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ANDREW SSEMUGENYI FOR AXIOS INTERNATIONAL, INC.

USAID GLOBAL HEALTH SUPPLY CHAIN PROGRAM

TECHNICAL ASSISTANCE

NATIONAL SUPPLY CHAIN ASSESSMENT REPORT

RWANDA

November 2017

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CDC
U.S. President's Malaria Initiative

PEPFAR
U.S. President's Emergency Plan for AIDS Relief

Acknowledgement
This assessment was conducted by the Ministry of Health (MOH) in collaboration with technical assistance from Axios International Inc. The Ministry of Health extends its appreciation to the United States Agency for International Development (USAID) Washington team for their support in funding this activity and the USAID Global Health Supply Chain Program - Procurement and Supply Management (GHSC-PSM) team for the collaboration through the entire process. Furthermore, thank you to the Permanent Secretary, MOH Rwanda, for guidance on this assessment. Special thanks to Joseph Kabatende, Head of the Logistics Management Office (LMO) of the MOH for his tremendous assistance during the assessment, and to the many MOH personnel who participated in the assessment as data collectors, respondents, or in other roles. Lastly, thank you also to all the data collectors for their hard work, and to the respondents for their insights.

Brief Description
USAID support for this assessment was provided through the Global Health Supply Chain Technical Assistance program, which serves the health commodity technical assistance needs of partner country governments, USAID, other United States Government agencies, non-governmental organizations, and other entities across all health elements (e.g. malaria, and family planning, HIV/AIDS, tuberculosis, and maternal and child health) to meet the evolving challenges in ensuring long-term availability of health commodities in public and private services worldwide. Through this program, USAID awarded Axios International Inc. (Axios) a task order in 2016 to provide services specific to USAID's National Supply Chain Assessment tools (NSCA). At the request of the Ministry of Health, Rwanda, USAID committed to supporting a comprehensive assessment of Rwanda's national supply chain system utilizing the recently updated NSCA tool kit (NSCA 2.0). USAID designated Axios to conduct the assessment as part of the above-mentioned task order. This report presents the methodology and outcome of that assessment, which was carried out in Rwanda in April and May of 2017.

About Axios
Axios is a global healthcare organization with over 20 years of experience in the delivery of sustainable and innovative access to care solutions in low and middle-income countries. Axios provides a broad range of services in the global health sector to help modernize and strengthen health systems and quality of care. For more information, visit: www.axiosint.com

Recommended Citation
Axios International, Inc. (2017). Rwanda National Supply Chain Assessment Report: Capability and Performance. Submitted to the United States Agency for International Development by Axios International, Inc., under USAID Contract Number: AID-OAA-I-15-00029 / AID-OAA-TO-16-0013 - USAID Global Health Supply Chain Program Technical Assistance.

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This report was contracted under USAID Contract Number: AID-OAA-I-15-00029 / AID-OAA-TO-16-0013 - USAID Global Health Supply Chain Program Technical Assistance

ACRONYMS AND ABBREVIATIONS

Axios	Axios International, Inc.
CMM	Capability Maturity Model
DH	District Hospitals
DP	District Pharmacy
eLMIS	Electronic Logistics Management Information System
FEFO	First Expiry First Out
GHSC-PSM	USAID Global Health Supply Chain Program - Procurement and Supply Management
HC	Health Center
HIV	Human immunodeficiency virus
HR	Human Resources
KPI	Key Performance Indicator
LMIS	Logistics Management Information System
LMO	Logistics Management Office
M&E	Monitoring & Evaluation
MOH	Ministry of Health
MPPD	Medicine and Procurement Planning Division
NSCA	National Supply Chain Assessment
PBF	Performance Based Financing
PHPO	Public Health Program Office
PSM	Procurement and Supply Management (see GHSC-PSM above)
RH	Referral Hospitals
SCM	Supply Chain Management
SDP	Service Delivery Points
SOP	Standard Operating Procedure
SOW	Scope of work
TB	Tuberculosis
USAID	United States Agency for International Development

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EXECUTIVE SUMMARY

The National Supply Chain Assessment (NSCA) was conducted in Rwanda during April and May 2017 at the request of the Ministry of Health (MoH), Rwanda (MOH) by Axios International, on behalf of the United States Agency for International Development (USAID), with the strong support of MOH staff throughout the system to conduct surveys and gather data. The capability maturity of 11 functional modules of the supply chain and 14 key performance indicators (KPIs) were assessed at all relevant levels using NSCA 2.0 tools.

The NCSA 2.0 utilized in Rwanda comprised of three components: mapping the supply chain, assessment of the capability maturity of 11 functional modules of the supply chain (see Table 1), and 14 key performance indicators (KPIs), at all relevant levels of the public supply chain in Rwanda. Results of the capability maturity and KPIs are shown in the report against the functional modules and at health facility levels throughout the supply chain system.

TABLE 1.
NSCA 2.0 FUNCTIONAL MODULES

- Forecasting & Supply Management
- Procurement
- Pharmacy & Stores Management
- Distribution
- Policy & Governance
- Strategic Planning & Management
- Quality & Pharmacovigilance
- Logistics Management Information Systems
- Human Resources
- Financial Sustainability
- Waste Management

The MOH and development partners have invested significantly – and successfully – in policy, governance, strategic planning, Human Resources (HR), a new electronic Logistics Management System (eLMIS), Procurement, and Forecasting at the central level. This is reflected in the relatively high Capability Maturity scores reported for these functions in this assessment. These capability maturity scores support a broadly satisfactory level of operational performance in relevant key performance indicators.

In a key measure impacting patients, stock outs are at a relatively low level, and are usually corrected within a matter of days. This is a tribute to both the staff and the systems and processes in place, which emphasize the goal of providing a reliable service to patients and other users of the health service in Rwanda. Other key findings from the assessment include:

- All levels reported low results against the stocked according to plan KPI. Corrective measures are recommended in the report and can be expected to have a significant positive impact at the health facility level.
- The low level of stock outs is maintained partly due to regular use of emergency orders as a compensation mechanism to avert or correct stock outs at service delivery points- health centers and hospitals.
- The eLMIS is not yet used to its optimal capacity; consequently, available data is not widely used in decision-making for reordering and stocking.
- Operational components of the supply chain, such as Pharmacy and Store management, Distribution, Waste Management, Quality, and Pharmacovigilance, have relatively low maturity scores at all levels.

- The District Pharmacies (DPs) report lower levels of both capability and KPI scores. Regression analysis supports the hypothesis that continued investment in improved performance in the DPs will have a disproportionate impact of performance across the system and for patients.

- Quality assurance and pharmacovigilance needs significant strengthening across all levels.

In summary, this assessment of the Government of Rwanda's national public health supply chain shows a well-functioning system, which is driven by an ethos to serve patients and improve the health of the nation. It also shows the challenges to a system continuing to mature while simultaneously adapting to ever increasing volume and variety of products, as well as the emergence of new technologies and expectations of ever faster response times. Well targeted interventions can rapidly overcome the challenges identified and raise performance levels across the system.

BACKGROUND

Over the last few years the Ministry of Health in Rwanda has worked closely with implementing partners to strengthen the national supply chain management (SCM) system to ensure that health products are continually available to people who need them. The MOH and Logistics Management Office (LMO) utilized the results of a 2013 National Supply Chain Assessment to inform the development of the National Pharmaceutical Supply Chain Strategic Plan (2013-2018), which aims to strengthen the SCM system and improve health outcomes.

The MOH also instituted a Performance Management Plan to ensure proper implementation, monitoring, and improvement of the SCM system, including the roll out of an Electronic Logistics Management Information System (eLMIS) to increase visibility and improve supply chain performance. Rwanda's Pharmacy Policy of 2016 defines and addresses the importance of rational use of medicines and health commodities to improve access to the right medications, at the right dose, at the right price, and at the right time and place (Pharmacy Policy, 2016). Each of these documents guide and support pharmaceutical supply chain efforts in Rwanda, including this NSCA.

HEALTH SUPPLY CHAIN IN RWANDA

Rwanda operates an integrated health commodity supply chain in which the Medicine Procurement and Production Division (MPPD) manages the Procurement, forecasting, supply planning, storage, and distribution of all health commodities for all program products, including non-program products. The MOH takes ownership of the pharmaceutical supply chain, leading the strategic functions such as, policy formulation, stewardship, and quality assurance driving major operational functions and overseeing the funds required for Procurement and policy implementation.

In July 2012, the MOH established the LMO to direct supply chain functions, making it responsible for all health commodities at all levels of care in Rwanda. Functions of the LMO include: formulating health sector policy for all areas of the pharmaceutical supply chain; stewarding logistics management systems; and coordinating the functions across the supply chain system (SCMS/Rwanda Ministry of Health, 2013). The MOH/LMO currently manages 561 public health facilities, with the MPPD serving as a central warehouse, supplying health commodities directly to 30 district pharmacies (DP), and four referral hospitals (RH). The MPPD is overseen by the Rwanda Biomedical Center (RBC), an institution that is

affiliated with and supervised by the MOH. Figure 1. on the following page outlines the organizations and elements within the supply chain system in Rwanda as well as the flow of commodities and information through the supply chain.

