostly confirmed the presence of key financial capabilities, in contrast with the RMS branches—including annual budgets (100 percent versus 13 percent), miscellaneous budget lines (100 percent versus 13 percent), and explicit recording of supply chain costs (100 percent versus 53 percent). Similarly, nearly all hospitals reported annual budget

preparations, and many reported allocating funds for unexpected issues and explicitly recording supply chain costs.

Exhibit 41. Percentage of Facilities with Key Financial Sustainability Capabilities in Place						
	Health post	Health center	District hospitals	Provincial hospitals	Referral hospitals	RMS branches
n =	71	72	17	4	7	30
Percentage of sites reporting that budgets are prepared or updated annually	27%	96%	95%	100%	100%	70%
Percentage of sites reporting that budgets include miscellaneous funds for unexpected issues	26%	57%	56%	50%	43%	13%
Percentage of sites reporting that supply chain costs are recorded and records maintained	46%	77%	87%	100%	100%	53%

Lower-level service delivery points, especially health posts, reported diminishing financial capabilities and a high variability within groups.

Sources of funding and funding shortfalls. Exhibits 42 and 43 display the information on the source of facility funds for supply chain operations and health commodities, respectively. High proportions of facilities across all levels reported that government and/or facility revenue and cost recovery contributed to their sources of funds in these two areas (the question allowed for the selection of multiple sources). The NSCA credits supply chains where the government or facility revenue contributes substantially to supply chain operational and health commodity costs (without differentiating relative contribution values). In Rwanda, with the exception of health posts, most sites reported that most or all of the budget in these areas was sourced from government contributions or facility revenue. That said, a substantial percentage of sites also reported a budget shortfall for health commodities in the previous year, including around half of lower-level SDPs, 49 percent of district hospitals, 100 percent of provincial hospitals, and 29 percent of referral hospitals. Even more telling is the fact that one in three RMS branches faced shortages, while RMS Central was reportedly stocked at all times, pointing out sub-optimal allocation.

Exhibit 42. Noncentral-level Sources of Funding for Supply Chain Operations						
	Health post	Health center	District hospitals	Provincial hospitals	Referral hospitals	RMS branches
n =	71	72	17	4	7	30
Government budget (central or decentralized level)	13%	66%	65%	0%	86%	60%

Facility revenue/cost recovery	94%	33%	96%	100%	100%	77%
Donor/implementing partners	1%	97%	39%	50%	43%	37%
Percentage of sites reporting government and/or facility revenue contributing most or all of supply chain budget last year	66%	75%	84%	75%	86%	90%

Exhibit 43. Noncentral-level Sources of Funding for Health Commodities

	Health post	Health center	District hospitals	Provincial hospitals	Referral hospitals	RMS branches
n =	71	72	17	4	7	30
Government budget (central or decentralized level)	58%	69%	95%	75%	86%	83%
Facility revenue/cost recovery	94%	97%	100%	100%	100%	80%
Donor/implementing partners	17%	33%	49%	25%	29%	50%
Percentage of sites reporting government and/or facility revenue contributing most or all of health commodities last year	19%	52%	45%	60%	43%	43%
Percentage of sites reporting a budget shortfall for health commodities last year	58%	47%	46%	100%	29%	60%

Recommendations

This assessment suggests that many best practices in the financial management of public health supply chains are currently in place, including widespread budgeting and record keeping and primary reliance on government budgets and facility revenue to fund costs. However, a lack of financial solvency throughout the system is undermining trust in the financial institutions with corrosive effects on supply chain functions and ultimately the availability of health commodities. The NSCA also points to some disparity in performance at the non-central level, especially for health posts but also at RMS branches, but with a high degree of variation between facilities in different geographical locations. Therefore, the authors of this report recommend:

- Addressing funding shortages that are causing issues with adequate supply in the system
- Ensuring that facilities across the supply chain and in all geographical locations receive guidance and support to implement basic financial management best practices universally
- Explicitly including supply chain costs in all budgets to ensure adequate consideration and funding and facilitate financial tracking and monitoring of these activities

Supplemental Exhibit

Exhibit 44. Financial Sustainability: Distribution of Questions and Assignment of Weight Across Capability and Facility Levels

MODULE	BASIC (50%)	INTERMED. (30%)	ADVANCED (15%)	SOA (5%)
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	# of Qs	WEIGHT	# of Qs	WEIGHT	# of Qs	WEIGHT	# of Qs	WEIGHT
Health posts (n=71)	7	7.1%	11	2.7%	6	2.5%	4	1.3%
Health centers (72)	7	7.1%	11	2.7%	7	2.1%	4	1.3%
District hospitals (17)	7	7.1%	11	2.7%	6	2.5%	4	1.3%
Provincial hospitals (4)	7	7.1%	11	2.7%	7	2.1%	4	1.3%
Referral hospitals (7)	7	7.1%	11	2.7%	7	2.1%	4	1.3%
RMS branches (30)	14	3.6%	11	2.7%	7	2.1%	4	1.3%
RMS Central (1)	14	3.6%	11	2.7%	7	2.1%	4	1.3%
BUFMAR (1)	14	3.6%	11	2.7%	7	2.1%	4	1.3%
MEDIASOL (1)	14	3.6%	11	2.7%	7	2.1%	4	1.3%
RBC (1)	14	3.6%	11	2.7%	7	2.1%	4	1.3%
MOH (1)	7	7.1%	12	2.5%	7	2.1%	4	1.3%

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

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

Forecasting and Supply Planning

The FASP section seeks to ensure forecasts are being created using quality data and sound methodologies, monitored frequently, and ultimately used to inform procurement decisions. Areas of focus that factored into the scoring for this CMM module include forecasting involving multiple stakeholders for multiyear periods, well-established SOPs involving data from multiple sources, active supply plan monitoring, and sharing of supply plans among partners (see Exhibit 45).

Exhibit 45. Examples of Scored Forecasting and Supply Planning Capabilities

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

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

The National Pharmaceutical Strategic Plan 2018–2024 highlighted the existence of strong systems for forecasting and planning supplies, based on financing for essential and program medicines at RMS and referral-hospital levels. Forecast plans are for two years, and supporting systems triangulate available consumption and morbidity data sources to conduct regular updates.

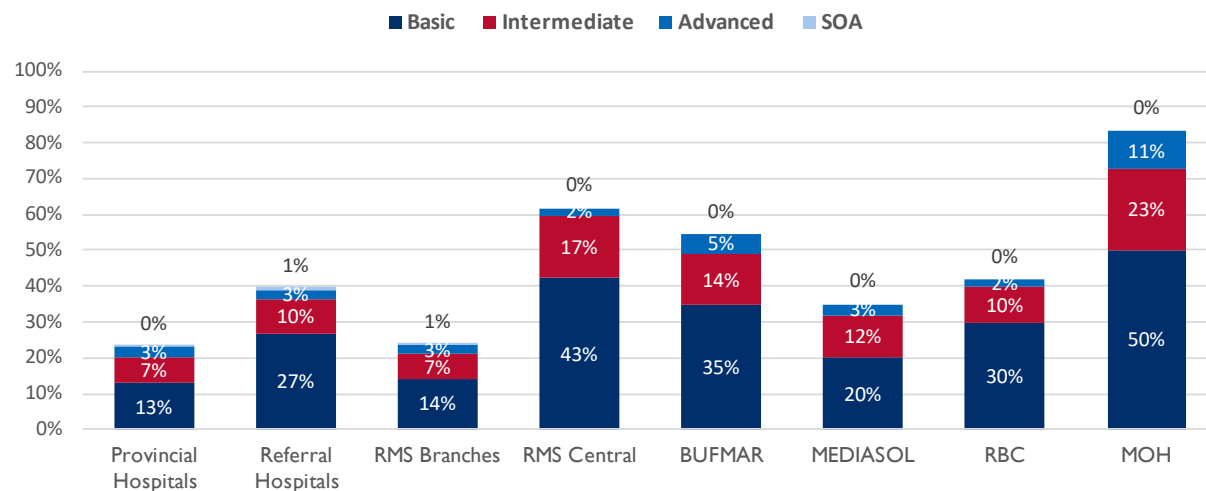
The same document, however, mentioned that data for KPIs on forecast accuracy were not available, making it difficult to know if forecasting tools were consistently producing realistic information for resource/financial planning. Consequently, one of the explicit recommendations was to address capability and performance gaps related to the use of eLMIS tools to obtain more accurate consumption data from health facilities, including infrastructure and training requirements.

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The NSCA typically assumes and assesses FASP capabilities at a unified “central” level as well as among regional medical stores and referral hospitals. In Rwanda, the RMS branches are not expected to conduct forecasting themselves but should be aware of their role in the centrally managed process.

The NSCA found solid capabilities at MOH, contrasted with a general lack of capabilities across the entities within MOH with reference to forecasting. The other entity showing a significant capability, even if it did not meet the NSCA 80 percent benchmark, was RMS Central, with a 62 percent overall maturity score, and 85 percent of basic capabilities present, as could be expected given the salient role it plays in the forecasting. This was followed by BUFMAR, with a 54 percent overall maturity, and 70 percent of basic capabilities in place, and then Rwanda Biomedical Center, with 60 percent of basic capabilities in place but only a 42 percent overall maturity score. The remaining central-level entity, MEDIASOL, had only 40 percent of basic capabilities present, and an overall 35 percent maturity score.

For the non–central level entities that intervene in the forecasting process, the average overall maturity scores were all low, with the highest being 40 percent for referral hospitals. As it has been the case in other modules, capabilities vary widely among entities at the same level across the sample. In this case, however, even the highest-scoring single facilities did not reach the NSCA benchmark, with one RMS branch 67 percent overall maturity (compared to 0 percent with the lowest scoring one), and 80 percent of basic capabilities present (compared with the 0 percent with the lowest one). For the referral hospitals, the highest-performing one has a 62 percent overall maturity (compared with 0 percent for the lowest-scoring one), and a 68 percent of basic capabilities present (compared with the 0 percent with the lowest one). These low scores seem to indicate that, beyond regional capability disparities, the representative responding to the NSCA questionnaire may have had an incomplete understanding of all functions and operations within the entity.

Exhibit 46. Forecasting Capability Maturity Scores

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

Exhibit 47. Forecasting and Supply Planning Maturity Score, and Basic Capabilities in Place

	Provincial hospitals	Referral hospitals	RMS branches	RMS Central	BUFMAR	MEDIASOL	Rwanda Biomedical Center	MOH
n =	4	7	30	1	1	1	1	1
Overall maturity score (range)	22% (0–33%)	40% (0–62%)	24% (0–67%)	62%	54%	35%	42%	83%
Percent of basic items in place (range)	25% (0–36%)	53% (0–68%)	29% (0–80%)	85%	70%	40%	60%	100%

Exhibit 48. Forecasting Methodology Employed as Identified by Respondent, by Facility Type

Methodology	Provincial hospitals	Referral hospitals	RMS branches	RMS Central	BUFMAR	MEDIASOL	Rwanda Biomedical Center	Ministry of Health
Morbidity based	25%	71%	43%	100%	0%	0%	0%	100%
Consumption based	50%	86%	60%	100%	100%	100%	0%	100%
Demographic projections	0%	29%	30%	100%	0%	0%	100%	100%
Service Statistic-based	0%	29%	23%	100%	0%	0%	0%	100%

Continuing with the lower-level entities, the NSCA found low forecasting and supply planning capabilities at provincial hospitals, referral hospitals, and regional medical stores. Most facilities (60 percent of provincial hospitals, 86 percent of referral hospitals, and 60 percent of RMS branches) reported forecasting health commodities during the questionnaire, with the following financial support from the government.

Exhibit 49. Government Contribution to Recurring Forecasting and Supply Planning Costs

	Provincial hospitals	Referral hospitals	RMS branches	RMS Central	BUFMAR	MEDIASOL	Rwanda Biomedical Center	Ministry of Health
Minimal (less than 25%)	50%	100%	7%	100%	100%	100%	100%	100%
Some (25–50%)	0%	0%	7%	0%	0%	0%	0%	0%
Most (51–99%)	25%	0%	20%	0%	0%	0%	0%	0%
All (100%)	25%	0%	27%	0%	0%	0%	0%	0%

These facilities varied significantly in executing their FASP activities. Facilities reported using many different data sources during the forecasting process. MOH and RMS Central reported using all forecasting methods, while BUFMAR and MEDIASOL used only consumption data, and Rwanda Biomedical Center forecast is based exclusively on demographic projections. Forecasting methodologies seems to be varied at referral hospitals, but with some variation in between them, while capabilities seem much more limited at provincial hospitals.

Few facilities in the NSCA sample could produce SOPs to guide those forecasting processes: one in four provincial hospitals, one in seven referral hospitals, and five in 30 RMS branches could produce a copy of the SOPs used in that process. Notably, it was also not available at RMS Central, MEDIASOL, or the Rwanda Biomedical Centre. To improve forecast accuracy, it is necessary to carefully gather information, document the forecast assumptions, and measure the accuracy so that the whole process can be refined over time. Thus, measuring forecast accuracy is a good indicator of FASP maturity, and not surprisingly it is done annually at MOH and RMS Central, given the central roles they play in the process. The same can be said, however, of only one in four provincial hospitals, one in seven referral hospitals, and one in 30 RMS branches in the sample.

Finally, in financial support for these FASP processes, at the central level the GOR provides some support, covering 25 percent of expenses at RMS Central, MEDIASOL, Rwanda Biomedical Centre, and MOH. That level of support drops at the lower levels, with no support reported at any sampled provincial hospital or BUFMAR, and support reported at only two of seven referral hospitals and two of 30 RMS branches.

Exhibit 50. FASP Accuracy for All Tracer Products

Product	Forecast accuracy	Supply plan accuracy
RHZE (rifampin/isoniazid, pyrazinamide, and ethambutol)	89%	52%
Two-rod contraceptive implant (Jadelle)	48%	56%
DMPA (depot medroxyprogesterone acetate)	94%	---
Insulin long acting	68%	85%
Salbutamol Inhaler	66%	68%
Rapid diagnostic test–malaria	26%	48%
Artemether/lumefantrine 6x4	64%	100%
Amoxicillin	95%	82%
Paracetamol	93%	66%

Lamivudine/tenofovir/dolutegravir (TLD-300) (90ct)	81%	80%
Determine HIV rapid test kit	84%	100%
Oxytocin IM/IV	64%	60%
Powdered gloves	96%	68%
Zinc DT	11%	40%
Pentavalent (DTwP-Hep B-Hib) vaccine	67%	99%

A note about the lack of data for DMPA supply chain accuracy: during the previous-year quantification period, sufficient stock was found to be available in-country. Therefore, no orders or shipments were made in 2022.

Recommendations

The NSCA found a disparity of capabilities in FASP across entities, with reassuringly solid performance at MOH and to a lesser point at RMS Central. However, this is not the case in the rest of the central-level entities, and predictably even less so at lower levels of the supply chain. The recommendation therefore is to:

- Ensure updated FASP SOPs are widely disseminated, training is given to all involved staff, and mechanisms are in place to monitor the quality and timeliness of data gathered.
- Ensure clarity of roles and expectations. If FASP activities are more centralized than responses would suggest (and MOH guidance dictates), then there is a gulf between *expectation* and *reality* for FASP in the supply chain.
- Regularly monitor the forecast accuracy by a committee with the authority to introduce changes so that assumptions can be refined.

Supplemental Exhibit

Exhibit 51. FASP, Distribution of Questions, and Assignment of Weight Across Capability and Facility Levels								
MODULE	BASIC (50%)		INTERMEDIATE (30%)		ADVANCED (15%)		SOA (5%)	
	# of Qs	WEIGHT	# of Qs	WEIGHT	# of Qs	WEIGHT	# of Qs	WEIGHT
Provincial hospitals (four)	22	2.3%	26	1.2%	12	1.3%	3	1.7%
Referral hospitals (seven)	22	2.3%	26	1.2%	12	1.3%	3	1.7%
RMS branches (30)	20	2.5%	7	4.3%	14	1.1%	3	1.7%
RMS Central	20	2.5%	7	4.3%	14	1.1%	3	1.7%
BUFMAR	20	2.5%	7	4.3%	14	1.1%	3	1.7%
MEDIASOL	20	2.5%	7	4.3%	14	1.1%	3	1.7%
RBC	20	2.5%	7	4.3%	14	1.1%	3	1.7%

MOH and GHS (two)	21	2.4%	27	1.1%	14	1.1%	3	1.7%
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Note that interpretations of the scoring, and discussions of “differences” in the scores, need to recognize that the number of assessed capabilities differs by facility type and module. Thus, positive responses to individual questions (i.e., reports of present capabilities) carry different weights, depending upon the technical area and facility type.

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

Procurement and Customs Clearance

The procurement and customs clearance section seeks to determine that procurements are done transparently and in accordance with best practices. Major areas factored into the scoring for this CMM module are transparent, auditable procurement systems governed by policies and procedure; active management of vendor performance; and well-functioning customs clearance processes. This module was designed with public-sector procurement systems in mind. Exhibit 52 provides various examples of procurement capabilities at the different levels.

Exhibit 52. Examples of Scored Procurement and Customs Clearance Capabilities

Basic	Existence of an approved vendor list All tenders include terms and conditions A documented process is in place for identifying and qualifying vendors A contract management or an order and delivery management system is in place
Intermediate	Procurements are approved by authorized personnel/stakeholders Vendor performance results are communicated to vendors Entity benchmarks or compares its purchase prices against market indices
Advanced	A procurement ethics or anticorruption program is in place External audits of the procurement system are conducted annual Procurement appeal decisions are made publicly available
SOA	Data in the contract management system are updated in real time or daily An electronic procurement (e-procurement) process is used

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

The NSCA from 2017 highlighted the establishment in 2016 of the online e-procurement system to automate and digitize key procurement process functions (from bid launching to submission, technical/quality/financial evaluation, to evaluation and supplier contracting), and the introduction of procurement best practices such as the use of multi-year framework contracts, product and supplier pre-qualification systems, and establishment of procurement SOPs and controls.