PURPOSE OF THE SUPPLY CHAIN ASSESSMENT

This assessment was proposed in a workplan developed by the MOH and the USAID Global Health Supply Chain Program - Procurement and Supply Management, Rwanda (PSM Rwanda) with the overall aim of providing results that would facilitate the development of goals and specific objectives to strengthen the supply chain in Rwanda. To this end, the assessment examined the capability and performance of the pharmaceutical supply chain system at three levels (central, district, and health center), utilizing the newly updated NSCA 2.0 Toolkit. The toolkit was designed to identify the capacity and performance of the supply chain at the various levels by mapping and measuring supply chain capability maturity and processes against KPIs. The primary objectives of this assessment were to:

- Measure the performance and capability of the public health supply chain;
- Identify the performance and gaps to guide Rwanda's and donors' investments to strengthen supply chain;
- Analyze the overall operational capacity and performance of the public health supply chain, identifying bottlenecks and opportunities for improvement; and
- Provide the Government of Rwanda with information to initiate strategic planning and to implement system strengthening initiatives that can contribute towards a well-performing supply chain.

REPORT OVERVIEW

This report provides an overview of the NCSA 2.0 assessment implemented in Rwanda, including the results of the assessment activities. Assessment results will be described in three key segments: 1) supply chain mapping, 2) capability maturity model and KPI scores presented by both functional module and level of service (e.g., health center, district hospital), and 3) a set of regression analyses exploring potential correlations between the CMM scores and KPI performance. The discussion will focus on providing interpretations of the results and translating these points into recommendations for future SCM activities. The conclusion will focus on key takeaways and considering future areas for investigation. The Report Annexes provide complete assessment tools, results, analysis, and other detailed information.

METHODOLOGY

This section describes the methodology used to conduct the NSCA in Rwanda. In summary, the method to conduct the assessment was crafted through a series of meetings with relevant in-country stakeholders, which defined the Scope of Work (SOW) and enabled partner buy-in. The NSCA 2.0 toolkit was used to guide data collection, storage, and analysis. Data collectors attended a 5-day Data Collection Training, and data were collected from a random sample of districts and facilities including MOH and MPPD over a 2-week period in April and May 2017.

SCOPE OF WORK

The SOW required that the assessment team conduct a comprehensive assessment of the Rwandan national SCM system at three levels: the central level; the district level (intermediate); and the peripheral level (HCs) by examining the capability and performance of the SCMS. This was to be done by mapping the supply chain maturity and performance against KPIs. The NCSA 2.0 toolkit was utilized to complete the assessment.

This national assessment of the Rwandan health services supply chain was conducted with 54 health centers, 18 district hospitals, 2 referral hospitals, 18 district pharmacies, the Medicine and Procurement Planning Division (MPPD), and the MOH during April and May 2017. Overall, data were collected from 94 sites visits, including 4 at the central level, 34 at district levels, and 56 at service delivery levels.

THE NATIONAL SUPPLY CHAIN ASSESSMENT TOOLKIT

The NSCA 2.0 is a newly updated toolkit that measures the capability, functionality, and performance of supply chain functions at all levels of a national health supply chain system and formed the basis for this assessment. The NSCA 2.0 toolkit is comprised of three primary elements: Supply Chain Mapping; the Capability Maturity Model (CMM) Diagnostic tool, and the Key Performance Indicator Assessment tool. The NSCA 2.0 is a newly updated toolkit that measures the capability, functionality, and performance of supply chain functions at all levels of a national health supply chain system. The NSCA 2.0 toolkit is comprised of three primary elements (Table 2.).

TABLE 2. DESCRIPTION OF KEY ELEMENTS OF THE NCSA 2.0 TOOLKIT

ACTIVITY	DESCRIPTION
Supply Chain Mapping	The objective of mapping the supply chain is to obtain an in-depth understanding of the supply chain, including the role and responsibilities of the key actors in the supply chain.
Capability Maturity Model Diagnostic Tool	The CMM Diagnostic tool assesses capability and processes across functional areas and cross-cutting enablers (e.g. HR, financial sustainability, etc.) using interviews and direct observation.
Supply Chain Key Performance Indicators	The KPIs include a set of indicators that measure supply chain performance in selected functional areas.

CAPABILITY MATURITY MODEL DIAGNOSTIC TOOL

The **CMM Diagnostic Tool** assesses capability and processes across functional areas and cross-cutting enablers (e.g. HR, financial sustainability, etc.), using interviews and direct observation. Observations included assessing the physical infrastructure of facilities as appropriate for the level of the facility, as well as observing necessary paper or electronic items (logistics reports, requisition forms, etc.) to validate the information provided in the interviews. The capability and processes are assessed based on a maturity model, which was adapted from private-sector, best-practices to fit the public health context. Please refer to Annex 2 for the full NSCA 2.0 CMM Toolkit used during the Rwanda assessment, including the data sources. The complete data analysis results are available in Annex 3.

Different modules were applied at various levels (Table 3.): Eight modules were applied at all levels except for the MOH. Questions for the MOH focused on overall planning and management of the supply chain, Human Resources, and Financial Sustainability.

TABLE 3. CMM FUNCTIONAL AREA BY LEVEL IN THE RWANDAN SUPPLY CHAIN SYSTEM

#	FUNCTIONAL MODULES ASSESSED	MOH	MPPD	DISTRICT PHARMACIES	REFERRAL HOSPITALS	HCS
1	Strategic Planning and Management	√			√	
2	Human Resources	√	√	√	√	√
3	Financial Sustainability	√	√	√	√	√
4	Policy and Governance		√	√	√	√
5	Quality and Pharmacovigilance		√	√	√	√
6	Forecasting and Supply Planning		√	√	√	
7	Procurement and Customs Clearance		√		√	
8	Warehousing and Storage		√	√	√	√
9	Distribution		√	√	√	√
10	Logistics Management Information Systems		√	√	√	√
11	Waste Management		√	√	√	√

SUPPLY CHAIN KEY PERFORMANCE INDICATORS

The KPIs include a set of indicators that measure supply chain performance in selected functional areas. The Supply Chain Key Performance Indicator tool was used to measure the performance of the public health supply chain by collecting quantitative data for a core set of KPIs that are in alignment with international standards for supply chain management, feasible to collect in the timeframe of the analysis, and comparable across time and across the levels of the supply chain.

Some of the data (stock data, order data, temperature excursion data) were collected for the 6 months prior to the assessment, while other data (mainly at central level, but also for HR) were collected for

the year. Please refer to Annex 4 for the full NSCA 2.0 KPI Toolkit used during the Rwanda assessment, including the data sources. The complete data analysis results are available in Annex 5.

TABLE 4. KEY PERFORMANCE INDICATORS BY THE LEVEL IN THE RWANDAN SUPPLY CHAIN

#	KEY PERFORMANCE INDICATOR	MOH	MPPD	DISTRICT	REFERRAL HOSPITALS	HEALTH CENTRES
1	Stock Data		√	√	√	√
2	Downstream Delivery		√	√		
3	Human Resource	√	√	√	√	√
4	Stock Turn Data		√	√		
5	Facility Reporting Rates	(no KPIs collected)				
6	Supplier Fill Rate			√		
7	Temperature Excursions		√	√	√	√
8	Forecast Accuracy	√	√	√	√	√
9	Supply Plan Accuracy	(no KPIs collected)				
10	Vendor On-Time Delivery		√			
11	Source of Funds Data	√				
12	Prices Paid		√			
13	Quality Control Testing	√				
14	Distribution Cost		√			

ADVANCED ANALYTICS: THE RELATIONSHIP BETWEEN THE CMM AND KPIS

The relationship between capabilities and KPIs was assessed based on a 'root-cause' type analysis. One would expect that high capability scores would lead to good performance, as measured by the KPIs; however, some supply chains are found to have low maturity and high performance, while others have high maturity and low performance. This is because low capability scores present a *risk* to good performance; that risk may or may not be actualized within timeframe of the assessment. Thus, for areas identified as 'poor performing' based on the KPIs, we assess the related capability modules to determine: (1) Whether this poor performance is captured in the overall capability maturity scores; and (2) If commonly missing key items (capabilities or infrastructure/systems) might explain the low performance. On the other hand, there may be areas of high risk (low capability) that were not reflected in the KPIs (or that the KPIs did not measure); these areas are also considered for improvements. As a result, system-strengthening activities can be focused on weak areas identified either in the KPIs or the CMM.

DATA COLLECTION

The data collection and interviews were conducted by 10 data collection teams with two to three members each. The teams were composed of two RBC and MOH staff (1 DP director and 1 staff from central level that could be a MOH, RBC or PSM). one GHSC-PSM/Rwanda staff member, and Axios staff. The participation of local supply chain actors from various levels of the supply chain ensured access to key informants and data sources, while also promoting local ownership of and buy-in of the assessment. District pharmacists were not sent to their home districts to avoid potential bias. Data collection teams undertook two exercises at each site:

- Interviewed the stock manager and/or the health facility manager using the relevant CMM questionnaire(s), noting that interview results are verified by review of documentation as well as direct observation of the relevant supply chain space such as a store room or warehouse; and
- Collected relevant KPI data using source data such as stock cards, LMIS reports, pro-formas, eLMIS data, orders and delivery notes.