Of the areas noted as critical issues the following are worth special consideration:

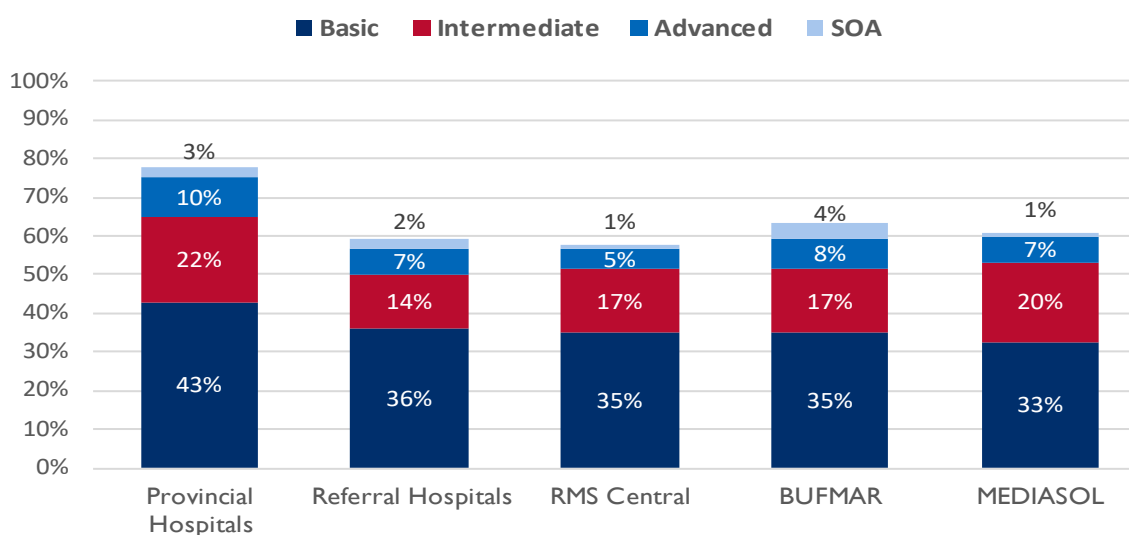
1. While procurement systems are relatively robust, availability of products in the public sector is still inadequate compared to need.
2. The national ERP-based eLMIS system needs to be strengthened in practice. Reliability of data from the eLMIS was a concern identified by NCSA respondents, with less than a third of health centers and DPs maintaining accurate eLMIS data.

2022 NSCA Findings and Analysis

Exhibits 53 and 54 display capability maturity scores for procurement and customs clearance. Procurement practices are currently distributed throughout the system. Normally, the NSCA does not assess procurement practices below the subnational level, but it was important to get an understanding of procurement practices across the public health landscape. Procurement capabilities were assessed at all regional medical stores, referral hospitals, and provincial hospitals. It should also be noted that procurement was not assessed at the Rwanda Biomedical Centre central vaccine warehouse as the procurement is conducted by UNICEF and delivered products are managed by RBC.

Overall, procurement maturity is fair across Rwanda's public health supply chain with most entities overall maturity scoring around 60 percent. No entity, however, scored high enough to receive the NSCA's recommended benchmark score of 80 percent.

Exhibit 53. Procurement and Customs Capability Maturity Scores



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

Exhibit 54. Procurement and Customs Clearance Maturity Score, and Basic Capabilities in Place					
	Provincial Hospital	Referral hospitals	RMS Central	BUFMAR	MEDIASOL
n =	4	7	1	1	1
Proportion of assessed facilities reporting that site procures some pharmaceuticals directly	25%	71%	100%	100%	100%
Overall maturity score (range)	77% (77–77%)	59% (36–73%)	57%	63%	61%
Percent of basic items in place (range)	85% (85–85%)	72% (50–90%)	70%	70%	65%

Procurement Processes. Looking closer at procurement processes, we see some disparity on the sampled entities regarding the presence of the most important best practices throughout the supply chain (see Exhibit 55). RMS Central, BUFMAR, all sampled provincial hospitals and all but one referral hospitals (six of seven) reported that procurements are approved by authorized stakeholders or personnel, though this practice was absent at MEDIASOL. Another inconsistent best practice is the existence of procurement ethics or anticorruption programs, that at the central level were only present in BUFMAR and MEDIASOL, and present in 50 percent and 60 percent of the sampled provincial and referral hospitals, respectively. On the other hand, an area where there is widespread maturity was the presence of procurement guidelines, manuals, or SOPs. While national procurement guidelines, with all entities across the supply chain could produce them on the day of the assessment. According to the respondents, these guidelines are updated yearly at MEDIASOL and RMS Central, while the respondent from BUFMAR did not know. At lower levels of the supply chain, 80 percent of referral hospitals declared updating them every three years, while the responses from the sampled provincial hospitals were divided with half declaring the guidelines being updated annually, while the other half did not know.

Encouragingly, external audits of the procurement system take place annually or more often in all reporting facilities. Furthermore, during sourcing and procurement all facilities responded they use internal control mechanisms, most commonly the use of Value Thresholds and Tender Committees amongst others (see Exhibit 55). This is reversed with respect to the presence of documented processes for identifying and qualifying vendors and developing an approved vendors list, only verified at RMS Central, 60 percent of sampled referral hospitals and all sampled provincial hospitals. However, in keeping a well-maintained database with vendor information, all central-level entities reported this practice except, surprisingly RMS Central, as well as 80 percent of referral hospitals and 50 percent of provincial hospitals.

Another noticeable absence is the lack of an electronic procurement system with only RMS Central maintaining a procurement website accessible to external stakeholders. While this is a more advanced capability, an electronic system would help significantly increase transparency and accountability in the system. It would also help improve access to information for decision makers on how to improve procurement processes.

Exhibit 55. Key Procurement Capabilities (Resources, Practices, and Items) and Percentage of Facilities Reporting					
	Provincial hospitals	Referral hospitals	RMS central	BUFMAR	MEDIASOL
n =	4	7	1	1	1
Procurements approved by authorized personnel or stakeholders	100%	80%	100%	100%	0%
Internal control systems**	Value thresholds; protocols; tender committee; contract mgt	Value thresholds; tender and contract committees; separation of roles; legal review	Value thresholds; tender committee; legal review	Protocols; tender and contract committees; contract mgt	Value threshold; protocols; tender com; contract mgt; separation of roles
Annual external audits of procurement system	100%	100%	100%	100%	100%
Procurement ethics or anticorruption program in place	50%	60%	0%	100%	100%
Procurement guidelines, manuals, or SOPs available (and onsite)	100%	100%	100%	100%	100%

Documented process for identifying and qualifying vendors	100%	60%	100%	0%	0%
Approved vendor list exists	100%	60%	100%	0%	0%
Vendor information is maintained in a database	50%	80%	0%	100%	100%
Most common system for maintaining procurements information	Electronic file (100%); software (50%); manual (84%)	Manual (94%); electronic (38%)	Manual (100%)	Electronic file (100%)	Manual (100%); electronic file (100%)

Exhibit 56. Procurement KPIs for CMS Facilities		
	RMS Central	BUFMAR
Vendor on time and in full rate	50%	55%
Vendor fill rate	89%	94%
Percentage of procurements placed as an emergency order	15%	35%
Average number of days for customs clearance	2.5	--
Stock turn per annum	12.0	4.1
Percent of incoming batches tested for quality	36%	--
Percent of product batches tested that meet quality standards	100%	--

Prices Paid. Typically, NSCA methodology examines only procurement prices at the central level but because of the diffused procurement activity across many facilities in Rwanda, the review of procurement was expanded down to the provincial hospital level. As medicine prices are always of interest, the assessment's tracer commodities was used to track pricing for procurements at various levels in the system.

The following Exhibits displays the percentage of international reference price paid for the different commodities at the central and non-central level, respectively. Exhibit 57 shows the prices paid for the tracer commodities by RMS Central. There is no data for MEDIASOL, BUFMAR, or RBC as at the time of the assessment, these entities did not conduct the actual purchasing of any of the tracer items of for this NSCA.

Exhibit 57. Percentage of International Reference Price Paid by RMS Central for Select Commodities	
Commodity	RMS Central
Salbutamol Inhaler, 250mcg, 200 doses	76%
Paracetamol, 500mg	57%
Powdered gloves, size 7.5	88%
TLD 300/300/50mg (90 ct.)	100%

Exhibit 58 depicts prices paid averaged across all orders collected from the sampled Provincial Hospitals, with results disaggregated by CMS versus private to accommodate for the instances where the commodities were sourced from the private sector when needed. Prices were in principle expected to be relatively less competitive, taking into account both the need to use local currency, while international prices are referred to U.S. dollars, and the fact that supply to landlocked countries such as Rwanda are more expensive than countries with access to a seaport. Notwithstanding the above, prices were found to be fairly competitive. Please note that the calculations will show cheaper prices shown as a percentage less than 100 percent.

Exhibit 58. Average of Percentage Paid of International Reference Price Paid by Referral Hospitals for Self-initiated Procurement		
Commodity	Purchased from RMS Central	Purchased from Private Sector
Albendazole		141%
Amoxicillin	103%	
Amoxicillin/clavulanic acid		159%
Blood glucose strips, pieces	116%	
Bupivacaine hyperbaric injection 4ml	64%	
Catheter	87%	119%
Cefixime		96%
Ceftriaxone injectable	95%	95%
Cetrimide/chlorhexidine 15%/1.5%		54%
Ciprofloxacin IV		87%
Enoxaparin Injectable		111%
Examination gloves 7.5	38%	
Hydrocortisone Injectable		64%
Ibuprofen		630%
Insulin long acting		58%
Insulin long lasting	64%	
Lidocaine	213%	84%
Non-sterile examination gloves	51%	54%
Omeprazole	68%	
Oxytocin injection		218%
Paracetamol	124%	69%
Tape test for autoclave		38%

Source of Funds for Procurement. Another important component of Rwanda's procurement environment is the sources of funding for those procurements. Exhibit 59 details the source of funds for procurements for Rwanda public health programs. It is encouraging to see how donors or implementing partners do not seem to be the main source of funding at any level, with most entities relying either on GOR budgets and Facility Revenue & Cost Recovery. At none of the 30 RMS branches did respondents to the NSCA questionnaire know the source of funding for these entities.

Exhibit 59. Source of Funds for Procurement							
Funding source	Provincial hospital	Referral hospital	RMS branches	RMS Central	BUFMAR	MEDIASOL	Rwanda Biomedical Centre
Government	50%	80%	0%	100%	0%	0%	100%
Donor/ implementing partners	100%	20%	0%	100%	0%	0%	100%
Facility revenue/cost recovery	100%	100%	0%	0%	100%	100%	0%

Customs Clearance. In Rwanda the following central-level MOH: RMS Central, BUFMAR and MEDIASOL all have an approved contract for customs clearance services.

Recommendations

The overall maturity score of the central-level entities active in procurement was around 60 percent, so below the NSCA maturity threshold of 80 percent. Even if the presence of basic capabilities was better at 65–70 percent, it is recommended that their SOPs are revised, and even more importantly, staff gets trained on the updated protocols and oversight mechanism put in place. Some of the areas that need to be incorporated on the updated protocols are establishing:

- A procurement ethics or anticorruption mechanism
- Criteria and processes in place to evaluate vendor performance
- A process to discriminate whether commodity imports may qualify for customs duties and/or tax exemption

Supplemental Annex

Exhibit 60. Procurement and Customs Clearance: Distribution of Questions and Assignment of Weight Across Capability and Facility Levels

MODULE	BASIC (50%)		INTERMED. (30%)		ADVANCED (15%)		SOA (5%)	
	# of Qs	WEIGHT	# of Qs	WEIGHT	# of Qs	WEIGHT	# of Qs	WEIGHT
Provincial hospitals (4)	20	2.5%	33	1.1%	16	1.0%	4	1.2%
Regional hospitals (7)	20	2.5%	33	1.1%	16	1.0%	4	1.2%
RMS Central (1)	20	2.5%	33	1.1%	16	1.0%	4	1.2%
BUFMAR (1)	20	2.5%	33	1.1%	16	1.0%	4	1.2%
MEDIASOL (1)	20	2.5%	33	1.1%	16	1.0%	4	1.2%

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

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

Warehousing and Storage

The Warehousing and Storage section seeks to ensure pharmaceuticals are stored using the most appropriate method to confirm their quality for patient use. Major areas that were factored into the scoring for this CMM module are existence of, and adherence to, SOPs for storage and inventory management, adequate physical infrastructure and safety equipment for storage of commodities, and appropriate security and accountability mechanisms in place (see Exhibit 61). Exhibits 62 and 63 show warehousing and storage results.

Exhibit 61. Examples of Warehousing and Storage Capabilities

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

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

The NPSSP recognizes historical challenges with warehousing and storage in the health supply chain. It acknowledges that the supply chain has “Inadequate storage/distribution capacity and management at DP and lower levels.” The plan goes on to identify two strategic outcomes related to warehousing that it will be focused on:

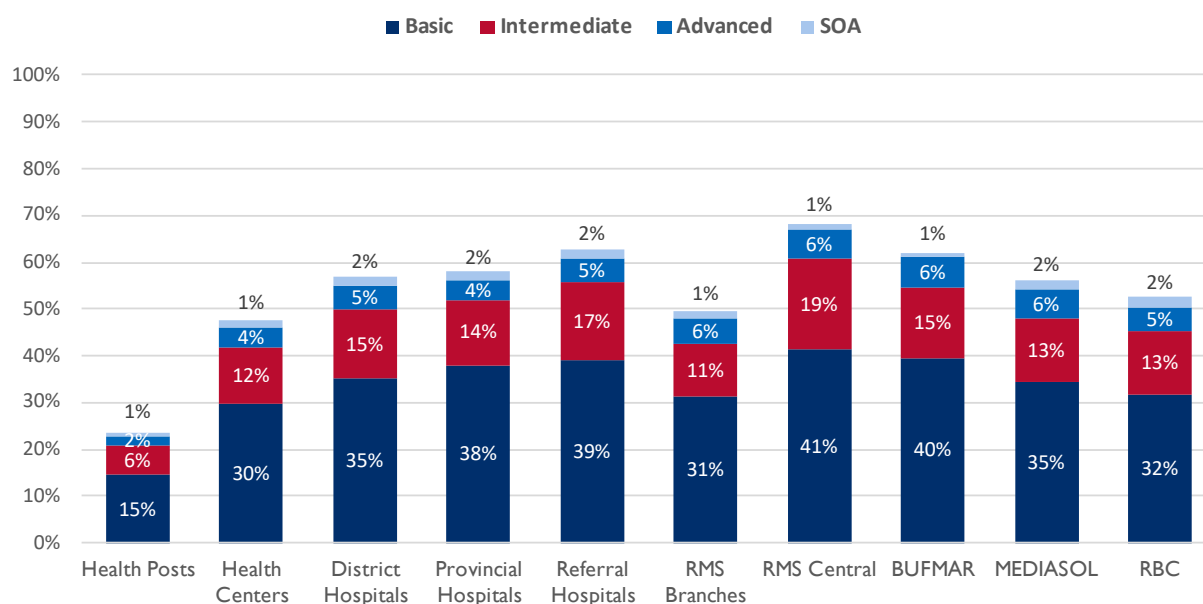
- Ensure adequate capacity in health commodities and technologies management to improve stock management and prevent losses through expiries and pilferage
- Improve storage infrastructure and equipment for health commodities and technologies needs in terms of capacity, design, maintenance, and security to meet applicable standards

2022 NSCA Findings and Analysis

Overall, as is expected, warehousing and storage capabilities improve further up in the supply chain from the last mile. With a score of 68 percent, RMS Central scored higher than any other entity owned by the GOR with BUFMAR and MEDIASOL scoring at lower but comparable levels of 62 and 56 percent, respectively. However, these scores are all well below the NSCA’s recommended benchmark of 80 percent. Exhibits 62 and 63 display the capability maturity scores for warehousing and storage, by facility type. Results will be examined in several sections, including storage practices, stock card use, storage conditions, and stock availability.

Exhibit 62. Warehousing and Storage Maturity Score, and Basic Capabilities in Place

	Health posts	Health centers	District hospitals	Provincial hospitals	Referral hospitals	RMS branches	RMS Central	BUFMAR	MEDIASOL	RBC	MOH
n =	71	72	17	4	7	30	1	1	1	1	1
Overall maturity score (range)	23% (7–40%)	48% (28–65%)	58% (48–72%)	58% (53–65%)	63% (50–75%)	49% (37–70%)	68%	62%	56%	50%	25%
Percent of basic items in place (range)	29% (11–51%)	59% (32–78%)	71% (60–86%)	76% (73–84%)	78% (62–89%)	63% (45–84%)	83%	79%	69%	61%	11%

Exhibit 63. Warehousing and Storage Capability Maturity Scores

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

Storage and Inventory Management Practices. Standardized inventory management practices need to be developed and disseminated. Such practices must be supported by consistent training and ubiquitous presence of manuals, job aids, and SOPs in facilities. National standard SOPs for warehousing and storage do exist, and almost all health centers have warehousing SOPs available (either in electronic or paper format), including 83 percent of health centers and 100 percent of district, provincial, referral hospitals, and RMS central branches. The exception are health posts, with only 5 percent presence of SOPs.

Similarly, while maximum and minimum stock levels have been set for service delivery points throughout Rwanda, their acknowledgement and application across the system are inconsistent. When asked whether their inventory management system employs max/mins levels, 90 percent of RMS branches and all provincial hospitals responded yes, but surprisingly, only 43 percent of referral hospitals did so. Lower on the supply chain both district hospitals and health centers were 75 and 77 percent, respectively, but again, only 19 percent of health posts responded yes, with the most common reordering calculation method reported being intuition.

Exhibit 64. Methodology Used for Ordering as Reported by Facilities

	Health posts	Health centers	District hospitals	Provincial hospitals	Referral hospitals	RMS branches
Using min-max guidance	19%	75%	78%	100%	43%	90%
Using previous consumption to inform ordering	19%	17%	22%	0%	57%	10%
Using intuition to inform ordering	35%	6%	0%	0%	0%	0%

Other evidence of good inventory management practices is found throughout the system. For example, most facilities checked inbound shipments for quantity and remaining shelf life, with 74 percent of health posts, and almost all health centers (96 percent), and all district, provincial, and referral hospitals, branch and central warehouses (RMS Central, BUFMAR, and MEDIASOL) notify the issuing warehouse or the supplier of any discrepancy in commodities received, even if the protocol of checking inbound systems is in place.. On the other hand, only 13 percent of the RMS branches and even fewer health centers and health posts, at 6 percent and 7 percent, respectively, reported all together rejecting an entire shipment in case of a discrepancy.