Ten tracer commodities were used for KPI calculation throughout the assessment. These were identified by Rwanda's MOH in collaboration with USAID. Table 5 identifies the tracer commodities used during this assessment.

TABLE 5. TRACER COMMODITIES

	PRODUCT NAME	STRENGTH/DOSAGE	PRODUCT CATEGORY
1.	Amoxicillin Capsule	250mg	Essential Drug
2.	Coartem 6x4	20/120mg	Anti-Malarial
3.	Catheter G24	G24	Consumables
4.	Cotrimoxazole	960mg	Drugs against Opportunistic Infection
5.	Depo Provera	Injection	Family Planning
6.	Determine RTK	Test	Laboratory
7.	Oxytocin Injection	10ui/ml	Emergency Obstetrical Care
8.	Rifampicin/Isoniazid	150/75mg	TB
9.	TDF+3TC+EFV	300mg+300mg+600mg	ARV
10.	Zinc Sulfate	10mg	Community Case Management

SAMPLING CRITERIA

The sample size was determined using the hypergeometric sample size formula, assuming a margin of error of ±10%, and a 90% level of confidence (i.e., α=0.10). A two-stage sampling process was employed, with selection of central facilities and RHs done separately. The sample size was initially calculated for the number of districts, and later calculated for the number of HCs needed based on the above

parameters. Districts were selected with the probability of inclusion in the assessment proportional to the number of HCs in each district. Within each district, one DP and one DH were selected. For districts with more than one DH, the hospital included in the assessment was selected at random. In each district, and 3 HCs were selected at random. The two RHs, the MPPD, and the MOH were also included.

PRIMARY DATA COLLECTION

The Capability questionnaire was completed by interviewing the person at each site best suited to respond to each module based on the respondents' area of operation. Data was collected electronically using the SurveyCTO platform on tablet computers. Data was collected from 94 site visits, including 4 at the central level, 34 district levels, and 56 service delivery levels. This included the MOH, MPPD, 2 RHs, 18 DPs, 18 DHs, and 54 HCs. Please refer to Annex 6 for a complete list of the facilities assessed via sites visits. Annex 7 provides a map of the geographic coverage of sites assessed via site visits.
The primary data on KPIs was collected by utilizing the KPI Assessment Tool and obtaining data from existing LMIS tools (such as stock cards, LMIS and eLMIS reports, proof-of-delivery notes, dispatch notes, etc.). Incoming data were entered in the data collection tablet.

All completed questionnaires were uploaded to the SurveyCTO secure data server; data were reviewed daily and data collection teams were contacted to clarify discrepancies in or questions about the submitted data.

CENTRAL LEVEL DATA COLLECTION

At the central level, data collection was shared between two groups; one of the field teams was assigned to collect data from one of the two RHs, which was located within the districts in which they were collecting data, while the central team (made up of Axios team, USAID and PSM HQ staff) collected data from the second RH, MPPD and MOH.

The Head of the LMO, at the MOH, responded to questions on Strategic Planning and Management, HR, and Financial Sustainability. Two central level assessment teams interviewed various respondents at the MPPD on items contained in the capability questionnaire. Due to time constraints and inaccessibility to data, the teams could not collect KPI data and some CMM data on Quality & Pharmacovigilance, Policy and Governance, LMIS, and Forecasting.

REGRESSION ANALYSES

To assess the relationship between maturity scores and KPIs, and amongst KPIs, several regression models were run. The independent variables were KPIs related to important components of performance – the average number of days of drug stock outs per month (averaged across the 10 tracer commodities), the average number of commodities out-of-stock on the day of the assessment visit (out of the 10 tracer commodities), the percentage of orders delivered within 2 days of the promised delivery date over the 6 months prior to the assessment, and emergency orders as a percentage of all orders over the 6 months prior to the assessment. For the latter two KPIs, upstream data were used at HCs and hospitals, and downstream data were used for DPs.
These KPIs were regressed against the maturity scores for each module in the capability survey, the percentage of key supply chain staff leaving their positions in 2016, the supply chain staff vacancy rate on the day of the assessment, and the level (HC, DH, RH, or DP) of the facility. Regressions were re-

assessed for each level separately. The regressions used a stepwise approach, where the regression was run with all variables, and the variable with the highest p-value was removed, and the regression re-run again. This process was repeated until all variables remaining in the model had a p-value of less than 0.20. Because the data were clustered within district, robust standard errors were used to calculate p-values.

The results present factors that are correlated with the selected performance measures. The intent of the analysis is to help determine which modules/factors seem to have a relationship with performance, and at which levels these modules/factors are correlated with performance. That is, they are intended to highlight areas of strength and weakness, and to identify areas where interventions are most likely to have a relationship to performance. (They are not intended to reflect causal relationships; interpreting the coefficients, for example, as 'an X increase in maturity score will result in a Y increase in a particular KPI' would be an inappropriate use of the data.)

LIMITATIONS

Limitations for the overall assessment activity are listed below:

- The assessment is a cross-sectional survey and provides a snapshot of the supply chain system at the time of assessment. It does not provide trend information or change over time.
- Translation of the data collection tools from English into Kinyarwanda or French during interviews slowed the data collection process and meant that respondents had to devote a substantial amount of time to the assessment data collection teams;
- Logistics issues impacted project timelines and completeness of data collected. The amount data that was required to be retrieved manually (vs. electronic) was greater than expected, and other infrastructure challenges such as slow internet connections impeded easy access to eLMIS data (in some cases preventing eLMIS data collection altogether).
- Some appointments had to be rescheduled at the last minute, causing further delays.
- One of the days scheduled for data collection was a public holiday in Rwanda (Monday, May 1st) and relevant facilities staff were unavailable, often from the Friday before the holiday. This circumstance resulted in the loss of two data collection days.
- The combination of a limited amount of time for data collection activities, respondents' inability to provide data, lack of access to data, and missed/limited appointments with respondents resulted in the absence of some data (e.g., CMM, KPI).
- Essential MPPD KPIs for which data was not available to the NSCA team were: on-time delivery by vendors, emergency orders placed on vendors, stocked according to plan at MPPD, and downstream distribution performance to health facilities.
- The assessment identified some areas or measures that may be pertinent in Rwanda, but are not usually assessed (e.g. number of staff, short-term cash flow availability/shortfall, warehouse local storage capacity).

- Some data were requested but were not provided; for example, no data on timelines or completeness of reporting or forecasting were captured.

- Two challenges were experienced at the central level. Some of the scheduled respondents were engaged in other activities resulting in missed or very limited appointments. Secondly, the unavailability of data limited the team's ability to collect complete data sets, which may ultimately impact accurate data analysis that is fully informed from all levels.

RESULTS

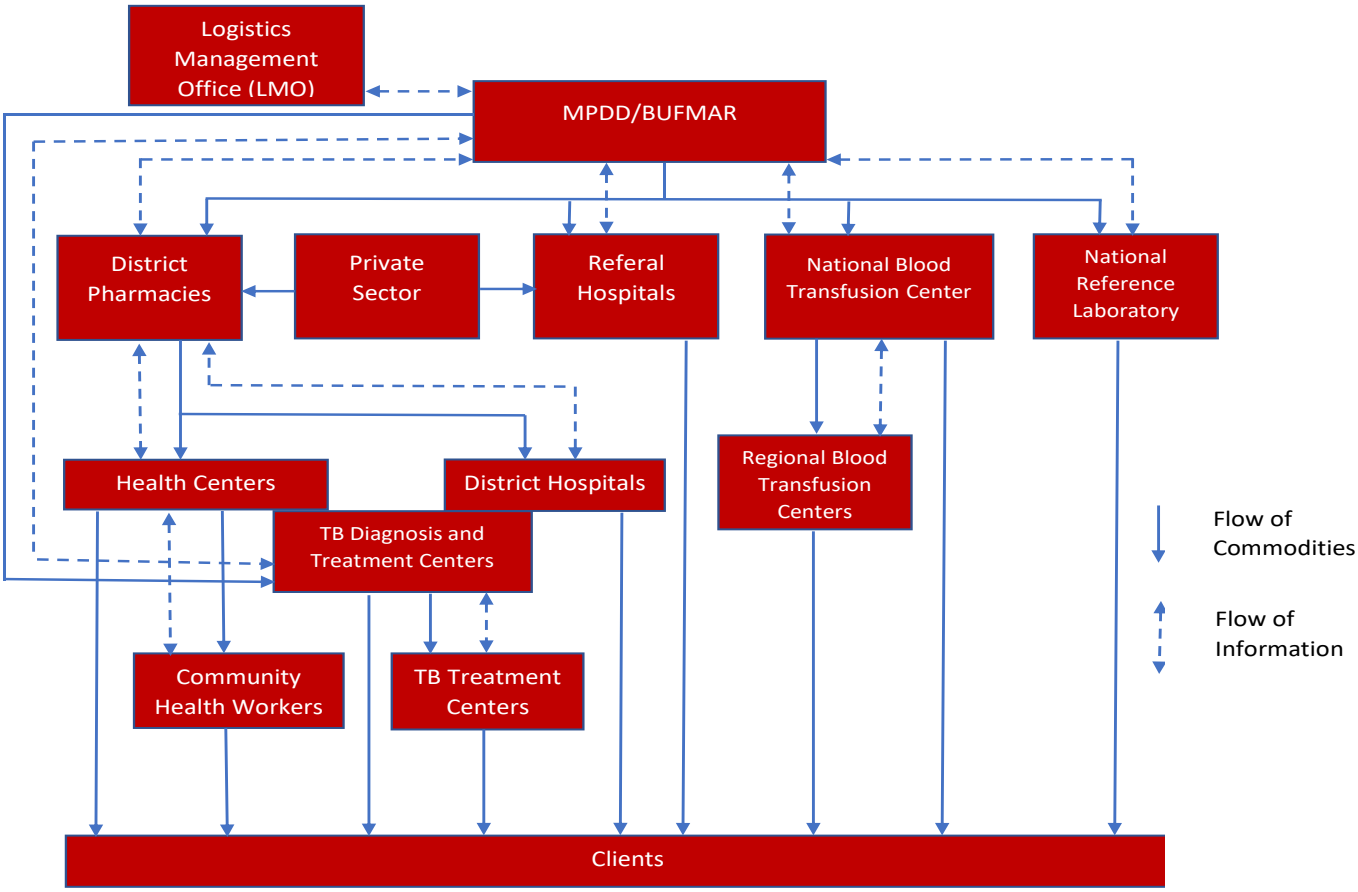
Findings from the completion of the Rwandan national assessment of the supply chain are outlined below. Overall, data were collected from 94 sites visits, including 4 at the central level, 34 at district levels, and 56 at service delivery levels. Data collection was completed at the MOH, MPPD, referral hospitals (N=2), district pharmacies (N= 18), and health centers (N=54). Please refer to Annex 6 in Volume II for a complete list of the facilities assessed via sites visits. Annex 7 in Volume II provides a map of the geographic coverage of sites assessed via site visits.