Equally commonplace was maintaining proof of delivery (POD) records for all products received. Maintenance of PODs ranged from 100 percent for the provincial hospitals to 81 percent of the district hospitals. However, the range for electronic PODs was much lower, from 19 percent of district hospitals to none of the health posts, provincial, and referral hospitals.

Stock Card Use and Inventory Tracking

Exhibit 74 displays the percentage of facilities, by tracer commodity, that were found to have perfectly accurate stock cards on the day of the visit. The performance is good at all facilities down to district hospital levels except for RMS branches that registered 64 percent. At the level of health centers and health posts the percentage of facilities with perfect accuracy was at a lower but still respectable 66 percent and 63 percent, respectively.

Exhibit 65. Percentage of Facilities With 100 Percent Accurate Stock Card, by Tracer Commodity

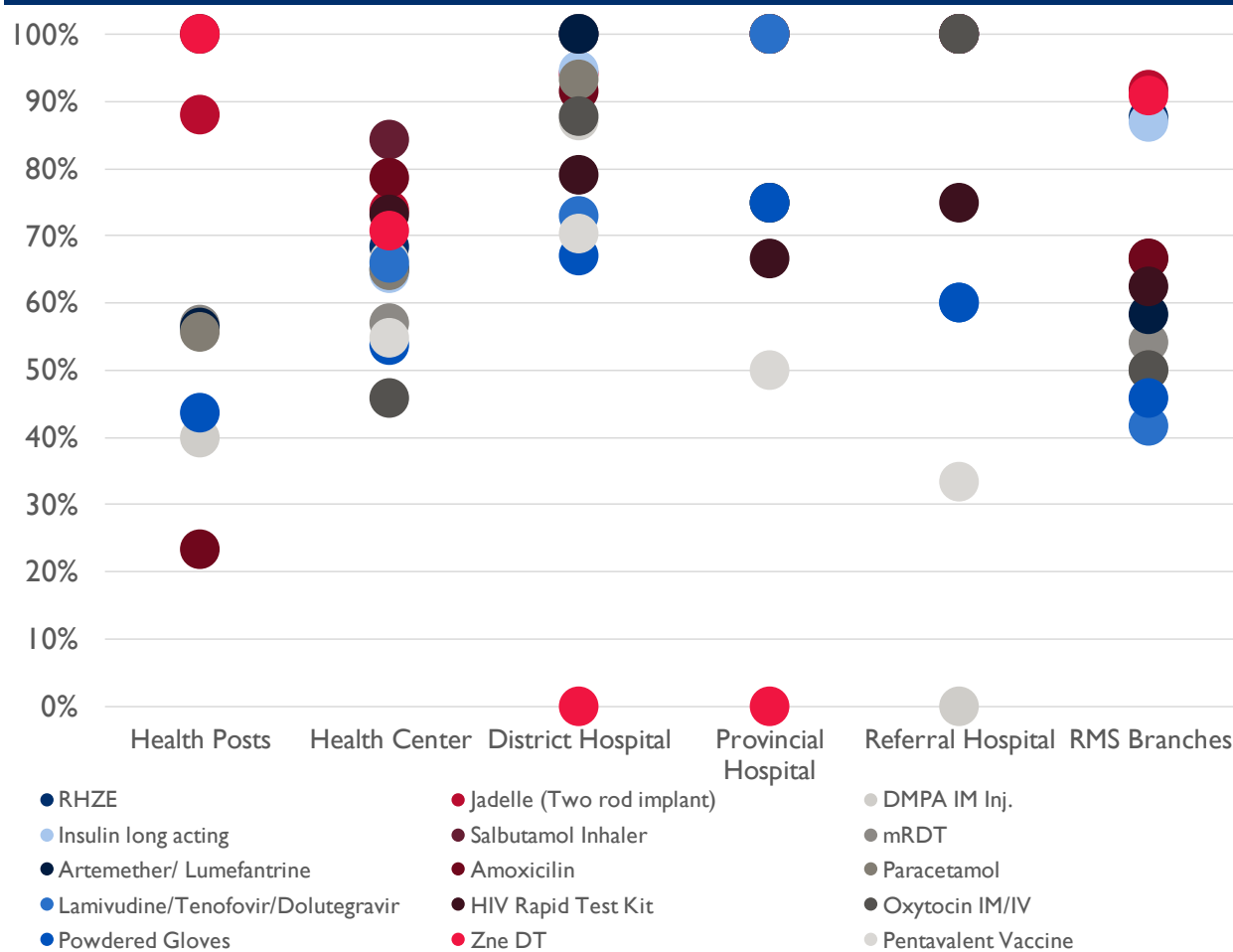


Exhibit 66. Percentage of Facilities with 100 Percent Accurate Stock Card, by Tracer Commodity

	Health posts	Health centers	District hospitals	Regional hospitals	Referral hospitals	RMS branches
n =	71	72	17	4	7	30
RHZE (rifampin/isoniazid, pyrazinamide, and ethambutol)		68%	100%	100%	100%	88%
Jadelle (two-rod implant)	88%	74%	94%	100%	100%	92%
DMPA (depot medroxyprogesterone acetate) IM	40%	66%	87%	100%	0%	50%
Insulin long acting		64%	95%	75%	60%	87%
Salbutamol inhaler		84%	100%	100%	100%	67%
Rapid diagnostic test–malaria	57%	57%	100%	100%		54%
Artemether/lumefantrine	56%	65%	100%	75%	100%	58%
Amoxicillin	23%	79%	92%	100%	100%	67%
Paracetamol	56%	65%	93%	100%	100%	50%
TLD 300 (90-count)		66%	73%	100%	60%	42%
HIV rapid test kit	100%	73%	79%	67%	75%	63%

Oxytocin IM/IV		46%	88%	75%	100%	50%
Powdered gloves	44%	54%	67%	75%	60%	46%
Zinc DT 10mg	100%	71%				91%
Pentavalent (DTwP-Hep B-Hib) vaccine		55%	70%	50%	33%	
AVERAGE	63%	66%	88%	87%	76%	64%

Storage Conditions. For infrastructure, many of the basic components are in place across the system. Permanent, leak-free roofing in facilities is ubiquitous across the country for district and provincial hospitals, but surprisingly in place in 71 percent of referral hospitals, 88 percent of health centers, and 92 percent of health posts. Similar dynamics exist for adequate ventilation and nonporous flooring, with identical figures for the referral and provincial hospitals and district hospitals verifying these 65 and 86 percent of the time, respectively. Health centers have these in place in 70 percent and 80 percent of facilities, respectively; and finally present in 54 and 65 percent of health posts. Also, electric lighting is found to be in place throughout facilities across the country, with health posts being the exception; 72 percent of facilities have electrical lighting.

Availability of cold chain storage was found at 97 percent of the RMS branches and at RMS Central, BUFMAR, RBC, and MEDIASOL. RBC in particular was found to have exceptional cold chain storage capabilities including an advanced temperature monitoring system. Only 6 percent of health posts maintain temperature logs in comparison to 93 percent of health centers, and 100 percent of district, provincial, referral hospitals, and RMS branches maintained temperature logs. Encouragingly, none of the sampled sites reported a temperature excursion in the last six months.

Regarding the presence of storage for hazardous substances, half of the RMS branches and all CMS central entities had separate space available for them within their storerooms. Of the 30 RMS branches, 23 (77 percent) also had space available for storage of controlled substances. Another significant observation is that only half of the RMS branches had separate areas for receiving and dispatch, probably leading to some movement challenges when receiving and dispatching health commodities. Exhibit 67 details specialized storage capabilities at service delivery points. Finally, only 1 percent of the health posts compared to 57 percent of the health centers and 100 percent of all hospitals (district, provincial, and referral) had a generator available to secure an alternative source of power in case of a power outage.

Exhibit 67. Specialized Storage Capabilities at Service Delivery Points

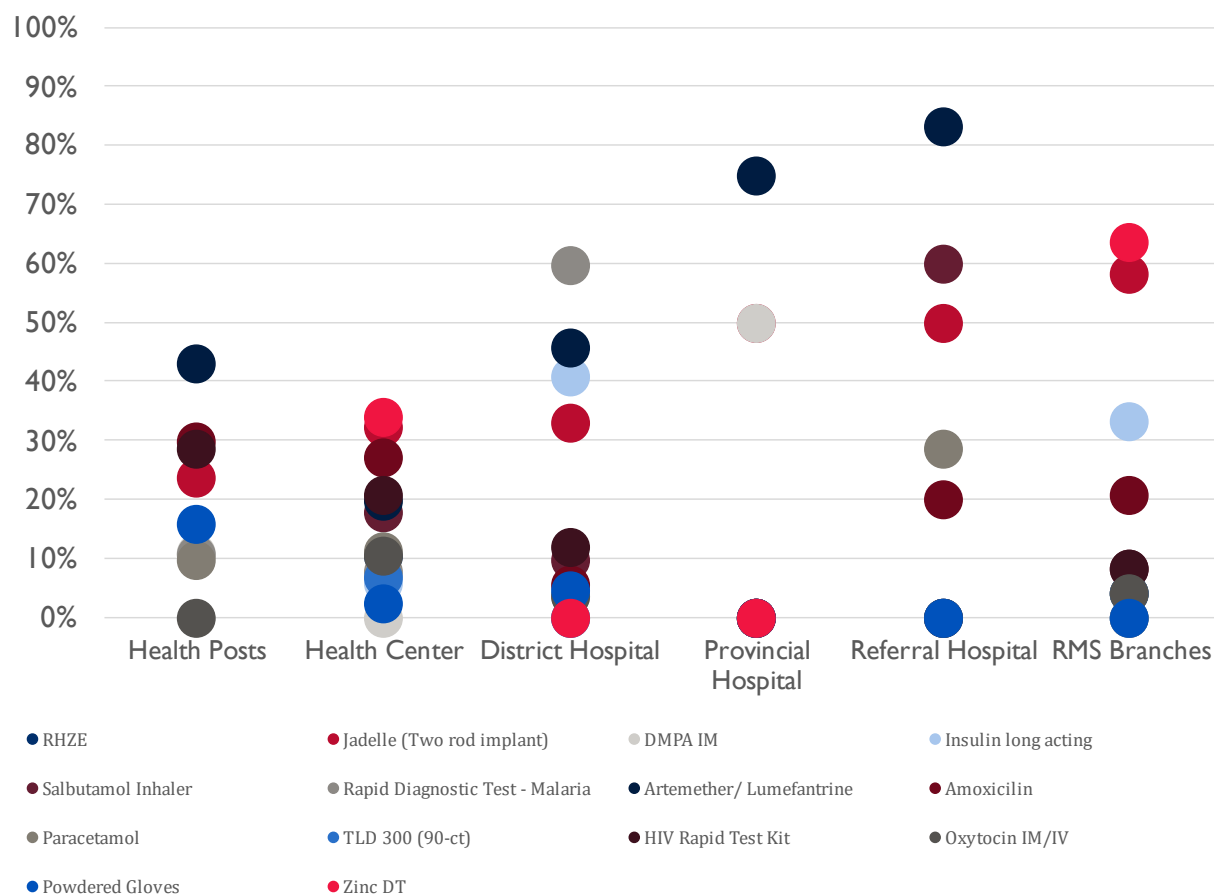
	Health posts	Health centers	District hospitals	Provincial hospitals	Referral hospitals
Percentage of facilities that have cold chain storage	1%	82%	90%	80%	100%
Percentage of facilities that have designated quarantine area	7%	50%	46%	60%	57%
Percentage of facilities that have designated storage for hazardous substances	0%	18%	55%	60%	86%
Percentage of facilities that have designated storage for controlled substances	4%	58%	83%	60%	100%

Stock Availability. The NSCA examined stock levels over the previous six months before the assessment by reviewing historical stock records. Exhibit 68 displays the stocked according to plan (SATP) rates, defined as the number of observations of stock levels that were within min/max levels, over the defined period. While the levels were below ideal, it was particularly concerning how low the SATP rates were at RMS branches. While concerning, it was not surprising to see such low SATP rates in the context of the ordering and distribution challenges that RMS branches are having. This is detailed in greater discussion in the distribution section but essentially the RMS branches are faced with a significant and consistent number of unplanned orders from SDPs resulting in a 48 percent order fill rate. High volumes of unplanned orders will make it a challenge for the RMS branches to maintain appropriate stock levels in their facilities.

Exhibit 68. SATP Rates for All Tracer Products, by Level in the Supply Chain

	Health posts	Health center	District hospital	Provincial hospital	Referral hospital	RMS branches
Number of observations:	71	72	16	5	7	30
RHZE		21%	20%	33%	33%	20%
Jadelle (two-rod implant)	63%	21%	18%	29%	8%	9%
DMPA IM inj.	21%	21%	26%	0%	67%	12%
Insulin long acting		28%	26%	8%	38%	5%
Salbutamol inhaler		39%	24%	67%	25%	24%
Rapid diagnostic test–Malaria	20%	17%	40%			15%
AL 6x4	29%	27%	17%	18%	25%	11%
Amoxicillin	15%	31%	15%	17%	30%	22%
Paracetamol	23%	39%	29%	54%	27%	22%
TLD 300 (90-count)		48%	40%	54%	46%	38%
HIV rapid test kit	100%	36%	39%	24%	46%	15%
Oxytocin IM/IV		33%	34%	13%	33%	19%
Powdered gloves	32%	31%	17%	17%	7%	8%
Zinc DT 10mg	100%	16%				15%

Exhibit 69. Percentage of Facility Stockout of a Tracer Commodity on the Day of the Assessment



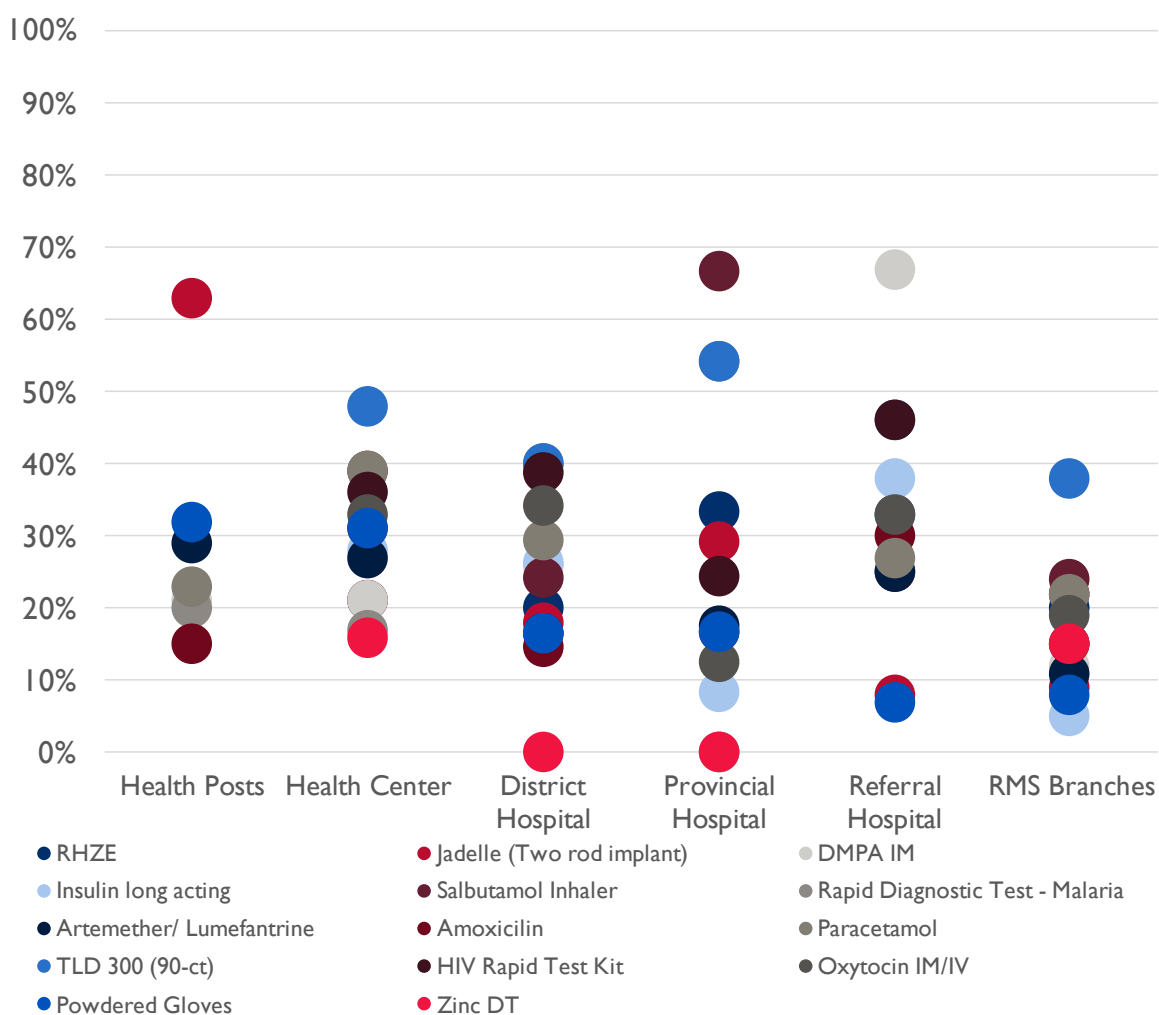
The availability of commodities at SDPs is the top priority of any well-functioning pharmaceutical supply chain. The NSCA found that stock was mostly available throughout the system, with no specific commodity or facility type being singled out. No facility stood out as having more consistent availability. The authors of this report understand that the higher-than-normal stockout rates of AL 6x4 that are detailed in Exhibit 70 are due to specific instructions from the National Malaria Control Program to hold off on distributing and dispensing of AL 6x4 to encourage consumption of a batch of AL 6x3 that was at risk of expiry in June 2022 and July 2022. This stockout imbalance was corrected once the older batch had been dispensed. It should also be noted that there were no stockouts of vaccines at the RBC central vaccine warehouse on the day of the visit.