The supply chain map is presented first to show the flow of products and information. An overall table of CMM results, followed by six KPIs provides an overview of the assessment results. Assessment results and findings are then detailed first for each module and then for each level of service. Within each module, Capability maturity model (CMM) scores are presented first; where relevant, Key Performance Indicators (KPIs) are included in the module results. For each of the 11 functional modules included in the capability maturity model questionnaire, results are presented as follows: 1) CMM score by level of service, 2) Capability Maturity Model score broken down by level of maturity, 3) key capability achievements, and 4) key capability gaps. For the Pharmacy and Stores Management, Distribution, Logistic Management Information System, and Human Resource modules, relevant KPI metrics have been included. Discussion and recommendations specific to that module or service level follow the presentation of findings. Recognizing the importance of system effects, regression results and a discussion of correlations and interdependencies follows.

SUPPLY CHAIN MAPPING

The objective of mapping the supply chain is to obtain an in-depth understanding of its structure, including the role and responsibilities of the key actors in the supply chain. This activity included gathering information on the components of the supply chain and how they are inter-connected. Figure 1. illustrates the organization and elements within the supply chain system in Rwanda as well as the flow of commodities and information through the system.

Figure 1: Flow of Commodities and Information under the Logistics Management Office



The Rwanda SCM system is comprised of 13 different elements. It is important to note that distric pharmacies are the newest element introduced into the Rwanda supply chain.

ASSESSMENT RESULTS AND ANALYSIS - CAPABILITY MATURITY MODEL (CMM) AND KPI

UNDERSTANDING THE CMM RESULTS

Please note that the following section is essential to an understanding of the charts and tables in this report that are related to the CMM.

The capability and processes were assessed based on a maturity model, adapted from private-sector best-practices to fit the public health context. Within each functional module, each question or item assessed has an assigned maturity level, ranging from 'Vital or Essential' to 'ideal'; the overall CMM score for this module is the sum of scores at each maturity level. Table 6. provides an overview of each level of maturity, the definition, and the overall contribution of each level to the overall CMM score.

TABLE 6. DEFINITIONS OF LEVEL OF MATURITY AND CONTRIBUTION TO THE OVERALL CMM SCORE

LEVEL OF MATURITY	DEFINITION	MAXIMUM CONTRIBUTION TO THE CMM SCORE
Vital or Essential	These are the **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%
Important	These are not must-haves but are **important** to have policies, structures, processes, procedures, tools, indicators (e.g. an excel sheet).	30%
Desirable	These are **nice-to-have** policies, structures, processes, procedures, tools, indicators, reports, and resources to operate a supply chain system (e.g. Rx solution, a dispensing and stock management electronic tool).	15%
Ideal	These are **non-Essential, state-of-the-art** 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%

To produce maturity scores, 'Vital and Essential' elements constitute 50% of the total score, 'Important' items constitute 30% of the total score, 'desirable' items constitute 15% of the score, and 'Ideal' items constitute 5% of the score. The scores are not directly interpretable – e.g., a score of 50% does not indicate that all of the Vital or Essential items are in place in all facilities, but are comparable across the functional areas. Thus, the scores can be used to assess which functional areas have relatively high (or low) capability compared with other functional areas. Further, maturity scores are broken down for the 'Vital or Essential' category, with the percentage of these items in place for each module reported. As a rough rule of thumb, it is anticipated that countries should aim to have 80% of 'Vital or Essential' items in place (indicating a minimum overall score of at least 40% out of 50%).

Capability achievements and gaps are also presented for each module in tabular form. The Key Capability Achievements tables detail those most significant results related to positive achievement, as defined by the data indicating ≥80% of facilities having implemented the indicator. Similarly, the Key Capability Gaps tables represent the results from a selection of indicators that indicated key gaps within the SCM system, as defined by ≥80% of facilities having not implemented the indicator. The Capability Gaps tables also describe possible solutions for addressing the gaps suggested by the data. The full data

analysis on Capability Achievements and Capability Gaps is available for reference in Annex 8 of this report.

SUMMARY TABLE: CAPABILITY MATURITY MODEL

Capability Maturity scores reflect the presence and sophistication of policies, structures, processes, metrics and resources to operate a supply chain system. Maturity is not the same as performance. For example- a system with basic inventory capabilities and therefore low maturity scores (e.g. stock cards) may have very high performance, as measured by stock out incidence rate.

TABLE 7. AVERAGE CAPABILITY MATURITY MODEL SCORE AND RANGE OF SCORES PRSEENTED BY LEVEL OF FACILITY FOR EACH FUNCTIONAL MODULE

MODULE	HEALTH CENTER	DISTRICT HOSPITAL	REFERRAL HOSPITAL	DISTRICT PHARMACY	MPPD	MOH
	n = 54	n = 18	n = 2	n = 18	n = 1	n = 1
Forecasting & Supply Planning	-	-	75% (52-91%)	-	83%	-
Procurement	-	-	63% (63-63%)	43% (20-65%)	67%	-
Pharmacy & Store Management	42% (12-54%)	52% (43-64%)	61% (54-68%	43% (34-56%)	74%	-
Distribution/ Receiving (HC,DH,RH)	53% (13-100%)	64% (25-100%)	26% (13-40%)	42% (28-60%)	39%	-
Policy & Governance	65 (0-100%)	74% (0-100%)	89% (78-100%)	61% (42-85%)	66%	
Strategic Planning and Management	-	-	51% (21-81%)	-	-	64%
Quality & Pharmacovigilance	8% (0-53%)	37% (0-89%)	61% (58-64%)	9% (0-36%)	36%	-
Logistics Management Information Systems	72% (23-93%)	75% (51-93%)	79% (69-90%)	52% (28-75%)	39%	-
Human Resources	58% (10-79%)	63% (26-88%)	42% (33-52%)	39% (18-56%)	44%	44%
Financial Sustainability	70% (33-98%)	70% (43-98%)	62% (50-75%)	68% (50-78%)	68%	31%
Waste Management	33% (0-92%)	63% (16-100%)	73% (62-84%)	40% (3-71%)	55%	-

In addition to noting the average capability maturity by function and facility, it is important to note the range of scores recorded; this range indicates the variation in maturity across the facilities in a particular level. The table can also serve to show functions where capability scores are low across the system, indicating that a more systemic or strategic approach is required.