Exhibit 70. Percentage of Facilities With Stockout on Day of Assessment

	Health posts	Health center	District hospital	Provincial hospital	Referral hospital	RMS branches	RMS Central
Number of observations:	71	72	17	4	7	30	1
RHZE		11%	0%	0%	0%	0%	0%
Jadelle (two-rod implant)	24%	32%	33%	50%	50%	58%	0%
DMPA IM	11%	0%	0%	50%	0%	4%	0%
Insulin long acting		6%	41%	0%	0%	33%	0%

Salbutamol inhaler	18%	10%	0%	60%	8%	0%	
Rapid diagnostic test, malaria	11%	8%	60%	0%	0%	0%	
AL 6x4	43%	20%	46%	75%	83%	4%	0%
Amoxicillin	30%	27%	5%	0%	20%	21%	100%
Paracetamol	10%	11%	4%	0%	29%	4%	0%
TLD 300 (90-count)	7%	0%	0%	0%	4%	0%	
HIV rapid test kit	28%	21%	12%	0%	0%	8%	0%
Oxytocin IM/IV	0%	10%	4%	0%	0%	4%	0%
Powdered gloves	16%	2%	5%	0%	0%	0%	0%
Zinc DT	34%				64%	100%	
Pentavalent vaccine	5%	0%	0%	0%			

Exhibit 71. Stocked According to Plan Rates for All Tracer Products, by Level in the Supply Chain



RMS Branches. The RMS branch facilities play a crucial role in the warehousing and distribution of health commodities to last-mile facilities and ultimately to patients. Yet despite being this crucial node in

warehousing and distribution, they scored the lowest capability score for warehousing of any facility type other than health posts. With sub-optimal stock card accuracy rates, low SATP rates, and a high degree of variance of capability across the 30 different branches, RMS branches need to be strengthened so they can fully execute their roles. The authors of this report are aware of concurrent warehousing capacity assessment happening in all RMS branches to better understand how to support their warehousing throughput and operations. The findings presented here and those of that report should be used to focus on strengthening the RMS branch level of the supply chain.

Recommendations

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

- Invest in capabilities at last-mile facilities, especially at the health posts. Most Rwandans access their health services at this level, especially in rural areas. These facilities need to be properly equipped to ensure quality medicines are available when needed.
- Investigate why RMS branches continue to have such low rates of stocked according to plan. The supply chain continues to operate in a low-supply environment, making it particularly susceptible to any minor supply disruptions upstream.
- Continue to provide capacity building around inventory management for last-mile facilities. Strong quality logistics data starts with the stock card and many facilities continue to have inaccurate records.

Supplemental Exhibit

Exhibit 72. Warehousing and Storage: Distribution of Questions and Assignment of Weight Across Capability and Facility Levels								
MODULE	BASIC (50%)		INTERMED. (30%)		ADVANCED (15%)		SOA (5%)	
	# of Qs	WEIGHT	# of Qs	WEIGHT	# of Qs	WEIGHT	# of Qs	WEIGHT
Health posts (n=71)	48	1.0%	29	1.0%	13	1.1%	7	0.7%
Health centers (72)	48	1.0%	29	1.0%	13	1.1%	7	0.7%
District hospitals (17)	48	1.0%	29	1.0%	13	1.1%	7	0.7%
Provincial hospitals (4)	53.3	0.9%	30	1.0%	13	1.2%	6	0.8%
Referral hospitals (7)	53.3	0.9%	30	1.0%	13	1.2%	6	0.8%
RMS branches (30)	74.7	0.7%	37	0.8%	14	1.1%	5	1.0%
RMS central (1)	74.7	0.7%	37	0.8%	14	1.1%	5	1.0%
BUFMAR (1)	74.7	0.7%	37	0.8%	14	1.1%	5	1.0%
MEDIASOL (1)	74.7	0.7%	37	0.8%	14	1.1%	5	1.0%
RBC (1)	74.7	0.7%	37	0.8%	14	1.1%	5	1.0%

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

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

Distribution

The safe and efficient distribution of pharmaceuticals and medical products is a fundamental function of public health supply chains. In this technical area, the NSCA seeks to ensure that distribution plans are structured, implemented, and monitored so that they regularly achieve on-time distribution of commodities to service delivery points. Major areas that were factored into the scoring for this module included the existence of a distribution plan, consideration of appropriate factors for optimizing distributions, best practice policies and procedures, active recording and monitoring of cost and transit data, and appropriate mechanisms to ensure safety and quality of products during transit (see Exhibit 73).

Exhibit 73. Examples of Scored Distribution Capabilities

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

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

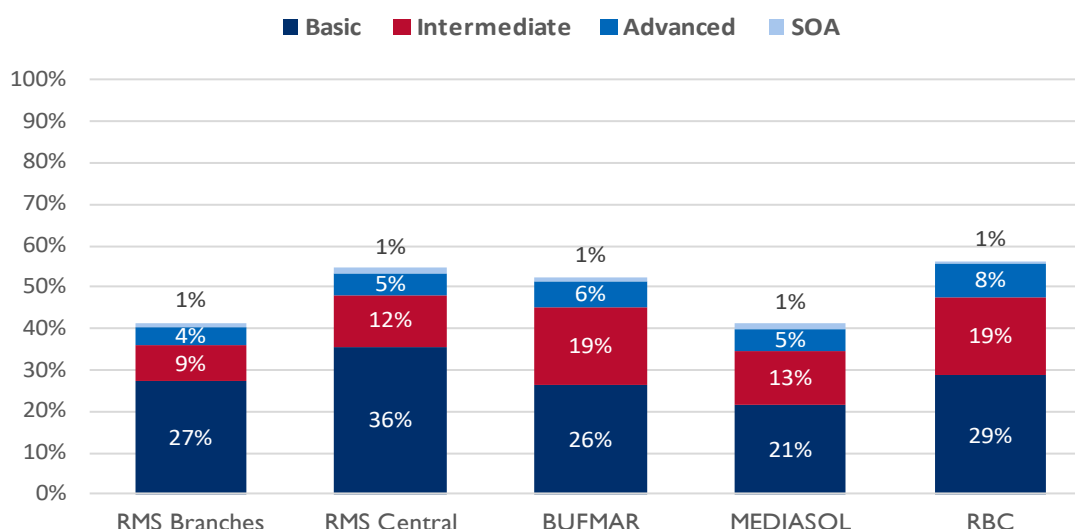
The NPSP 2018–2024 highlighted the supply chain struggles with “Inadequate storage/distribution capacity and management at DP and lower levels, as well as distribution capability at MPPD level.” To prioritize this for improvement, the NPSP included one subcomponent of strategic objective 6 to “Strengthen storage and distribution capacity and management at lower levels” and also a strategic outcome of “Encourage the equitable distribution of pharmacy services both in rural and urban areas.”

2022 NSCA Findings and Analysis

Distribution is currently being handled as direct delivery from RMS branches to SDPs throughout Rwanda. RMS branch orders are fulfilled by RMS Central. Distributions from the central level down to the SDP level are done in an integrated manner by RMS institutions. However, BUFMAR and MEDIASOL reported not distributing in an integrated way. Results from the 2022 NSCA reveal a strong basis of foundational capabilities for the system. Specifically, every entity assessed reported having an approved distribution plan with pre-planned distribution routes and distribution schedules that are communicated in advance to health facilities. These are essential elements of effective distribution and

will serve the system well in ensuring continuous supply. Exhibits 74 and 75 detail the distribution maturity scores for all five entity types assessed as well as the proportion of basic elements in place.

Exhibit 74. Distribution Maturity Scores



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

Exhibit 75. Distribution Maturity Score, and Basic Capabilities in Place

	RMS Branches	RMS Central	BUFMAR	MEDIASOL	RBC
n =	30	1	1	1	1
Overall maturity score (range)	41% (20%–68%)	55%	52%	41%	56%
Percent of basic items in place (range)	54% (24%–81%)	71%	52%	43%	57%

Looking more closely at the capability scores, all four CMS institutions review distribution routes bi-annually, though only 50 percent of RMS branches do so. When planning routes, RMS Central and MEDIASOL consider truck capacity, product volumes, and geographic location. BUFMAR reported only considering geographic location. It is surprising, however, to see that RMS Central does not have policies that cover distribution and transportation of commodities. RMS branches taking direction from RMS Central largely echo this absence of policies. Considering their other existent capabilities, this should a straightforward effort of codifying and validating what they already put into practice to ensure standardization of the function. The lack of policies and the associated questions are holding RMS Central back from a higher capability score in this NSCA.

A large gap in the distribution system currently is the lack of monitoring transportation-a related KPIs. This is further compounded by the lack of systems in place at RMS Central, MEDIASOL, or RBC for capturing and maintaining transportation-related data. Encouragingly, distribution cost data are collected by all four CMS institutions, although this largely disappears at the RMS branch level, as only 17 percent of RMS branches reported collecting cost data.

Exhibit 76. Downstream Order Key Performance Indicators (Sept. 2021–Feb. 2022)

	RMS branches	RMS Central	BUFMAR	RBC
Total number of orders (randomly selected over a six-month period)	235	20	20	20
Order turnaround time (days)	8.8	9	4	3.26
Percentage of orders adjusted	89%	60%	5%	65%
Average deviance from 100 percent fill rate	48%	22%	8%	2%
Percentage of orders delivered in-full	56%	45%	85%	90%

Challenges in the distribution system come to light through a closer examination of the performance indicators collected. Currently, on-time delivery rates for last-mile facilities are around 70 percent though they were found to be as low as 45 percent for referral hospitals. Exhibit 76 details downstream performance from RMS branches to various facility types, as reported by those facilities. Exhibit 77 details order fill rates and on-time-in-full (OTIF) rates as reported by the issuing entity. Currently, district hospitals are placing unplanned orders roughly half of the time with RMS branches. This helps contextualize the fact that currently, RMS branches are delivering only 56 percent of orders in-full. Though district hospitals lead the country in placing the largest proportion of unplanned orders, it is a consistent phenomenon across all facility types surveyed. Unplanned orders should rarely constitute more than 5 percent of orders being placed. The compounding effect further upstream can be seen at RMS Central, where only 45 percent of orders are delivered in full. BUFMAR and RBC are largely unaffected by this dynamic, delivering in-full 85 percent and 90 percent of time, respectively. Placing this dynamic that RMS is experiencing in the context of the low accuracy of LMIS data as noted in the NSCA (see LMIS section), it is not surprising to see that facilities are placing many unplanned orders and RMS cannot completely fulfill those orders, as they are well outside of their supply plan quantities.

Exhibit 77. RMS Branches Delivery Key Performance Indicators (Sept. 2021–Feb. 2022)

	Health posts	Health centers	District hospitals	Provincial hospitals	Referral hospitals
n =	71	72	16	5	7
Total number of orders reviewed	437	866	243	71	99
Percentage of orders that had all relevant data available	45%	81%	79%	94%	68%
Percentage of orders that are planned	86%	73%	59%	56%	79%
On-time delivery (as reported by receiving facility)	66%	70%	70%	90%	45%
Turn-around time (as reported by receiving facility)	4.8 days	13.5 days	7.6 days	6.7 days	8.9 days

The distribution system in Rwanda has solid foundational capabilities that will serve it well for years to come. However, to bring the system to the highest levels of effectiveness and efficiency, a concerted focus on collecting, interpreting, and using data to guide distribution planning and operations is needed. Incorporating the costing data that currently exist will help realize even further gains.

Recommendations

- Codify the practices and procedures of all RMS entities into formal policies for transportation and distribution. Use this opportunity to review operational practices across the board to ensure consistency and appropriateness.
- Institute formal tracking of transportation and distribution related KPIs and establish a formal structure to monitor these KPIs. Empower managers to use this information to further drive distribution efficiency and effectiveness.
- Work with facilities more closely to understand why the system has such a high frequency of unplanned orders. More effective communication during order processing can help reduce the need for unplanned orders.

Supplemental Exhibit

Exhibit 78. Distribution Module, Distribution of Questions and Assignment of Weight Across Capability and Facility Levels								
MODULE	BASIC (50%)		INTERMEDIATE (30%)		ADVANCED (15%)		SOA (5%)	
	# of Qs	WEIGHT	# of Qs	WEIGHT	# of Qs	WEIGHT	# of Qs	WEIGHT
RMS branches (30)	21	2.4%	43	0.7%	17	0.9%	7	0.7%
RMS central (1)	21	2.4%	43	0.7%	17	0.9%	7	0.7%
BUFMAR (1)	21	2.4%	43	0.7%	17	0.9%	7	0.7%
MEDIASOL (1)	21	2.4%	43	0.7%	17	0.9%	7	0.7%
RBC (1)	21	2.4%	43	0.7%	17	0.9%	7	0.7%

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

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

Logistics Management Information Systems

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

performance monitoring on quality of reporting, and ultimately, performance in data accuracy, completeness, and timeliness (see Exhibit 79).

Exhibit 79. Examples of Scored Logistic Management Information System Capabilities

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

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

The National Pharmaceutical Strategic Plan (2018–2024) identifies various focus areas for improvement of the eLMIS. Specifically, it acknowledges “poor availability of accurate eLMIS data to guide inventory management practices” within lower-level health facilities. Furthermore, it identifies that during the 2017 NSCA, “reliability of data from the eLMIS was a concern identified by NCSA respondents, with less than a third of health centers and DPs maintaining accurate eLMIS data.”

The National Pharmaceutical Strategic plan “places an emphasis on capacity building around e-LMIS (provision of adequate infrastructure such as IT/Internet equipment, as well as training of staff on the application of e-LMIS tools) to improve supply and distribution maturity.”

2022 NSCA Findings and Analysis

LMIS capability and performance results from the 2022 NSCA are presented in Exhibits 80 through 82. Overall, capability scores were consistently above 50 percent across most assessed service delivery point facility types; however, lower scores were found in RMS branches and in the various CMS institutions. The NSCA revealed a baseline of important basic capabilities in the system, such as the use of LMIS data to inform order, reporting, and inventory management. However, adherence to standard processes and eLMIS accuracy continues to remain low, near the levels of the 2017 NSCA results. Analysis is detailed here within through subsections of CMS institutions, paper LMIS, eLMIS, HR for LMIS, and data quality assessments.

Exhibit 80. LMIS Maturity Scores Across All Surveyed Facility Types

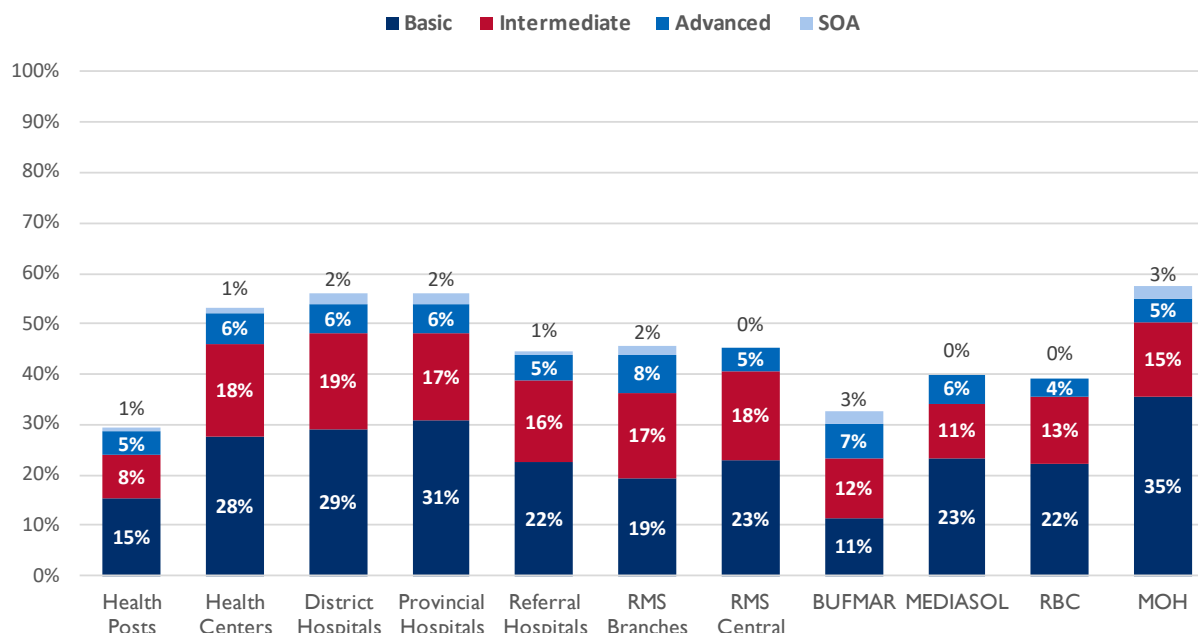


Exhibit 81. LMIS Maturity Score, and Basic Capabilities in Place for Sub-national entities

	Health posts	Health centers	District hospitals	Provincial hospitals	Referral hospitals	RMS branches
n =	71	72	17	4	7	30
Overall maturity score (range)	29% (0–64%)	53% (31–75%)	56% (40–69%)	56% (42–66%)	45% (10–63%)	46% (28–67%)
Percent of basic items in place (range)	31% (0–83%)	55% (27–80%)	59% (44–81%)	62% (46–69%)	50% (36–67%)	39% (15–65%)

Exhibit 82. LMIS Maturity Score, and Basic Capabilities in Place for Central-level entities

	RMS Central	BUFMAR	MEDIASOL	RBC (Central vaccine warehouse)	MOH
n =	1	1	1	1	1
Overall maturity score (range)	45%	33%	40%	39%	57%
Percent of basic items in place (range)	46%	23%	47%	44%	71%

Central Medical Stores and RMS Branches. Typically, one will find the strongest capabilities within supply chain functions at the central level, and those capabilities decrease progressively in going through

the health system to last-mile facilities. In Rwanda, however, capabilities around LMIS at central medical stores seem not to follow that trend. CMM scores for LMIS were lower at RMS Central, RMS branches, BUFMAR, MEDIASOL, and RBC than they were at health centers, district hospitals, and provincial hospitals. Looking at the RMS network, it is encouraging to see that LMIS data are regularly reviewed and there is a standardized process for it. Conversely, RMS branches are not conducting data quality assessments (DQAs) uniformly across the country. This is evident in Exhibits 83 and 84, which detail the eLMIS accuracy for various tracer products across the RMS branches. RMS Central does have many of the important foundational capabilities in place, unlike BUFMAR and MEDIASOL, which could benefit from a renewed focus on foundational elements of the LMIS, such as availability of SOPs to staff, and standard processes to review the LMIS data. With four distinct CMS institutions in Rwanda that all demonstrate variable adherence to foundational LMIS components, an opportunity is presented to create a coordination and standardization mechanism that would allow all actors to operate with the same understanding and expectations.

As noted in the limitations section, a flooding event occurred at the RMS central warehouse, which made it physically impossible to conduct physical counts to assess eLMIS accuracy for any of the tracer commodities. MEDIASOL does not manage any of the tracer commodities in its warehouse. BUFMAR does manage amoxicillin and paracetamol, both of which had 100 percent concordance observed between physical count and LMIS records.

Exhibit 83. Key Capabilities in Place at Central Medical Stores—eLMIS					
	RMS branches	RMS Central	BUFMAR	MEDIASOL	RBC (central vaccine warehouse)
n =	30	1	1	1	1
Percentage of facilities reporting tracking of timeliness, completeness, and accuracy of reporting by lower level facilities	40%–53%	x	x	✓	x
Percentage of facilities reporting presence of manuals or SOPs on eLMIS	37%	✓	x	x	x*
Percentage of facilities reporting conducting internal DQAs	37%	✓	✓	x	x
Percentages of facilities reporting inclusion of LMIS in the overall organizational budget	43%	✓	x	✓	x
Percentage of facilities reporting a standard process to review LMIS data	73%	✓	x	x	✓

*RBC uses a separate reporting system that is not part of the eLMIS

Paper LMIS. Paper LMIS is not commonly used in Rwanda except at the health post level. No facility surveyed in the entire assessment reported using only a paper-based LMIS system besides health posts. However, at the health post level, about half of facilities responded using a paper LMIS; 38 percent of facilities reported using no type of LMIS at all, while 17 percent reported using eLMIS or paper and eLMIS. Of those who did report using a paper LMIS, concordance was strong in acknowledging a monthly reporting cycle, which is encouraging. However, only 4 percent of health posts nationwide reported having a standard process to review LMIS data and reports. Furthermore, 29 percent of health centers nationwide reported having a stockout of stock cards within the last year. Compounding this problem, none of the sampled health posts reported having SOPs for the paper LMIS available.

With the lowest capability scores of any facility type assessed, there is a clear need at the health post level to conduct foundational capacity building to ensure that these last-mile facilities have the essential building block of LMIS to contribute consistent, high-quality logistics data to the supply chain.

eLMIS. The electronic logistics management information system in Rwanda is a strength of the supply chain system, as it has been implemented down to the service delivery level. The eLMIS is ubiquitous throughout the country except at the health-post level, where paper reports are still used as a means of conveyance to the next supply chain level, where the information is digitized. The eLMIS in Rwanda has been rolled out in the country since 2014. This is strongly supported by the fact that all (96 percent and higher) sampled health centers and district hospitals reported using eLMIS to inform ordering and reporting, and inventory management.

A closer look at LMIS processes shows room for improvement. Exhibit 84 details key LMIS capabilities in place across various service delivery points as well as related key performance indicators. Specifically, roughly half of health centers and district hospitals reported having a standard process to review LMIS data and reports. This is further compounded by roughly half of facilities reporting the availability of eLMIS SOPs. The authors of this report understand that digital SOPs are available within the eLMIS software but if facility staff are unaware of this fact or not trained in how to access them, they are effectively not available. As detailed in the HR for LMIS section below, capacity building on eLMIS is prevalent throughout the health system. The MOH needs to review the materials used in capacity-building sessions to ensure that health facility staff are aware of what is expected of them for eLMIS work and what standard procedures they should use to review LMIS data, as well as remind them how to access those SOPs as needed.

Looking more closely at the performance of the eLMIS, challenges remain with eLMIS accuracy. During the 2017 NSCA, 33 percent of health centers were reported to have 100 percent accurate stock records in the eLMIS as compared to physical count. The 2022 NSCA found that the performance was down to just 21 percent for the same metric. For those facilities that did not have accurate records, the magnitude of the deviance away from 100 percent accuracy is striking. Health centers had a range of 158–2,238 percent deviance from the true stock on hand. Such imbalances create serious challenges for accurate ordering and consumption monitoring. Exhibits 85 and 86 display both of these metrics at the tracer product level to demonstrate the high degree of variability found during the assessment. Only one single product at one single facility type had 100 percent accuracy when comparing physical count to the eLMIS record.

Putting these capability and performance issues into context helps clarify the challenges the supply chain system is facing. Exhibit 87 details the challenges cited most often by health centers and district hospitals with using the eLMIS. Internet connectivity continues to be major challenge for health facilities nationwide—a *problem that was found and highlighted during the 2017 NSCA as well*. Insufficient training or human resource capability was also a frequently cited challenge, indicated that there continues to be room for improvement in the quality of this training or support.

Exhibit 84. Key Performance Indicators and Capabilities in Place—eLMIS

	Health centers	District hospitals	Provincial hospitals	Referral hospitals
n =	72	17	4	7
Percentage of facilities reporting there a standard process, such as scheduled, regular meetings, to review LMIS data and reports	44%	52%	25%	43%
Percentage of facilities reporting presence of manuals or SOPs on eLMIS	18%	25%	25%	17%
Percentage of facilities reporting existence of reliable internet connectivity at facility (“always or almost always works”)	66%	68%	25%	67%
Percentages of facilities reporting inclusion of eLMIS in the overall organizational budget	54%	65%	75%	33%
eLMIS record accuracy: Percentage of facilities with 100 percent accurate stock card, average across tracers	21%	37%	42%	33%
eLMIS record accuracy: Percentage points deviation from 100 percent accuracy (range across tracer commodity)	158%–2,238%	49%–4,109%	92%–5,000%	0%–1,042%

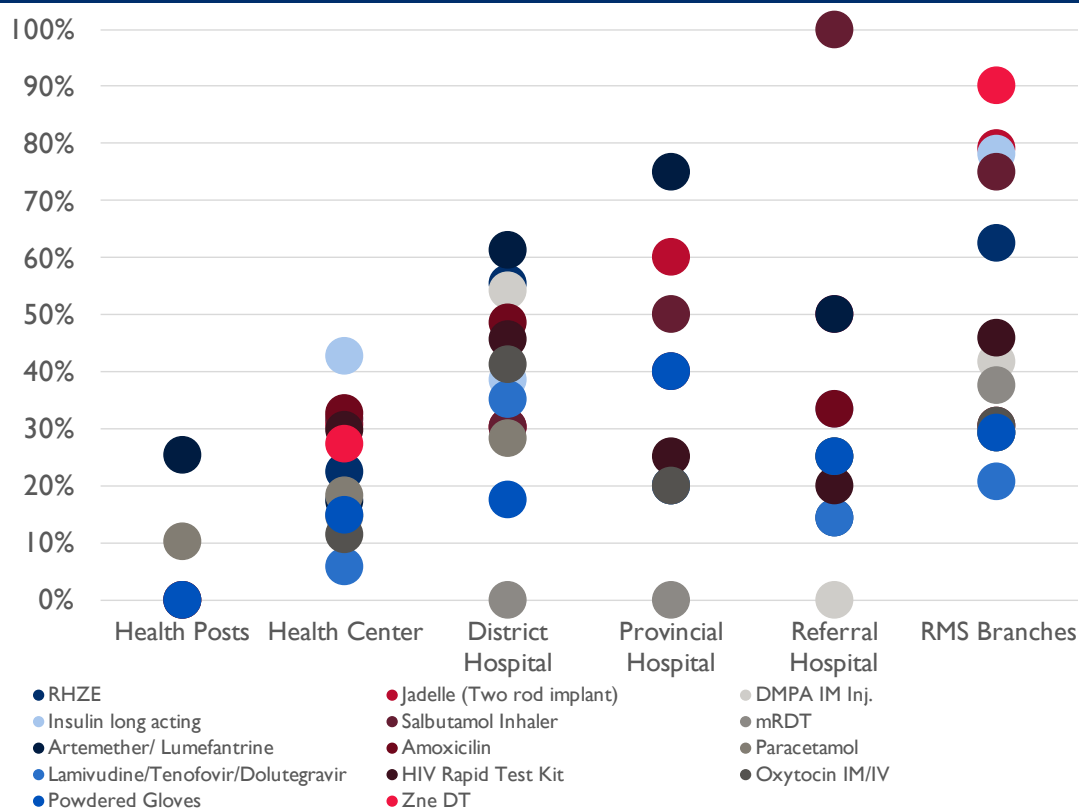
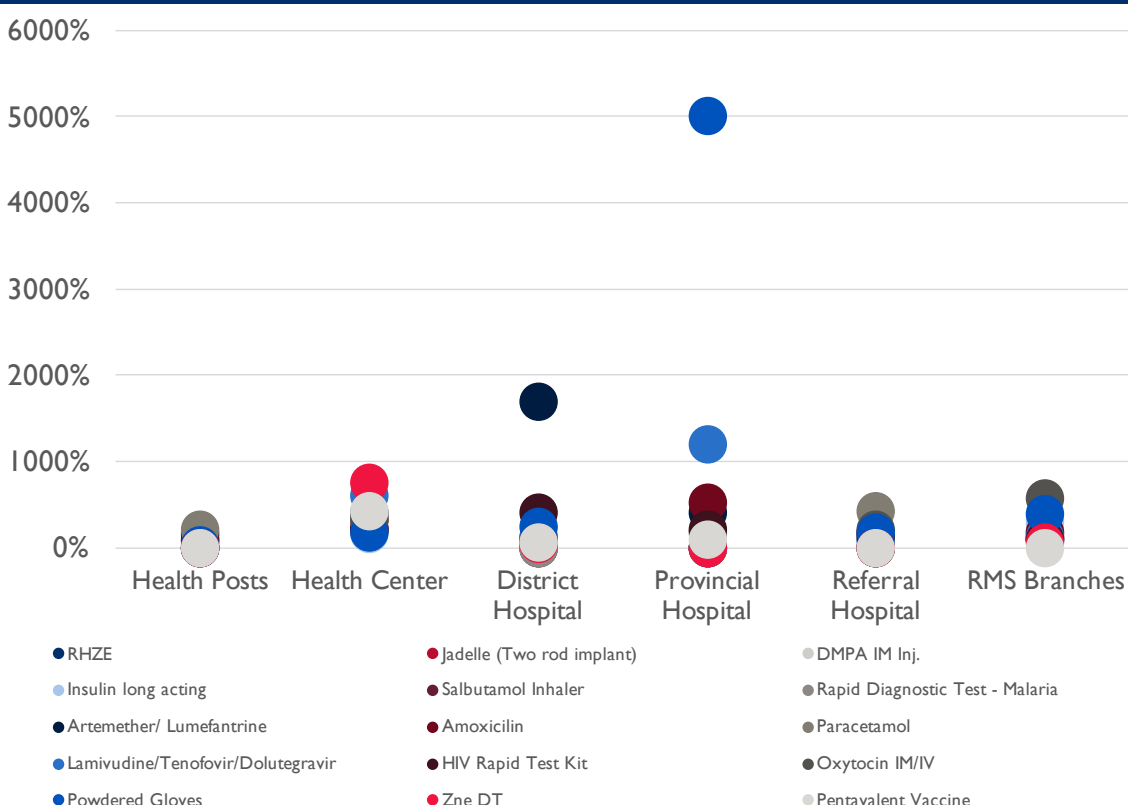
Exhibit 85. Percentage of Facilities With 100 Percent Accurate eLMIS Record, by Tracer Commodity

Exhibit 86. Average eLMIS Record Deviation From 100 Percent Accuracy, by Tracer Commodity



HR for LMIS. While the Human Resource module has its own section of the report, the authors felt it important to highlight some of the HR dynamics related to LMIS, as the system’s success or failure is largely driven by the people who input, analyze, and use the information from the system. Two of the most important considerations for supportive capabilities for the workforce are staff’s understanding of their job responsibilities and the opportunities for those staff to grow and refresh their skills as it relates to their job duties. Exhibit 89 details the prevalence of LMIS as a formal component of job descriptions and the proportion of staff receiving capacity building opportunities in LMIS across various service delivery points.

Exhibit 87. Most Frequently Cited Challenges with eLMIS

District hospitals (eLMIS)	Percent facilities	Health centers (eLMIS)	Percent facilities
Internet connectivity	81%	Internet connectivity	61%
Lack of time due to other tasks	50%	Lack of time due to other tasks	83%
Insufficient training or human resources capability	73%	Challenges in analysis of data	35%
Down time centrally (system failure)	13%	Availability of computers	26%
Challenges in analysis of data	19%	Data quality or data entry errors	26%
Data loss	16%	Insufficient training or human resources capability	57%

Exhibit 88. LMIS Prevalence in Job Descriptions and Capacity Training Opportunities

	Percentage of facilities reporting							MOH
	Health posts	Health centers	District hospitals	Provincial hospitals	Referral hospitals	RMS branches	RMS central	
n =	71	72	17	4	7	30	1	1
LMIS in formal job descriptions of at least one staff member	2%	46%	90%	100%	71%	83%	✓	✓
Capacity training on LMIS in past year	10%	73%	92%	100%	71%	77%	✓	✓

It is encouraging to see that at the referral and warehouse levels that LMIS is rather ubiquitous in job descriptions and capacity-building opportunities. This indicates strong commitment by the government to ensure that staff are aware of their LMIS responsibilities and have the skills needed to complete the work. However, the prevalence of both items in last-mile decreases sharply. Less than half of health posts and health facilities reported having LMIS as a formal component of at least one staff member's job description (see Exhibit 88). Capacity building at the health-post level on this topic was also scarce. It is further concerning that the degree of training observed in district hospitals is not yielding the anticipated gains in performance. Putting all of this into the context detailed in the eLMIS subsection, a clear picture emerges about the need to review and update the quality of the training and capacity building around eLMIS with health facilities.

Data Quality Assessments. Any well-functioning LMIS requires the regular use and review of DQAs to ensure validity of the information stored in the system. In the Rwandan health supply chain, DQAs are a normal part of supply chain operations. Only 5 percent of health posts, 60 percent of health centers, and 37 percent of RMS branches report conducting them. Looking closer, the most common type of DQAs is internal, with facility staff being the most common implementers of DQA. MOH representatives and district health officials were also reported as the most common participants in DQAs. Encouragingly, we see that 82 percent of health centers and 85 percent of district hospitals report receiving feedback on their DQAs.

However, when examining these capabilities in light of eLMIS performance, some disconnect is apparent. Exhibits 85 and 86 detail the degree of accuracy and deviance from accuracy across various tracer products. There is still plenty of room for improvement in having high-quality consumption data within the eLMIS.

Recommendations

Rwanda has a huge opportunity to leverage its robust, nationwide eLMIS system as the cornerstone of its supply chain. To do so a countrywide commitment to systems and data quality is needed. Specifically, the GOR should consider the following steps:

- Conduct a systematic review of capacity-building methods employed for eLMIS within service delivery points. Ensure a standardized approach is being used to bring all health facility staff to the same minimum level of competency.

- Ensure that all facilities nationwide have connectivity and at least one person on staff with LMIS duties as a formal part of their job responsibilities. Staff cannot be expected to work on tasks they are not responsible for. Simultaneously, ensure that infrastructure and adequate staffing are present within facilities nationwide to allow for LMIS duties to be completed in a satisfactory manner.
- Reinvigorate the processes for internal and external data quality assessments. A renewed focus on eLMIS accuracy is needed, as the intervening years between the last NSCA and this one have not yielded any substantive gains in data accuracy in the eLMIS.
- Ensure that all CMS institutions are sharing best practices and coordinating across entities to ensure consistency of expectations, policy, and practice for LMIS data in the supply chain.

Supplemental exhibits

Exhibit 91. LMIS: Distribution of Questions and Assignment of Weight Across Capability and Facility Levels								
MODULE	BASIC (50%)		INTERMEDIATE (30%)		ADVANCED (15%)		SOA (5%)	
	# of Qs	WEIGHT	# of Qs	WEIGHT	# of Qs	WEIGHT	# of Qs	WEIGHT
Health posts (71)	12	4.1%	11	2.7%	5	3%	2	2.5%
Health centers/polyclinics (72)	12	4.1%	11	2.7%	5	3%	2	2.5%
District hospitals (17)	12	4.1%	11	2.7%	5	3%	2	2.5%
Provincial hospitals (4)	11	4.5%	14	2.1%	6	2.5%	2	2.5%
Referral hospitals (7)	11	4.5%	14	2.1%	6	2.5%	2	2.5%
RMS branches (30)	20	2.5%	21	1.4%	11	1.4%	2	2.5%
RMS Central (1)	20	2.5%	21	1.4%	11	1.4%	2	2.5%
BUFMAR (1)	20	2.5%	21	1.4%	11	1.4%	2	2.5%
MEDIASOL (1)	20	2.5%	21	1.4%	11	1.4%	2	2.5%
RBC (1)	20	2.5%	21	1.4%	11	1.4%	2	2.5%
MOH (1)	43	1.2%	22	1.4%	12	1.3%	3	1.7%

Quality Assurance and Pharmacovigilance

Ensuring that the health commodities consumed by patients are safe, effective, and remain in good quality as they travel throughout the health system is a critical function of effective supply chains. This section of the NSCA seeks to make sure that a well-resourced system is in place for ensuring drug quality and that facilities at all levels understand and can act on their role in pharmacovigilance for medicines. Exhibit 92 outlines key capabilities of an effective quality assurance and pharmacovigilance strategy, including the existence of formal guidelines and SOPs, regular quality testing, and the availability of data collection tools and processes for pharmacovigilance.