SELECT KPIS

The following KPIs provide a good snapshot of overall system performance. Each KPI table will also be presented in the relevant section for further analysis

TABLE 8. PHARMACY & STORES MANAGEMENT PERFORMANCE INDICATOR SCORE BY LEVEL (AVERAGE SCORE WITH SOME RANGES)

INDICATOR	HCS	DHS	RHS	DPS	MPPD	MOH
# of Emergency Orders (Emergency orders as % of all orders)	23%	21%	55%			
Stocked-according-to-plan (Tracer Commodities)	11 - 67%	9 - 58%	0 - 100%	10 -34%		
Stock out on Day of Assessment	5%	2%	17%	7%		
Stock out for 182 Day Period*	6.6 (3.6%)	2.7 (1.5%)	17.7 (9.7%)	6.6 (3.6%)		
Average number of days per month with stock outs, given that there was a stock out	15.7	11.0	17.9	14.6		
% of Routine Orders delivered on or before promised delivery date	55%	52%	17%	31%		
% of Routine Orders delivered within 2 days of promised delivery date	71%	65%	67%	100%		
% of Emergency Orders delivered on or before promised delivery date	87%	61%	64%			
%of Emergency Orders delivered within 2 days of promised delivery date	92%	86%	100%			

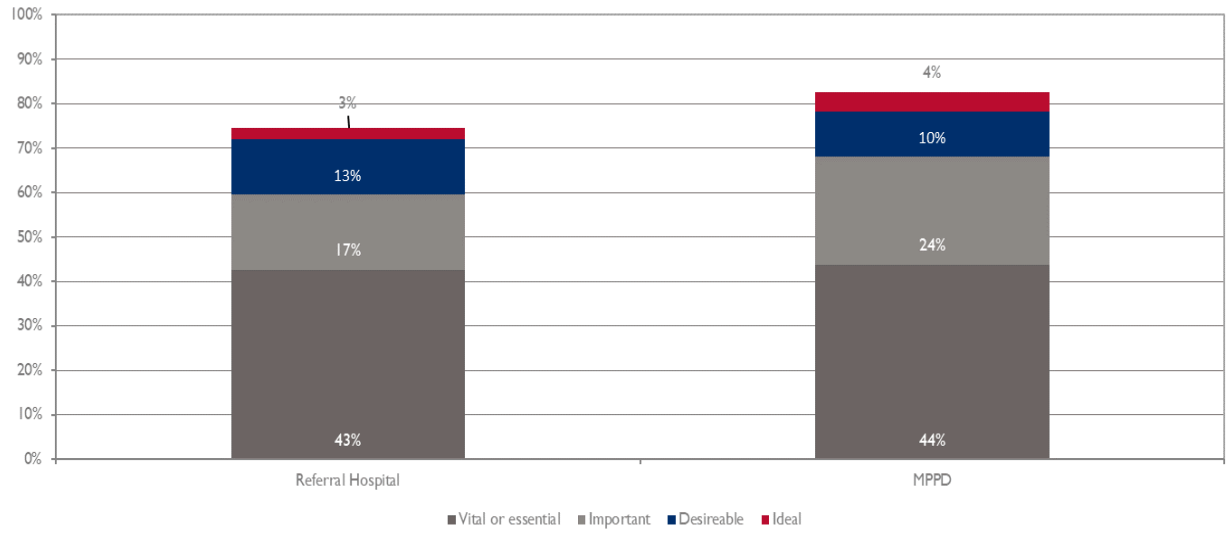
* The first number in this table refers to the average number of days the commodity was out of stock on average across the facilities during the six months of October 2016 through March 2017. There were 182 days in this period. The number in parenthesis is the percentage of days the commodity was out of stock, on average. Thus, 6.6 / 182 = 3.6%

BY FUNCTIONAL MODULE: OVERALL CAPABILITY MATURITY MODEL AND KPI QUESTIONNAIRE RESULTS

In the functional module sub-sections below, the following results are presented: breakdown of CMM scores by level of achievement, key capabilities, key gaps, key performance indicators (where applicable), and tracer commodity figures (where applicable).

FORECASTING AND SUPPLY MANAGEMENT

Figure 2. Forecasting and Supply Planning Capability Maturity Model Score Per Level of Achievement by Level



Maximum score for Vital or Essential is 50%; for important is 30%; for desirable is 15%; for ideal 5%. For instance, if Vital or Essential portion is actually 45%, it should be interpreted as 45/50. Understanding the CMM Results section provides a more detailed explanation.

Forecasting and Supply Management: Select Key Achievements

TABLE 9. FORECASTING & SUPPLY PLANNING – SELECT KEY CAPABILITY ACHIEVEMENTS	
INDICATORS FOR DISTRICT PHARMACY LEVEL	% COMPLIANT
The following methodologies are used during forecasting: Morbidity-based and consumption-based.	100%
Forecasts are used to inform drug procurement	100%
INDICATORS FOR MPPD LEVEL	% COMPLIANT
Forecasts are made 2 years into the future	100%
The quality of the consumption data is assessed	100%
The supply plan is shared annually with external partners	100%

District Pharmacies: Key Gaps

TABLE 10. FORECASTING & SUPPLY PLANNING – SELECT KEY CAPABILITY GAPS		
INDICATORS FOR DISTRICT PHARMACY LEVEL	% NOT COMPLIANT	POSSIBLE SOLUTIONS
Demographic projections are the method used during forecasting.	100%	Demographic data and projections should be included as part of the data used in forecasting. However, in practice, consumption data is preferred as a more accurate forecast methodology.
INDICATORS FOR MPPD LEVEL	% NOT COMPLIANT	POSSIBLE SOLUTION
The most recent methodology, data sources, and assumptions that were used in forecasting documented are readily available	100%	The most recent methodology, data sources, and assumptions that were used in forecasting should be documented and readily available

Summary of Results

Forecasting and Supply Planning activities are only performed at the RHs and MPPD, and show similar maturity scores for each. Overall performance at MPPD is strong with a total score of 82%; performance at the referral hospitals is satisfactory at 76%. Most of the Forecasting and Supply Planning is done at the MPPD, where Procurement of commodities mostly takes place. The frequent engagement in these activities by staff at MPPD possibly accounts for the slightly higher maturity scores compared to RHs. At the "Vital and Essential" level, there are only very minute differences in the scores – 43% at RH level and 44% at MPPD, indicating that both facility levels have over 80% of the required capabilities for this level in place. Data showed that, forecasts are made two-years into the future and the consumption data used is assessed for quality and resultant supply plans are shared with external partners, which can aid streamlining of commodity/supplies. Documents showing a clear process of forecasting methodology, data sources and assumptions are not maintained. The Forecasting and Supply Planning processes at the MPPD and other relevant levels should be well-documented and easily accessible for reference.

Discussion

This is a strong set of results from the two levels responsible for forecasting. It creates a sound base for the Procurement and stocking through the system, provided the results are used for decision-making and forecast accuracy is regularly assessed to support continuous improvement and reflect changes in demand.

Two RHs were included in the assessment - one was located in Kigali city center and the other was located in Huye district. The results suggest that one facility is highly mature, where the other is significantly lower. Generally, there should not be so much variability between the facilities in a level of service. Given that MPPD and one of the two RHs visited exceeded an 80% maturity score, it appears that forecasting capabilities already exist in the system but may not be evenly distributed or may be constrained by other factors. In this case, it may be advisable to support the high performing facility in coaching lower performing facilities for forecasting and planning. This kind of coaching may be critical as

it is difficult to plan Procurement appropriately without both the presence of forecasting as forecast accuracy.

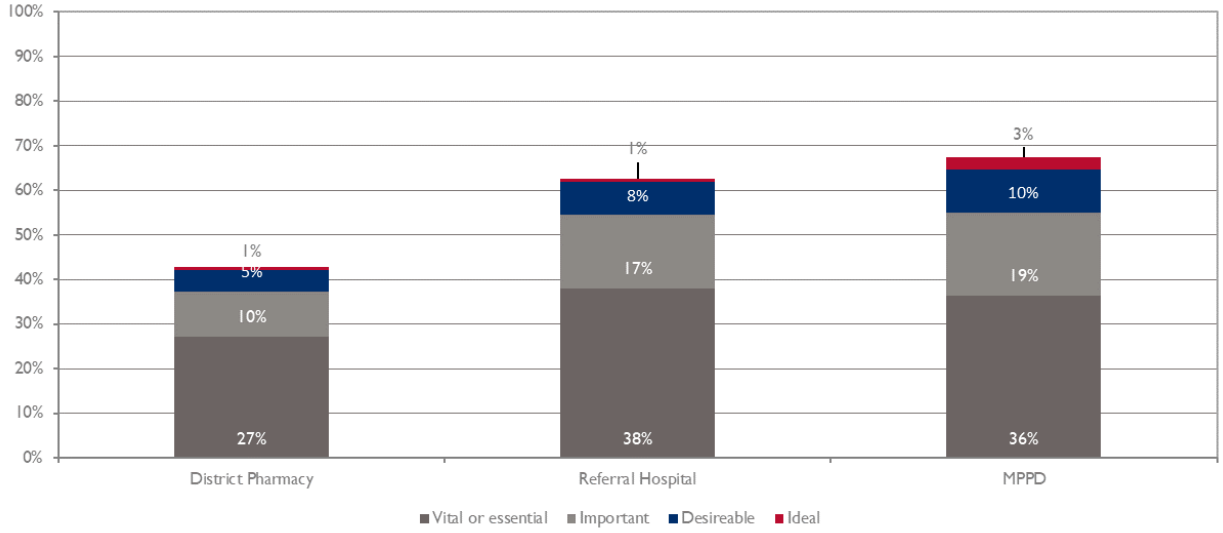
Since Forecast Accuracy and Timeliness data was not available, it was not possible to assess KPIs related to forecasting accuracy, nor is it possible to understand the impact of receiving late or incomplete data. This situation is important because KPIs are an important element of the continuous improvement process. Efforts should be made to ensure performance and maturity across the supply chain system.

Recommendations

- It is recommended that the MOH seek out the forecast accuracy and timeline data that were not readily available during the survey and use these KPIs to establish an effective feedback loop.
- It is recommended that the MOH consider identifying high performers for forecasting and supply planning and task the facilities/managers with coaching lower performers to bring overall forecast and supply planning capabilities up to a common standard across the system.
- Forecasts can only be as accurate as the data that feeds them. It is recommended that MOH explore the links between the timeliness and accuracy of the consumption data used in the forecast.