Exhibit 92. Examples of Scored Quality Assurance and Pharmacovigilance Capabilities

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

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

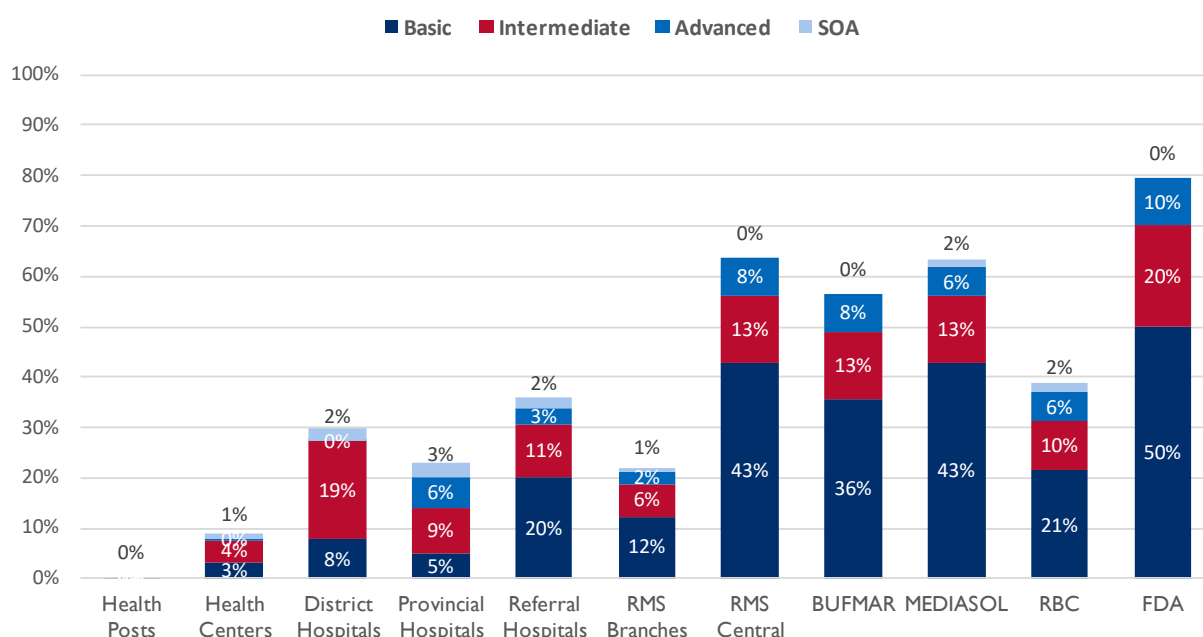
The NPSSP 2018–2024 identifies pharmacovigilance as one of its key focus areas. The PV section of the plan starts out identifying that “The NPSSP imperative for PV is focused on the implementation of existing comprehensive medicines guidelines including the establishment of the NPMIC within the Rwanda FDA.” The plan lays out three specific PV-related outputs for implementing the NPSP. Specifically, it highlights:

1. Procedures and systems are developed for PV
2. Partner support and engagement are reinforced
3. Health care professionals are sensitized to adhere to PV systems

2022 NSCA Findings and Analysis

Exhibits 93 and 94 display the capability scores, by facility type, for quality assurance and pharmacovigilance. The results show that Rwanda FDA serves as a center of excellence for pharmacovigilance in Rwanda. It has strong capability scores with all the basic elements in place and a total score of 80 percent. The GOR should be commended for putting in place such strong institutional capacity at the central level. However, outside of Kigali, capability scores for PV drop rapidly. Capabilities for pharmacovigilance at the health center and health post levels are effectively not operational. This dynamic of strong central capability and weak peripheral capability was also found to be the case during the 2017 NSCA.

Exhibit 93. Quality Assurance and Pharmacovigilance Capability Maturity Scores



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

Exhibit 94. QA and Pharmacovigilance Maturity Score and Basic Capabilities in Place

	Health posts	Health centers	District hospitals	Provincial hospitals	Referral hospitals	RMS branches	RMS Central	BUFMAR	MEDIASOL	FDA
n =	71	72	17	4	7	30	1	1	1	1
Overall maturity score (range)	1% (0–20%)	9% (0–50%)	30% (10–76%)	23% (8–38%)	36% (8–68%)	22% (0–53%)	64%	57%	63%	80%
Percent of basic items in place	0%	7%	16%	10%	40%	25%	86%	71%	86%	100%
Availability of SOPs for pharmacovigilance	0%	8%	30%	0%	43%	--	--	--	--	--
Availability of reporting forms for pharmacovigilance	3%	24%	100%	100%	100%	--	--	--	--	--
Availability of SOPs for product quality control/quality assurance	0%	13%	23%	20%	43%	17%	✓	✓	✓	✓

Rwanda FDA and Central-level Entities. The FDA is undoubtedly a point of strength for the medicine safety program in Rwanda. The entity scored an 80 percent in the module, with 100 percent of basic items in place. With such a strong score and such significant need for improvement in other parts of the system, little needs immediate attention at the central level to increase capability. Rather, the

FDA should focus on capacity building across the country. The CMS institutions also scored well on this module, with scores in the 60 percent range for all three entities. All CMS entities maintain Certificates of Analysis and Certificates of Conformance for products from international sources, though the adherence is more variable for domestically sourced products. All CMS institutions use some type of lab service for quality control testing of collected samples, although only RMS and BUFMAR use a WHO-accredited laboratory for testing. However, RMS Central reports that results can take anywhere from one to three months to return to the facility. Such a delay limits their ability to act promptly on any medicine safety issues that may arise. All CMS institutions except for MEDIASOL have a standard process in place to quarantine and/or recall products in case product quality is compromised. Generally, all the components needed for a functional PV system are in place at CMS institutions.

RMS Branches. As the last point in the distribution system before products reach service delivery points, RMS branches play a pivotal role in ensuring the quality of products that reach patients. However, these facilities are not well-equipped to fulfil this function. The RMS branches were one of the lowest-scoring facility types, after health posts and health centers. Only 13 percent (four of the 30) branches report that samples of pharmaceuticals are taken for testing. The same proportion (13 percent) of facilities reported having awareness of an SOP to be used in case product quality is compromised and the product needs to be recalled or quarantined. Maintaining Certificates of Analysis and Certificates of Conformance for tested products is also a capability that is scarcely in place. Presence and awareness of SOPs for pharmacovigilance processes generally is also scarce at this level in the health system. More focus and attention need to be given to bolster the capacity of the RMS branches to participate in the PV system for Rwanda.

Exhibit 95. Key QA and Pharmacovigilance Capabilities in Place at Service Delivery Points						
	Health posts	Health centers	District hospitals	Provincial hospitals	Referral hospitals	RMS branches
n =	71	72	17	4	7	30
Facilities reporting samples of products taken for testing	0%	4%	0%	0%	14%	13%
Facilities reporting SOPs for quarantine/recall of suspected products	0%	0%	0%	0%	14%	10%
Facilities reporting presence of action protocols based on PV results	0%	17%	49%	75%	29%	--
Facilities reporting sharing collected PV data with central-level authorities	3%	19%	83%	75%	71%	--

Service Delivery Points. Generally, service delivery points do not have the necessary foundational elements of a pharmacovigilance system in place. Scores across all five SDP types assessed did not exceed 36 percent, with most scoring falling lower than that. Looking at policies and procedures, the existence and awareness of SOPs for PV are rarely verified at health facilities. Health posts and health centers reported having them 0 percent and 8 percent of the time, respectively, although this does increase to 43 percent (three out of seven sampled) at the referral hospital level. SOPs for QA/QC are largely available to the same extent. Collection of pharmaceutical products for testing is not commonplace. Although reporting forms were scarcely available at the health post and health center levels, 83 percent of district hospitals reported having the forms available.

Examining response practices to the discovery of an adverse drug reaction (ADR), hospitals in Rwanda are better prepared. Over 70 percent of all hospital types shared ADR collected with central-level authorities, although the range of responses is wider for awareness and use of action protocols based on PV results. However, at the health post and health center levels, these practices are not commonplace. More attention needs to be given to all service delivery points to ensure they have the tools, resources, and training to actively participate in Rwanda's pharmacovigilance system.

Recommendations

- Ensure the widespread availability of SOPs, reporting tools, and staff prepared to complete these reports, without which the pharmacovigilance system cannot function. The MOH should print and distribute all necessary pharmacovigilance tools to facilities across the country, particularly to last-mile facilities.
- Pair distribution of materials with a cascading training program to ensure that staff understand when and how to respond to ADRs and other PV-related events.
- Strengthen QA and PV practices at the RMS branches. This level of the supply chain can serve as a strong linkage between FDA's central-level leadership and the nascent PV system at the service delivery level.

Supplemental Exhibit

Exhibit 96. QPV: Distribution of Questions and Assignment of Weight Across Capability and Facility Levels								
MODULE	BASIC (50%)		INTERMEDIATE (30%)		ADVANCED (15%)		SOA (5%)	
	# of Qs	WEIGHT	# of Qs	WEIGHT	# of Qs	WEIGHT	# of Qs	WEIGHT
Health posts (n=71)	4	12.5%	3	10.0%	4	3.8%	1	5.0%
Health centers (72)	4	12.5%	3	10.0%	4	3.8%	1	5.0%
District hospitals (17)	4	12.5%	3	10.0%	4	3.8%	1	5.0%
Provincial hospitals (4)	5	10.0%	8	3.8%	4	3.8%	1	5.0%
Referral hospitals (7)	5	10.0%	8	3.8%	4	3.8%	1	5.0%
RMS branches (10)	7	7.1%	9	3.3%	8	1.9%	3	1.7%
RMS Central (1)	7	7.1%	9	3.3%	8	1.9%	3	1.7%
MEDIASOL (1)	7	7.1%	9	3.3%	8	1.9%	3	1.7%
BUFMAR (1)	7	7.1%	9	3.3%	8	1.9%	3	1.7%
RBC (1)	7	7.1%	9	3.3%	8	1.9%	3	1.7%
FDA (1)	11	4.5%	15	2.0%	14	1.1%	3	1.7%

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

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

Waste Management

Medical waste management is a core operation of effective public health supply chains, ensuring that used, unsafe, or unusable pharmaceutical products are efficiently removed from the supply chain and properly disposed. Major areas that were factored into scoring of capabilities and performance of waste management included the existence of an approved national waste management plan, existence of SOPs and guidelines for waste management in all facilities, active monitoring of waste management and removal, and complete records of waste management events (see Exhibit 97).

Exhibit 97. Examples of Scored Waste Management Capabilities

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

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

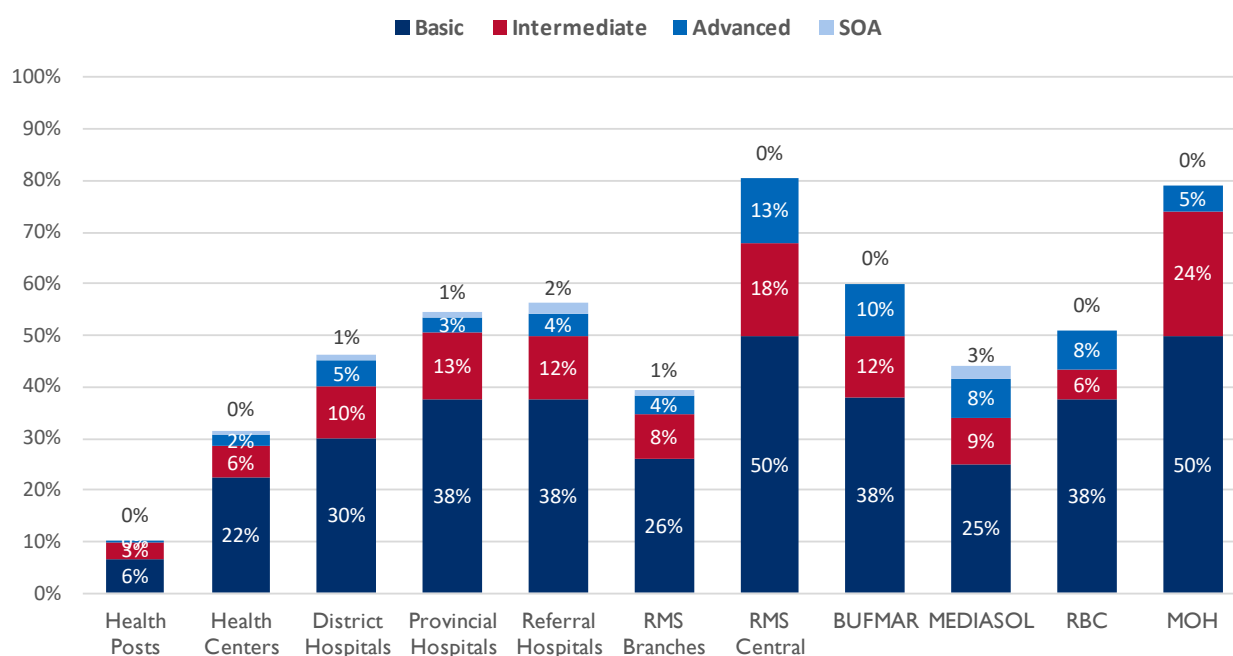
The NPSSP (2018–2024) does not make many mentions of waste management as a priority. However, it does list “waste management practices and resources at the [health center] level” under the heading of “Gaps and Opportunities: Capability Maturity in Certain System Areas Still Merits Attention.”

The 2017 NSCA in Rwanda revealed that capabilities “except for the referral hospitals. . . is relatively low. This low capability is mainly as a result of lack of awareness of SOPs in facilities, and a lack of internal audit of waste management to ensure that waste is promptly and safely removed from stores and disposed of appropriately.”

2022 NSCA Findings and Analysis

Exhibits 98 and 99 detail the findings for the waste management module during the 2022 NSCA. Both RMS Central and the MOH score around the 80 percent benchmark, indicating that these facilities have all of the necessary capabilities in place at their level. The MOH has all of the correct policies and oversight structures in place such as approved national waste management guidelines (with all the expected waste components covered), a regulatory authority for enforcing the guidelines, and approved SOPs for managing waste within facilities. RMS Central is by far the most advanced among the four central-level CMS institutions for waste management capabilities. MEDIASOL scored the lowest of all CMS institutions due to the lack of approved SOPs for waste management, no regular plan for updating those SOPs, and the lack of any software to track waste management activities.

Exhibit 98. Waste Management Capability Maturity Model Scores



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

Health Posts and Health Centers. Waste management practices and capabilities largely remain the same at the last-mile facilities from the 2017 NSCA findings. Exhibit 99 details the prevalence of SOPs and adherence to waste management practices at this level. Waste disposal events are rarely documented or authorized by a higher-level authority. These disposals are rarely reported to higher-level authorities as well. Facility staff at these facilities appear to lack understanding of expectations and appropriate practices. While most facilities at this level report onsite incineration or transport to a higher-level government facility, a concerning percentage (37 percent) of health posts reported not conducting waste disposal of any kind, implying that either waste is stored onsite or discarded haphazardly. The MOH should provide guidance and training to these facilities to ensure they are aware of proper waste management procedures and expectations.

Provincial and Referral Hospitals. Receiving capability scores over 50 percent, these two facility types demonstrated the strongest waste management capabilities of any facility type assessed during the NSCA. Within these facilities, presence of approved SOPs for waste management, documentation of waste disposal events, and separation of unusable pharmaceutical products are almost ubiquitous, with all items described happening with a 75 percent or greater frequency. However, these facilities seem to much less frequently report waste disposal events to a higher-level authority. On-site incineration of waste followed by landfill ash disposal is the most practiced waste disposal method found during the NSCA. How these facilities track waste disposal events varies widely, citing LMIS, MS Excel, or no method as all common reported practices. Standardizing how to log and track these events could prove helpful to these hospitals.

Exhibit 99. Waste Management Maturity Scores and Select Capabilities and Performance Indicators

	Percent of facilities reporting:										
	Health posts	Health centers	District hospitals	Provincial hospitals	Referral hospitals	RMS branches	RMS central	BUFMAR	MEDIASOL	RBC	MOH
n =	71	72	17	4	7	30	1	1	1	1	1
Overall maturity score (range)	10% (0–37%)	31% (0–61%)	46% (16–88%)	55% (29–73%)	56% (24–86%)	40% (3–63%)	81%	60%	44%	51%	79%
Percent of basic items in place (range)	13% (0–50%)	45% (0–75%)	59% (25–100%)	75% (25–100%)	75% (25–100%)	53% (0–100%)	100%	75%	50%	75%	100%
Percentage of facilities demonstrating presence of SOPs for waste management and disposal at site	0%	52%	73%	80%	86%	40%	✓	✓	0%	✓	✓
Percentage of facilities reporting that waste disposal events are authorized and documented	6%	30%	57%	80%	71%	37%	✓	✓	✓	✓	--
Percentage of facilities demonstrating that unusable pharmaceutical products are stored separately	16%	71%	69%	80%	86%	87%	100%	100%	100%	100%	--
Percentage of facilities reporting disposal supervised or certified by a regulatory authority	0%	10%	37%	40%	29%	17%	100%	100%	100%	100%	--

Recommendations

The findings on the current state of pharmaceutical waste management in the Rwandan supply chain system point to opportunities to expand and deepen capabilities in this key technical area.

Recommendations include:

- Ensure that policies and procedures for waste management, which have largely been elaborated and codified, are fully disseminated to all facilities across the country.
- Reinforce the distribution of these policies and practices with training and oversight. Facility staff will need supportive supervision to ensure that they are conducting waste management activities correctly.
- Standardize the process for documenting and communicating waste disposal events to central-level authorities for all facilities and ensure facilities understand how to adhere to them.

Supplemental Exhibit

Exhibit 100. Waste Management, Distribution of Questions, and Assignment of Weight Capability and Facility Levels								
	BASIC (50%)		INTERMED. (30%)		ADVANCED (15%)		SOA (5%)	
MODULE	# of Qs	WEIGHT	# of Qs	WEIGHT	# of Qs	WEIGHT	# of Qs	WEIGHT
Health posts (n=71)	4	12.5%	7	4.3%	5	3.0%	1	5.0%
Health centers (72)	4	12.5%	7	4.3%	5	3.0%	1	5.0%

District hospitals (17)	4	12.5%	7	4.3%	5	3.0%	1	5.0%
Provincial hospitals (4)	4	12.5%	10	3.0%	6	2.5%	2	2.5%
Referral hospitals (7)	4	12.5%	10	3.0%	6	2.5%	2	2.5%
RMS branches (30)	4	12.5%	10	3.0%	6	2.5%	2	2.5%
RMS Central (1)	4	12.5%	10	3.0%	6	2.5%	2	2.5%
BUFMAR (1)	4	12.5%	10	3.0%	6	2.5%	2	2.5%
MEDIASOL (1)	4	12.5%	10	3.0%	6	2.5%	2	2.5%
RBC (1)	4	12.5%	10	3.0%	6	2.5%	2	2.5%
MOH (1)	10	5.0%	5	6.0%	3	5.0%	2	2.5%

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

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

Cross-cutting Analysis

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

- **Multiplicity of CMS institutions:** When examining the Rwandan supply chain, one would be remiss to not comment on the number of different institutions serving some kind of CMS function. While the allocation of commodity types to facilities is strategic and beneficial, recurring evidence across multiple functional areas indicates that institutions are not coordinating and collaborating enough to ensure a uniformity of approach, rigor, and capability. The GOR should consider a mechanism or manner for having a more integrated approach in overall supply chain operation.
- **High geographic variability:** Unfortunately, this seems to be a recurrent theme across the three implementations of the NSCA in Rwanda. Evidenced by the non-uniformity of policy implementation and the wide range of CMM scores in practically every module assessed at the sub-national level, significant variances are found across the country. The GOR needs to recommit to understanding and earnestly addressing these differences through training and support.
- **Nascent capability at RMS branches:** As part of the entity that oversees the warehousing and distribution activities for the entire country, RMS branches hold a potentially transformational role in the supply chain. However, they largely are scoring the lowest capability score for each module assessed. With strong capability present at RMS Central, the need is clear and pressing to better equip and support these critical important facilities in the supply chain.
- **Last-mile waste management and pharmacovigilance:** Waste management and pharmacovigilance capability scores are consistently low across all last-mile facilities. These last-mile entities, health posts, and health centers did not score higher than 30 percent in the capability maturity module for either technical area, with most scores much lower than that. That means that few if any of even the most basic capabilities are in place for these facilities nationwide. As this is the first point of contact that most Rwandans have with the health system, it is a significant gap that should be addressed imminently. The opportunity is compelling to implement foundational activities in both these technical areas in the next set of reform activities.

Exhibit 101. Ministry of Health, CMM Scores for All Relevant Technical Areas

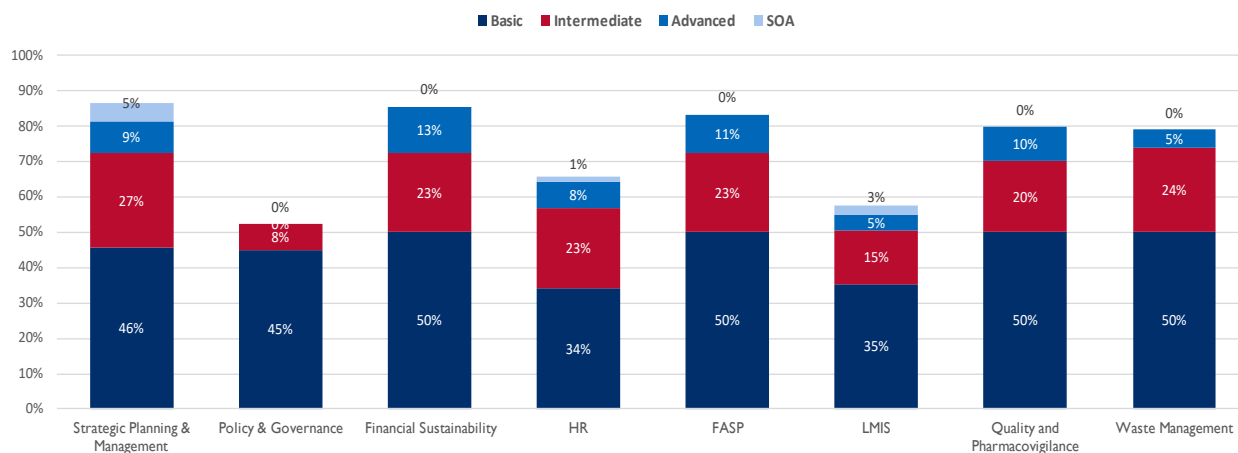


Exhibit 102. MEDIASOL, CMM Scores for All Relevant Technical Areas

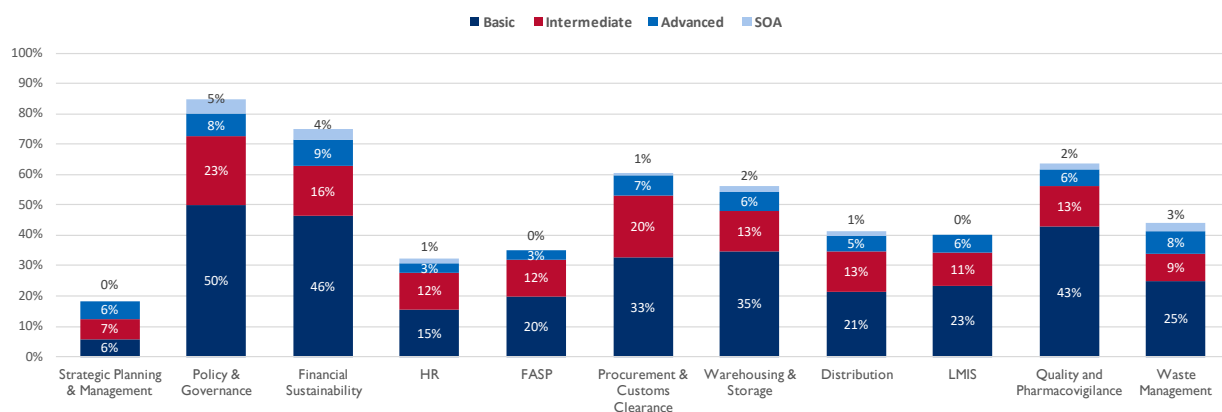


Exhibit I03. BUFMAR, CMM Scores for All Relevant Technical Areas

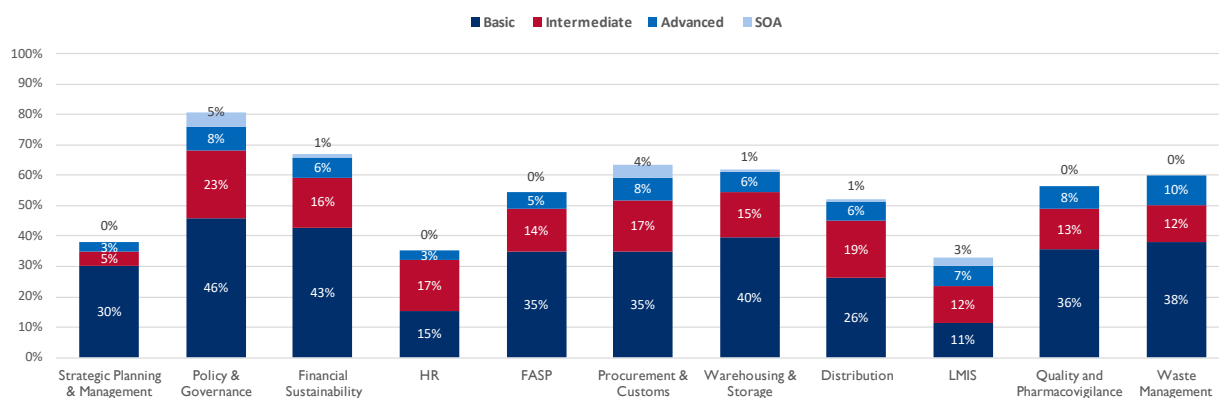


Exhibit I04. RBC (Central Vaccine Warehouse) , CMM Scores for All Relevant Technical Areas