PROCUREMENT

Figure 3. Procurement Capability Maturity Model Score Per Level of Achievement by Level



Maximum score for Vital or Essential is 50%; for important is 30%; for desirable is 15%; for ideal 5%. For instance, if Vital or Essential portion is actually 45%, it should be interpreted as 45/50. Understanding the CMM Results section provides a more detailed explanation.

Note: DPs are authorized to procure when MPPD cannot meet a DP's immediate needs.

Select Key Capability Achievements - Procurement

TABLE 11. PROCUREMENT KEY CAPABILITY ACHIEVEMENTS	
INDICATORS FOR DISTRICT PHARMACY LEVEL	% OF FACILITIES ACHIEVED
The Public Health Program Office provides standard specifications for pharmaceutical Procurement.	100%
Procurement tenders include terms and conditions that are enforced.	89%
INDICATORS FOR REFERRAL HOSPITAL LEVEL	% OF FACILITIES ACHIEVED
SOPs are in place for Procurement (receipt of bids, bid opening, bid evaluations).	100%
The Public Health Program Office provides standard specifications for pharmaceutical Procurement.	100%
INDICATORS FOR THE MPPD LEVEL	% OF FACILITIES ACHIEVED
Controls are in place to mitigate/prevent Procurement risks.	100%
The Public Health Program Office provides standard specifications for pharmaceutical Procurement.	100%

* For modules with a significant number of questions, achievements or gaps, indicators in this table were selected based on what stood out from these indicators or elements, and also to show the breadth of achievements.

Select Capability Gaps - Procurement

TABLE 12. PROCUREMENT KEY CAPABILITY GAPS		
INDICATOR FOR DISTRICT PHARMACY LEVEL	% OF FACILITIES WITH GAP	POSSIBLE SOLUTIONS
The Procurement system monitors identified KPIs.	94%	Monitoring & Evaluation (M&E) system should be put in place where KPIs are defined which monitor different aspects of the Procurement process.
INDICATOR FOR REFERRAL HOSPITAL LEVEL	% OF FACILITIES WITH GAP	POSSIBLE SOLUTIONS
Purchase orders include provisions for liability, recall, and liquidated damages.	100%	The purchase orders should be appropriately worded to ensure that risks of poor performance in terms of quality of the medicines procured, damages cost of corrective actions and all liabilities are transferred to the suppliers. The terms and conditions in the order should be reviewed by legal departments of the government for appropriateness and protection of government against litigations.
INDICATOR FOR MPPD LEVEL	% OF FACILITIES WITH GAP	POSSIBLE SOLUTIONS
Lead time is included during the tender evaluation processes.	100%	Lead time is a very important measure for Procurement efficiency. The MPPD should set lead-time an indicator when evaluating a tender and also define other KPIs that monitor the Procurement lead-time.
The Procurement system incorporates supplier monitoring and KPI monitoring.	100%	An M&E system should be put in place where KPIs are defined which monitor different aspects of the supplier performance and these KPIs assessed throughout the Procurement process.

Summary of Results

The MPPD completes the majority of the Procurement activities in the supply chain; however, the assessment team was not able to obtain information on the number and frequency of orders placed on vendors by MPPD. RHs and DPs engage with Procurement when the required commodities are not available at the MPPD and special approval needs to be obtained. Across all levels of achievement, scores range from 20% to 67%. The scores are highest at the MPPD, but even the MPPD only reaches a score of 67%. District Pharmacies display lower maturity overall with Procurement when compared to referral hospitals and MPPD.

SOPs, standards specifications, and enforceable terms and conditions have been successfully implemented at over 80% of sites, whereas few sites include more comprehensive contract language (e.g., liability, recall), control mechanisms, and monitoring mechanisms (KPIs) for internal and operations and suppliers as appropriate.

Discussion

The procurement function is concentrated at the MPPD, where CMM scores should have been high. Results however, indicate low CMM scores for procurement. This results from non-adherence to best practices in procurement in some instances, such as not including KPIs for monitoring supplier performance.

Results indicate the District Pharmacies performing at the lowest level of maturity. This finding may not be surprising as the DPs only procure what product is not available from MPPD, where the Procurement function is concentrated. However, it is a concern, as the DPs purchase on dynamic local markets

There are controls such as enforced order and payment approval processes, and tender committees, however there are still risks to the procurement processes as most of the DPs were not monitoring the Procurement system or supplier performance using KPIs. This can lead to inappropriate processes, and losses of funds and/or commodities. There is a need to establish monitoring and evaluation systems for Procurement.

It is reasonable to expect that DPs may continue to need support to grow their Procurement capability maturity scores.

Recommendations

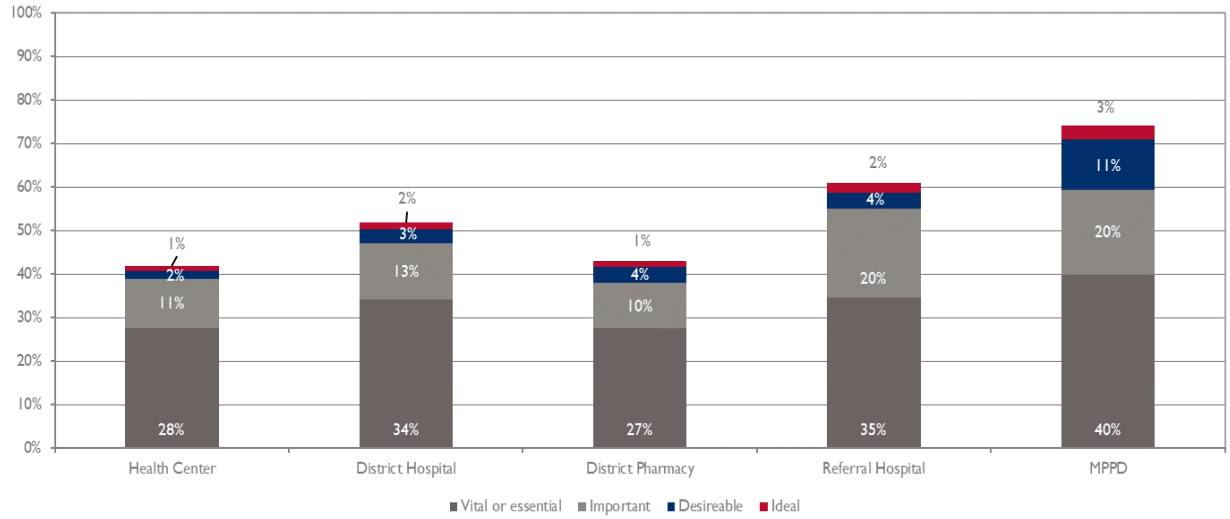
- It is recommended that the MOH focus on supporting DPs in growing their capacity for Procurement. Activities that may be helpful include the development and implementation of KPIs that help DPs succeed in procuring approved, high quality commodities at reasonable prices. Also, it may be helpful to support DPs in developing improved monitoring structures for Procurement activities.

- It is recommended to build staff capacity at all levels related to best practices for Procurement to support improved maturity in this functional module.

- It is recommended that efforts are made to build capacity for procurement processes. Specifically, supporting the establishment of an integrated electronic system of procurement, utilizing eLMIS data may help in this area.

PHARMACY AND STORES MANAGEMENT

Figure 4. Pharmacy and Stores Management Capability Maturity Model Score per Level of Achievement by Level



Maximum score for Vital or Essential is 50%; for important is 30%; for desirable is 15%; for ideal 5%. For instance, if Vital or Essential portion is actually 45%, it should be interpreted as 45/50. Understanding the CMM Results section provides a more detailed explanation.

Select Key Capability Achievements – Pharmacy and Stores Management

TABLE 13. PHARMACY & STORES MANAGEMENT – SELECT KEY CAPABILITY ACHIEVEMENTS	
INDICATORS FOR HEALTH CENTER LEVEL	% OF FACILITIES ACHIEVED
All medicines received are checked for expiration and quality.	94%
The store meets the minimum acceptable design, layout, and construction requirements for storage of pharmaceutical products.	85 - 91%*
The inventory management systems include min-max set points.	100%
INDICATORS FOR DISTRICT HOSPITAL LEVEL	% OF FACILITIES ACHIEVED
The inventory management system includes min-max set points.	94%
Controlled and high value items are stored in a lockable cage or cabinet.	100%
INDICATORS FOR THE DISTRICT PHARMACY LEVEL	% OF FACILITIES ACHIEVED
All medicines received are checked for expiration and quality.	100%
The inventory management system includes min-max set points.	94%
Cold chain infrastructure and capacity elements are in the store, including a free-standing refrigerator.	100%
The store meets the minimum acceptable design, layout, and construction requirements for storage of pharmaceutical products.	83 – 89%*
First Expiry First Out (FEFO) requirements adhered to.	100%
INDICATORS FOR THE REFERRAL HOSPITAL LEVEL	% OF FACILITIES ACHIEVED
All medicines received are checked for expiration and quality.	89%
The inventory management system includes min-max set points.	100%
SOPs are in place for handling controlled substances and high-value commodities and they are tracked through manual registers.	100%
INDICATORS FOR THE MPPD LEVEL	% OF FACILITIES ACHIEVED
The store meets acceptable design, layout, and construction requirements for storage of pharmaceutical products.	100%
Security measures for the store are in place and currently operational, including controlled access, locks on main doors, locks on product cabinet, burglar bars, staff ID cards, control of vehicle entering, security guards, and a record of all people entering and leaving.	100%
The inventory management system includes min-max set points.	100%

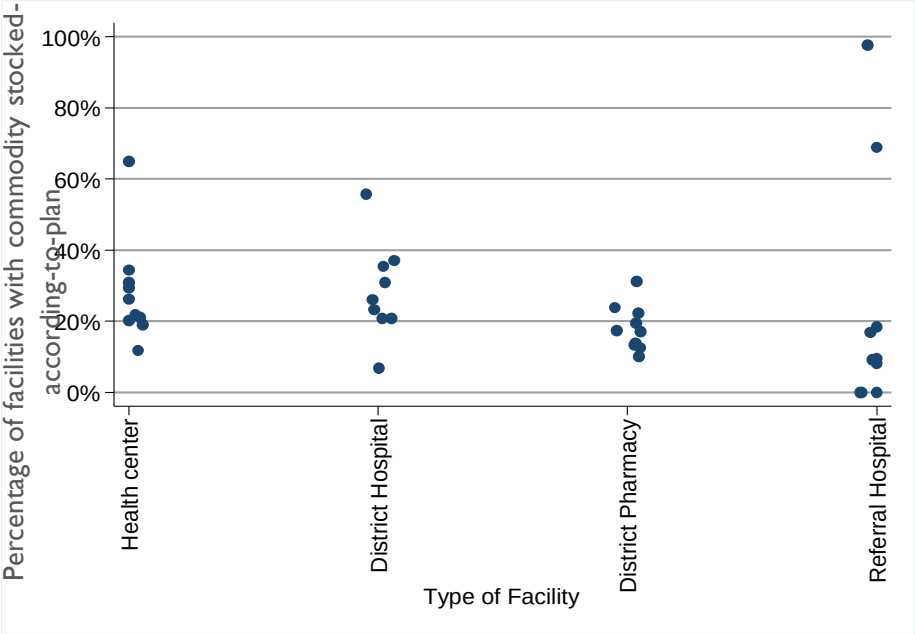
* This line represents multiple questions / indicators. The % of facilities achieving these multiple indicators is shown as a range.

Key Capability Gaps – Pharmacy and Stores Management

TABLE 14. PHARMACY & STORES MANAGEMENT – SELECT KEY CAPABILITY GAPS

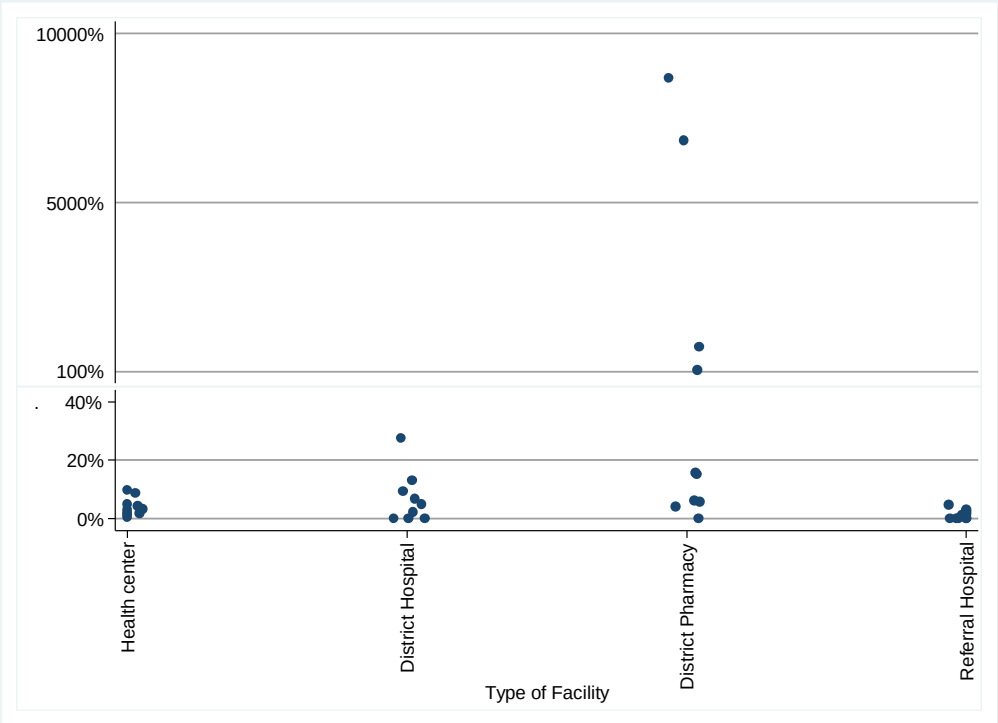
INDICATOR FOR HEALTH CENTER LEVEL	% OF FACILITIES WITH GAP	POSSIBLE SOLUTIONS
KPIs for stocked-according-to-plan and number and duration of temperature excursions are recorded.	81 - 94%	Establish an M&E plan, including the relevant KPIs, and manage stocks within the max/min band of stocked-according-to-plan.
INDICATOR FOR DISTRICT PHARMACY LEVEL	**% OF FACILITIES WITH GAP**	**POSSIBLE SOLUTIONS**
KPI at the facility include stock turn per annum, warehousing utilization//bin occupancy, order turnaround time, number duration of temperature excursions, and % of in-coming batches quality tested.	83 - 100%	Establish an M&E plan, including the relevant KPIs, and manage stocks within the max/min band of stocked-according-to-plan.
INDICATOR FOR REFERRAL HOSPITAL LEVEL	**% OF FACILITIES WITH GAP**	**POSSIBLE SOLUTIONS**
KPI at the facility include stocked-according-to-plan, stock accuracy, order fill rate, wastage, and duration of temperature excursions.	100%	Establish an M&E plan, including the relevant KPIs, and manage stocks within the max/min band of stocked-according-to-plan.
INDICATOR FOR MPPD LEVEL	**% OF FACILITIES WITH GAP**	**POSSIBLE SOLUTIONS**
KPI at the facility include stocked-according-to-plan.	100%	Add to range of KPIs routinely monitored.
Shipments and orders are confirmed though manual paper documentation.	100%	Strengthen the manual shipment confirmation through delivery notes and goods received notes at the MPPD level. 2. Explore the Procurement and use of Personal Digital Assistant.
Cold chain requirements are monitored from manufacturer to service delivery point using color changing markers.	100%	Implement a system to monitor cold chain system through to health facility.
All orders received are checked for accuracy.	100%	Implement a system to routinely check all deliveries against the order.

Figure 5. Key Performance Indicator: % of Tracer Commodities Stocked-According-to-Plan by Facility



Each dot reflects the average percentage of days (based on the first day of the month for the 6 months prior to the assessment teams' visit) that one tracer commodity was stocked according to plan across the facilities visited, separated by type of facility.

Figure 6. Key Performance Indicator of Tracer Commodities: Average Deviation from 100% Stock Card Accuracy Across Facilities (No Deviation = 0)



Each dot represents the average across facilities surveyed for 1 tracer commodity.

TABLE 15. PHARMACY & STORES MANAGEMENT PERFORMANCE INDICATOR SCORE BY LEVEL (AVERAGE SCORE WITH SOME RANGES)

INDICATOR	HCS	DHS	RHS	DPS	MPPD
KPI 1 – # of Emergency Orders (Emergency orders as % of all orders)	23%	21%	55%	-	-
KPI 2 – Stocked-according-to-plan (Tracer Commodities)	11 - 67%	9 - 58%	0 - 100%	10 -34%	-
KPI 3 – Stock out on Day of Assessment	5%	2%	17%	7%	-
KPI 4 – Stock out for 182 Day Period*	6.6 (3.6%)	2.7 (1.5%)	17.7 (9.7%)	6.6 (3.6%)	-
Supplemental: Average number of days per month with stock outs, given that there was a stock out	15.7	11.0	17.9	14.6	-
Supplemental: % of facilities with a stock out of any tracer commodities (10/2016 to 03/2017)	69%	68%	100%	94%	100%
KPI 5 – Stock Card Accuracy (Paper-based)	87%	91%	95%	75%	-
KPI 6 – Stock Card Accuracy Deviation Rate (Paper-based)	0 - 11%	0 - 25%	0 - 5%	2-8771%	-
KPI 7 – Order Fill Rate Average (Quantity Delivered/Quantity Ordered)	-	-	-	97.3% (86-100%)	90.6% (91-123%)
KPI 8 – Order Adjustment Rate (range across tracer products)	-	-	-	6.5% (3-10%)	17.4% (6 -38%)
KPI 9 – Stock Turn Per Annum (# of Stock Turns per Year)	-	-	-	4.3	2.4
KPI 10 – Wastage from Damage, Theft, Expiration (% of total stock lost, damaged, or expired 10/16 to 02/17)	0.1%	0.0%	0.0%	0.1%	0.0%
KPI 11 – Order Turn Around Time (# of days between order received and shipped)	-	-	-	9.9 days	18.1 days
KPI 12a – Temperature Excursion (Excursions per month)	0.18	0.01	0.00	0.01	1.2
KPI 12b - % of days with temperature outside of acceptable range	0.70%	0.04%	0.00%	0.14%	3.8%

* 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 October 2016 through March 2017. There were 182 days in this period. The number in parenthesis is the percentage of days the commodity was out of stock, on average. Thus, 6.6 / 182 = 3.6%

TABLE 16. REASON FOR ORDER ADJUSTMENT: % OF ADJUSTED ORDERS AT DISTRICT PHARMACIES (RELATED TO KEY PERFORMANCE INDICATOR 8) (N=64)	
DOWNSTREAM (TO HEALTH FACILITIES) % OF ORDERS ADJUSTED	
Stock out	5%
Insufficient stock	39%
Incorrect calculations	44%
Product nearing expiry	2%
Surplus	5%
Other	6%
MPPD TO DISTRICT PHARMACY (RECEPTION AT DP) ORDER FILL RATE	
Stock out	35%
Insufficient stock	15%
Incorrect calculations	34%
Product nearing expiry	0%
Surplus	3%
Other	14%

Summary of Results

Order Adjustment. The number of orders on the MPPD and the DPs from lower levels that get adjusted is significant.