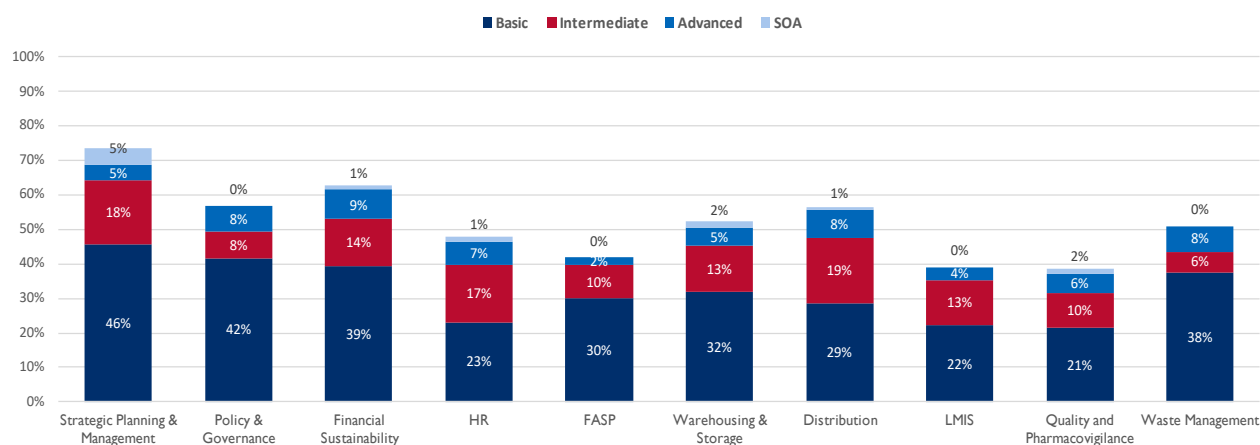


Exhibit I05. RMS Central, CMM Scores for All Relevant Technical Areas

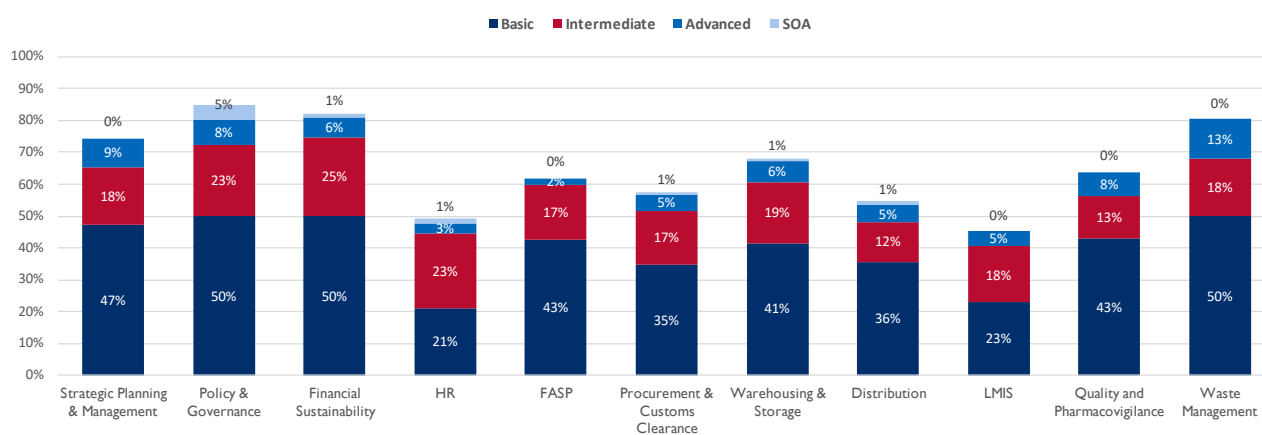


Exhibit 106. RMS Branches, CMM Scores for All Relevant Technical Areas

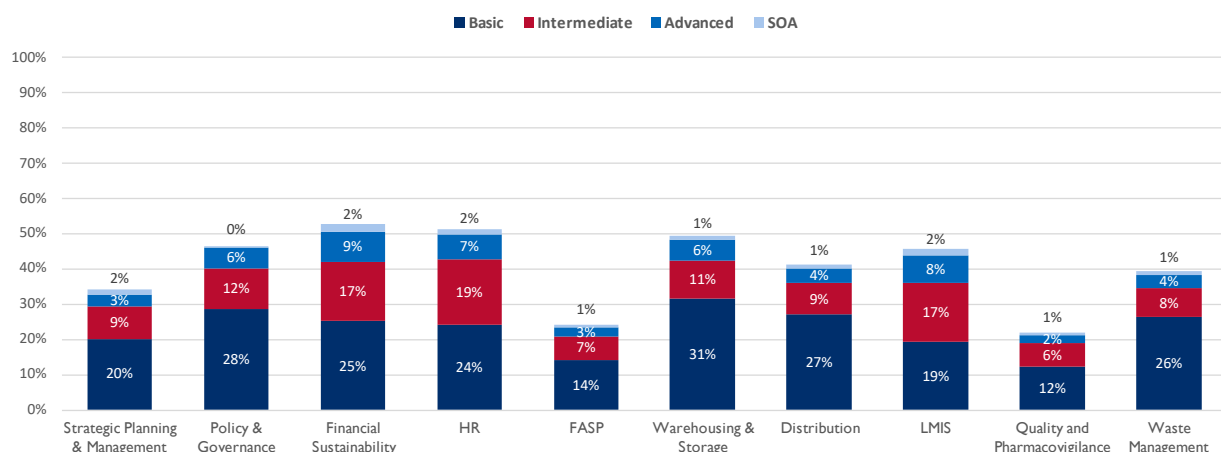


Exhibit 107. Provincial Hospitals, CMM Scores for All Relevant Technical Areas

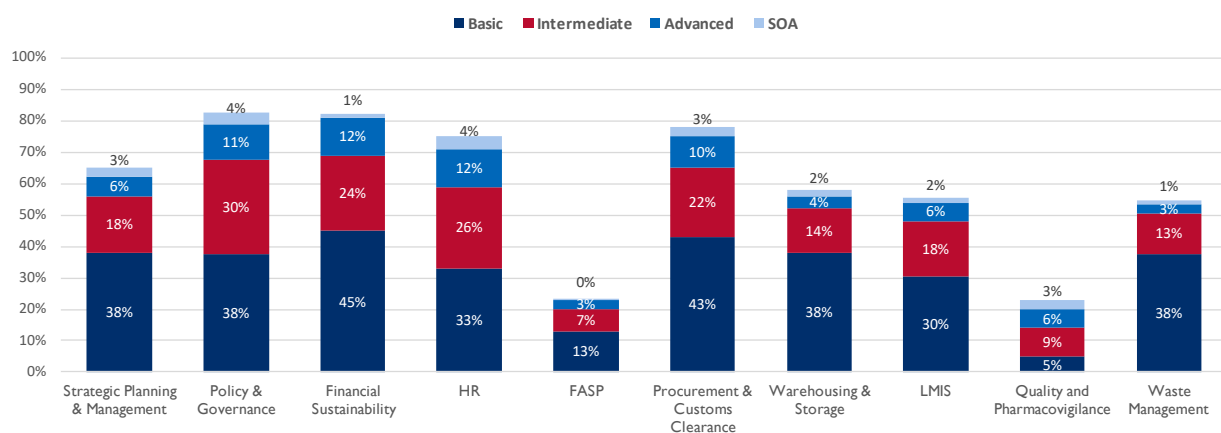


Exhibit 108. Referral Hospitals, CMM Scores for All Relevant Technical Areas

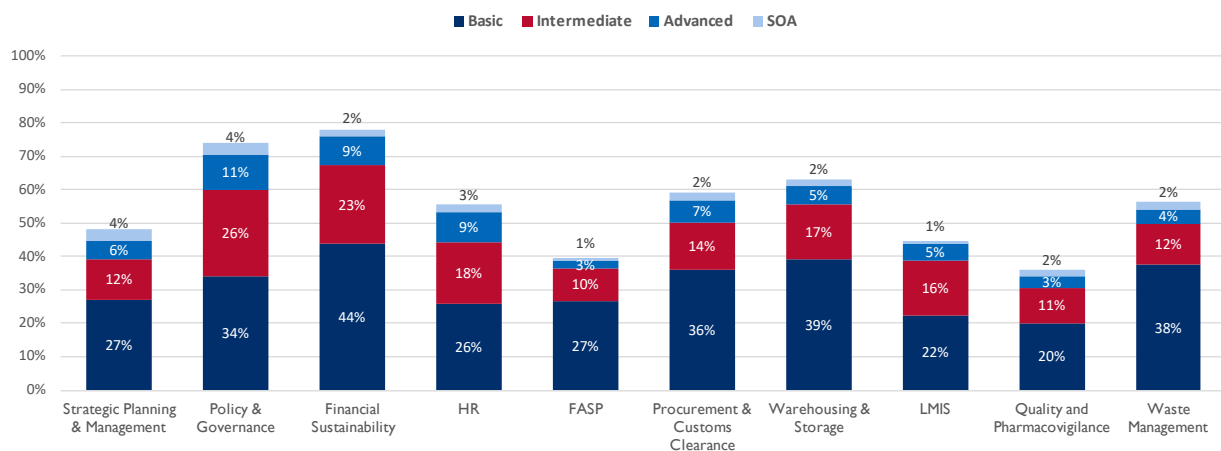


Exhibit 109. District Hospitals, CMM Scores for All Relevant Technical Areas

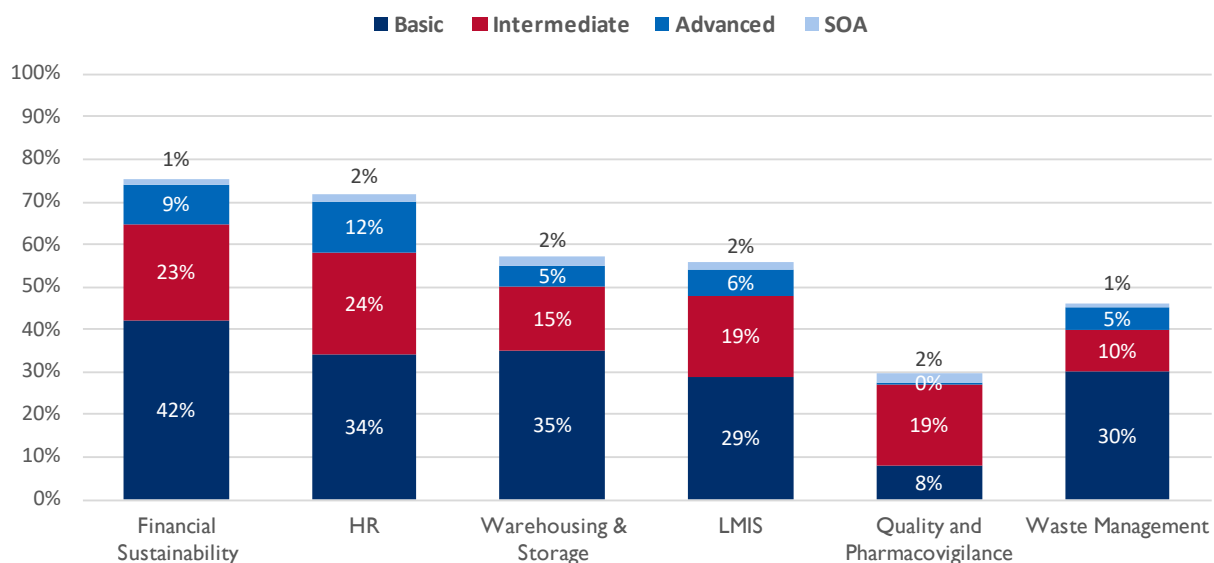


Exhibit 110. Health Centers, CMM Scores for All Relevant Technical Areas****

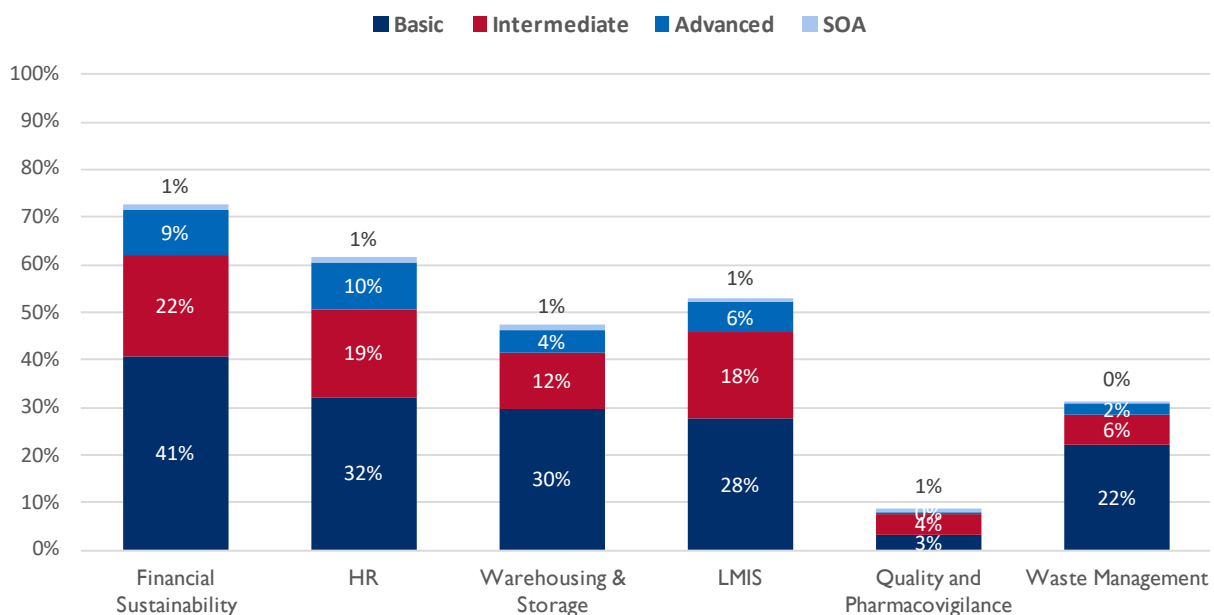
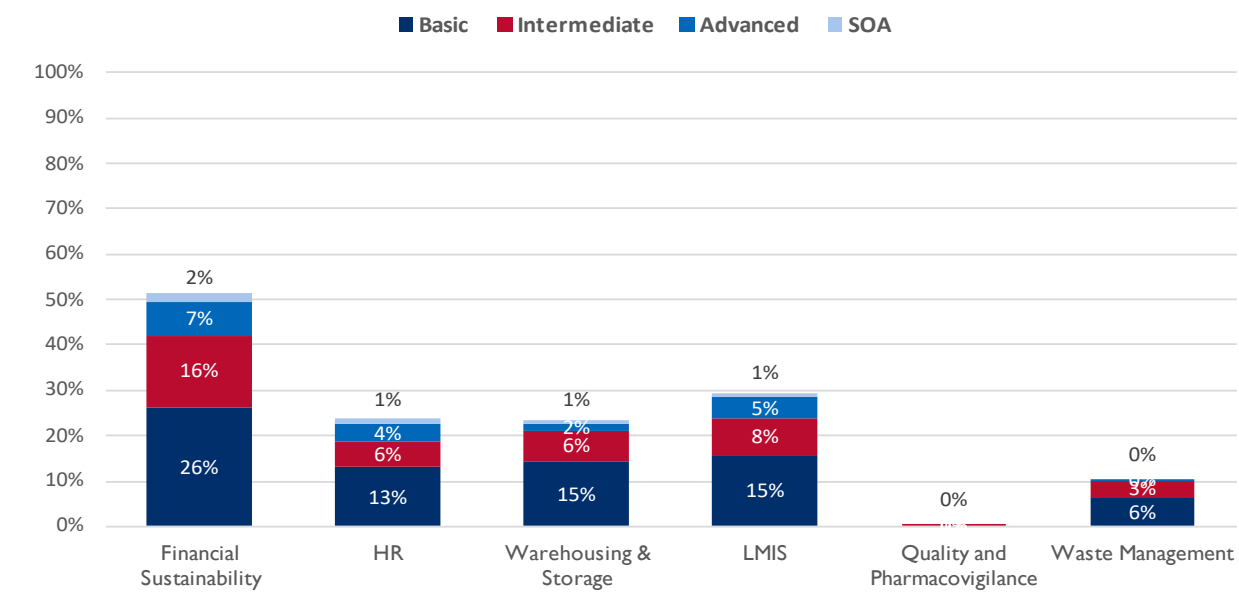


Exhibit III. Health Posts, CMM Scores for All Relevant Technical Areas***



Consolidated Recommendations

NSCA methodology produces targeted, actionable recommendations across the entire supply chain. To facilitate coordinated planning and action, select recommendations from across the report are consolidated here, by technical area. To help facilitate prioritization, the authors of this report have created a classification system for report recommendations. Actions to improve the supply chain can be prioritized in three ways:

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

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

To ensure that workstreams remain on track for implementing the NPSSP, the GOR should consider prioritizing the following recommendations:

Strategic Management and Planning

- Establish a process for creating, implementing, and harmonizing strategic plans across central-level entities of RMS, BUFMAR, MEDIASOL, and RBC. [Low-cost/high-yield]
- Ensure that these strategic plans are fully funded and formally monitored and overseen so that efforts are not duplicated and awareness is shared across institutions. [Prevailing priority]
- Include the formal assessment of supply chain risk as the multiplicity of central-level actors can create blind spots in perceived allocation of responsibility. [Prevailing priority]
- Ensure that RMS Central coordinates with the RMS branches more closely on strategic planning. As the branches take direction from RMS Central on all things SPM, the head office needs to ensure they are aware of how they fit into the RMS five-year strategic plan. [Low-cost/high-yield]

Policy and Governance

- Ensure that the protocols and procedures in place are adhered to in every entity, regardless of their geographical location, that STGs and protocols are updated, staff are trained in their use, and mechanisms are in place to monitor adherence. [Prevailing priority]

- Update STGs annually or bi-annually instead of every four years to support the above recommendation. [Low-cost/high-yield]
- Address the fact that RMS branches continue to score poorly on high-level functions. If they are not responsible for carrying out this function themselves, then RMS HQ needs to do a more consistent job at helping them understand the policies, their roles within them, and expectations for their performance. [Prevailing priority]

Human Resources

- Incorporate supply chain functions into formal job descriptions at all levels but especially at health posts and health centers, ensuring that responsibilities for all basic supply chain functions are designated to at least one site personnel. Simultaneously, ensure appropriate funding, capacity training, and performance measurement (within existing supportive supervision processes) are allocated to empower designated personnel to assume and execute supply chain roles. [Prevailing priority]
- Leverage the extensive extant supportive supervision to review and discuss revised supply chain job description roles and responsibilities, ensuring staff are aware of the supply chain functions they are responsible for, evaluate them on their performance, and support them with training and monitoring feedback. [Prevailing priority]
- Revisit staffing norms and capacity building budgets for last-mile facilities. Workload and finances continue to be barriers to further strengthening supply chain capabilities at the last mile. [Low-cost/high-yield]

Financial Sustainability

- Address funding shortages that are causing issues with adequate supply in the system. [Prevailing priority]
- Ensure that facilities across the supply chain and in all geographical locations receive guidance and support to implement basic financial management best practices universally. [Prevailing priority]
- Ensure that supply chain costs are explicitly included in all budgets, to ensure adequate consideration and funding and facilitate financial tracking and monitoring of these activities. [Low-cost/high-yield]

Forecasting and Supply Planning

- Ensure updated FASP SOPs are widely disseminated, training is given to all involved staff, and mechanisms are put in place to monitor the quality and timeliness of data gathered. [Prevailing priority]
- Ensure clarity of roles and expectations. If FASP activities are more centralized than responses would suggest (and MOH guidance dictates), then there is a gulf between *expectation* and *reality* for forecasting and supply planning in the supply chain. [Prevailing priority]
- Regularly monitor forecast accuracy by a committee with authority to introduce changes so that assumptions can be refined. [Low-cost/high-yield]

Procurement and Customs Clearance

- Establish a procurement ethics or anticorruption mechanism [Prevailing priority]
- Set criteria and processes for evaluating vendor performance [Prevailing priority]
- Initiate a process for determining whether commodity imports may qualify for customs duties and/or tax exemption [Low-cost/high-yield]

Warehousing and Storage

- Invest in capabilities at last-mile facilities, especially at the health posts. A majority of Rwandans access their health services at this level, especially in rural areas. These facilities need to be properly equipped to ensure quality medicines are available when needed. [Prevailing priority]
- Investigate why RMS branches continue to have such low rates of stocked according to plan. The supply chain continues to operate in a low supply environment making it particularly susceptible to any minor supply disruptions upstream. [Time-order priority]
- Continue to provide capacity building around inventory management for last-mile facilities. Strong quality logistics data start at the stock card and many facilities continue to have inaccurate records. [Prevailing priority]

Distribution

- Codify the practices and procedures of all RMS entities into formal policies for transportation and distribution. Use this opportunity to review operational practices across the board to ensure consistency and appropriateness. [Low-cost/high-yield]
- Institute formal tracking of transportation- and distribution-related KPIs and establish a formal structure to monitor these KPIs. Empower managers to use this information to further drive distribution efficiency and effectiveness. [Low-cost/high-yield]
- Work with facilities more closely to understand why there is such a high frequency of unplanned orders in the system. More effective communication during order processing can help reduce the need for unplanned orders. [Prevailing priority]

Logistics Management Information System

- Conduct a systematic review of capacity-building methods employed for eLMIS within service delivery points. Ensure a standardized approach is being used to bring all health facility staff to the same minimum level of competency. [Prevailing priority]
- Ensure that all facilities nationwide have connectivity and at least one person on staff with LMIS duties as a formal part of their job responsibilities. Staff cannot be expected to work on tasks they are not responsible for. Simultaneously, ensure that infrastructure and adequate staffing are present within facilities nationwide to allow for satisfactory completion of LMIS duties. [Time-order priority]
- Reinvigorate the processes for internal and external data quality assessments. A renewed focus on eLMIS accuracy is needed, as the intervening years between the last NSCA and this one have not yielded any substantive gains in data accuracy in the eLMIS. [Prevailing priority]

- Ensure that all CMS institutions are sharing best practices and coordinating across entities to ensure consistency of expectations, policy, and practice for LMIS data in the supply chain. [Low-cost/high-yield]

Quality and Pharmacovigilance

- Ensure the widespread availability of SOPs, reporting tools, and staff prepared to complete these reports, without which the pharmacovigilance system cannot function. The MOH should print and distribute all necessary pharmacovigilance tools to facilities across the country, particularly to last-mile facilities. [Prevailing priority]
- Pair distribution of materials with a cascading training program to ensure that staff understand when and how to respond to ADRs and other PV-related events. [Prevailing priority]
- Strengthen QA and PV practices at the RMS branches. This level of the supply chain can serve as a strong linkage between FDA's central-level leadership and the nascent PV system at the service delivery level. [Prevailing priority]

Waste Management

- Ensure that policies and procedures for waste management, which have largely been elaborated and codified, are fully disseminated to all facilities across the country. [Prevailing priority]
- Reinforce the distribution of these policies and practices with training and oversight. Facility staff will need supportive supervision to ensure that they are conducting waste management activities correctly. [Prevailing priority]
- Standardize the process for documenting and communicating waste disposal events to central-level authorities for all facilities and ensure facilities understand how to adhere to them. [Prevailing priority]

Conclusions

The NPSSP (2018–2014) outlined key priorities for the MOH to address in the Rwandan supply chain, identified the underlying challenges that shaped those priorities, and delineated specific actions to address those priorities. This 2022 NSCA indicates that significant progress has been made toward achieving those goals. Still, significant room for improvement remains.

Overall, the NSCA documented the presence of existing capabilities and levels of performance across all technical areas covered and at all levels of the supply chain. The mixture of strengths and weaknesses points to a set of priorities for the GOR to review as it enters the final two years of the NPSSP. Numerous areas where challenges or priorities were delineated in the plan have largely not changed from when the plan was elaborated. Encouragingly, strong progress has been made in other areas.

An overarching question and a priority for implementing this assessment are understanding how the establishment of RMS has impacted the supply chain overall. Broadly speaking, the transition of the procurement, warehousing, and distribution to RMS has resulted into a continually operating supply chain that experiences limited stockouts. In some of its key areas of responsibility, RMS has demonstrated some of the strongest capabilities seen in Rwanda, notably in waste management and pharmacovigilance. However, the entity and its branch locations have scored notably low in some of its core functional areas such as procurement and warehousing. RMS also has a significant challenge in overcoming the perennial low-stock situation throughout its supply chain (see below). This report has outlined in several sections how RMS specifically could strengthen its own systems to help realize benefits for the supply chain overall. This is particularly important to address as the authors of this report understand that the entity will have expanded procurement responsibilities for the country's supply chain through the USAID-funded TRMS procurement agreement. With the implementation of key reforms identified in this report, RMS will be well-positioned to sustain the Rwanda supply chain for many years to come.

In addition to the issues raised specifically about RMS, the analysis has highlighted findings for consideration as the MOH prepares to implement the final two years of its strategic supply chain plan. Some takeaways regarding the current state of the supply chain that should be broadly considered during strategic planning:

Low-stock environment. The warehousing and distribution system that is being run by RMS and its branch locations continues to operate at stock levels outside of its minimum and maximum inventory levels. The stocked according to plan rates across six months of data collected and 15 tracer commodities revealed that the majority of RMS branches operate consistently understocked. This is further evidenced by the 48 percent fill rate for last-mile distribution and the near 50 percent unplanned ordering rate at the district hospital level. As the primary entity responsible for ensuring products are available at last-mile facilities, RMS needs to take a careful look at its supply planning to ensure that adequate quantities of commodities are being scheduled to meet the need. Operating on such low levels of stock puts the supply chain at particular risk for disruption in the event of unforeseen circumstances.

eLMIS data quality. As a cornerstone of the Rwandan supply chain, the eLMIS that has been rolled out to the service delivery level stands on the precipice of catalyzing significant improvement for the health system. However, all of the potential of those unrealized gains rests on improving the quality of the data in the system. This NSCA has documented that the data quality challenges plaguing the eLMIS in

its early days of implementation continue to persist. Facilities are not updating their information in a timely manner and the information that is being imputed is often incorrect. This dynamic continues to persist despite many facilities reporting the presence of data quality assessments as commonplace. Data quality issues in the system are undoubtedly related to the stock problems and the reliance on emergency orders to keep continuous supply available at the service delivery level. As information is one of the foundational inputs into a functioning supply chain, the Rwandan health supply chain cannot advance forward until data quality in the system is truly addressed. However, data quality may be a symptom of other challenges in the supply chain. Considering that SDPs cited Internet connectivity and human resource constraints as the biggest challenges to using eLMIS, there is clearly a need to address both of these issues to improve eLMIS performance.

Persistent geographic variability. A persistent theme that has been highlighted in previous NSCA implementations in Rwanda, is the high degree of variability between urban and rural locations in regard to health system capabilities. While this NSCA did not disaggregate its findings by any administrative boundaries (as this would make implementation prohibitively expensive), it's clear from the numerical ranges documented within the CMM scores for each facility type that a very wide range of capability exists within the health system. Ranges were found to be particularly wide at the health post, health center, and RMS branch levels. Also, there is clear evidence of non-uniform implementation of policies or SOPs that central-level actors considered to be well-established or nationally implemented. The NSCA generates its analytical findings from the combination of various individual questions to gather insights and confirm or rule out inconsistencies across the supply chain. The authors of this report notice that there is a gulf between the presence of capabilities and the concordant use or implementation of that capability. This reinforces the need to ensure that capabilities are more uniformly present as facilities while recognizing that uniformity in training approach may not be appropriate, as some facilities are likely to need greater support and more focus to catch up to their better-equipped counterparts. Achieving equity in access to health care will require the deployment of resources non-uniformly to address those deficiencies.

The authors of this report are confident that with empowered leadership, strategic targeting of supply chain weaknesses, and a commitment to equity within the health system, Rwanda can implement appropriate reforms to further strengthen the supply chain to help realize Rwanda's vision of universal access to high-quality health care.