Stock Management. Stock out on the day of assessment ranged from 2%-17%, and overall stock out incidence occurred between 1.5% and 9.7% of the days in the six-month period. Most levels of services stocked according to plan roughly between 20%-40% of the time, with the duration of stock outs being mostly under a week, and the deviation from the plan shown in Figure 6. At the lower levels in the system, there is a lack of monitoring and evaluation mechanisms and KPIs that could provide information to the facilities to improve performance. Increased use of technology, quality controls, and KPIs could further support capabilities.

Stock card accuracy ranged from 75%-95%. The KPIs for stock card accuracy deviation rate, using the paper stock cards, indicates that the highest deviations were observed at the DPs. Similarly, the stock card accuracy for the paper based system is also lowest at the DPs. The most broadly established store management capabilities center around the receiving and handling of materials and setting of inventory minimum and maximum levels. Wastage was reported at low rates between 0.0-0.1%.

Order fill rates and Emergency Orders. Order fill rates ranged from 90.6%-97.3% of the time, however, order adjustment rates ranged from 6.5%-17.4%, and orders placed on the MPPD are more likely to be adjusted. Emergency orders occurred between 23%-55% of the time, a notably high percentage for a tool that is used to compensate when other issues arise.

Discussion

This is a very instructive set of results regarding overall performance of the system for patients. Levels of stock out are relatively low, compared to many countries, especially as it is evident that stock outs are quickly corrected in most cases. One exception reported by respondents related to rapid test kits, where a change of policy regarding the test kit algorithm was rapidly introduced with insufficient stock in country. By contrast, both the capability and performance of stocked according to plan are low across the system. Frequent order amendments are also reported; this occurrence appears to be largely driven by available stocks to fulfill the request, again pointing to challenges in stocked according to plan measures. Data on several KPIs at the MPPD (e.g. number of emergency orders, stock outs, stocked according to plan) were not available to the assessment team. This impacted the ability to perform root cause analysis for performance against these measures across the system.

Storage Space. Physical space is a clear concern related to Pharmacy and Stores Management. Respondents advised the assessment team that there is inadequate storage space to allow for the best practice in commodities management across all levels of service. While there was no capability maturity metric or KPI measuring capacity, it was clear through observation. For example, commodities were stored in multiple locations with some locations long distances away from the central warehouse. It is possible that this challenge has arisen in part because more is being asked of the system. Over the past 10-15 years the quantity and variety of drugs in health systems has increased dramatically, often without comparable resources invested in physical space, particularly at the patient service delivery facilities. While this is a health outcomes success, if the volume and complexity increase without an increase in storage, inventory requirements are likely to increase. With insufficient inventory space for each product, the entire system is stretched.

Order Adjustments, Order Fulfilment, and Emergency orders. Another key concern centers on order adjustments. Most order adjustments are a result of incorrect calculations, insufficient stock, and stock outs. Pharmacy stores were also not stocked to plan; when this situation occurs, there is a downstream impact on the number of emergency orders created. Increased emergency orders impact the likelihood of stock out. In this case, there is an opportunity to improve stocking to plan and create downstream improvements in other areas. Respondents also stated that short term lack of funds is an area that can impact Pharmacy and Stores Management - orders cannot be placed until finances are available. For example, if a health insurance scheme does not reimburse a health center in time, the health center is impacted in its ability to order medications. This kind of impact on ordering capability may also increase the likelihood of emergency orders, order adjustments or stock outs.

Maturity at the DP level. The KPIs revealed high deviations in stock card accuracy at the DP level. There are multiple possible reasons for these results including lack of stock card updating for longer periods of time and lower accuracy for stock cards on the paper-based system. The KPIs suggest that DPs could be understaffed or staffed with personnel who have not been supported to build their capacity in supply chain management to attain greater capability maturity. These issues can all generally be addressed through capacity building activities with supply chain staff, as well as more proactive utilization of an

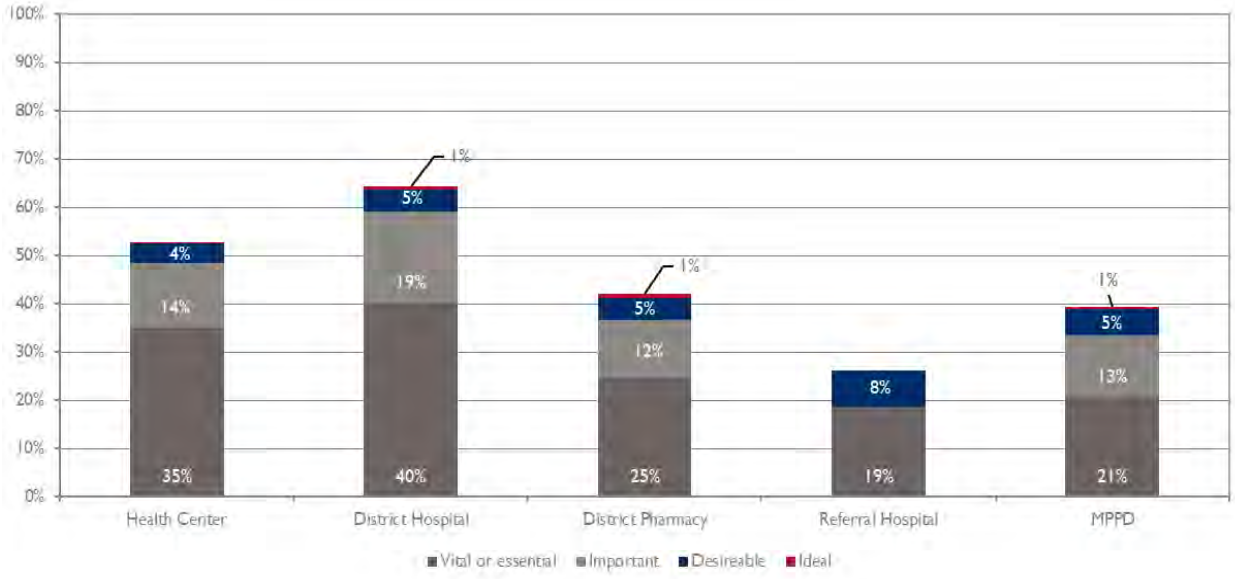
eLMIS system. Data shows capacity building is infrequent and does not adequately cover supply chain subjects. There needs to be adequate training and refresher training for supply chain staff to ensure they are updated with current trends in supply chain.

Recommendations

- The key metric to target for improvement is stocked according to plan. MOH should support all facilities in planning to improve this measure.
- It is recommended that the MOH explore ways to optimize existing space if possible, and then consider funding the acquisition of additional storage space to support improved commodities management in this functional module.
- It is recommended that the MOH focus on implementing training and retraining activities for supply chain staff to ensure they are updated with current trends, and in the use of eLMIS in the supply chain. With this focus on improving staff capacity, it is also recommended that trained staff undergo competency testing and job performance assessments.
- It is recommended that the MOH review staffing levels at the DPs to achieve higher levels of maturity.

DISTRIBUTION

Figure 7. Distribution Capability Maturity Model Score Per Level of Achievement by Level. (Includes Receiving for HC, DH, RH)



Maximum score for Vital or Essential is 50%; for important is 30%; for desirable is 15%; for ideal 5%. For instance, if Vital or Essential portion is actually 45%, it should be interpreted as 45/50. The **Methodology** section provides a more detailed explanation.

Select Key Capability Achievements – Distribution (Includes Receiving for HC, DH, RH)

TABLE 17. DISTRIBUTION – SELECT KEY CAPABILITY ACHIEVEMENTS	
INDICATORS FOR HEALTH CENTER LEVEL	% OF FACILITIES ACHIEVED
Proofs of delivery records are maintained.	100%
INDICATORS FOR DISTRICT HOSPITAL LEVEL	% OF FACILITIES ACHIEVED
Distribution schedule are received in advance from the District Pharmacy.	89%
INDICATORS FOR THE DISTRICT PHARMACY LEVEL	% OF FACILITIES ACHIEVED
An approved Distribution plan is in place.	100%
Distribution routes are pre-planned.	83%
Commodities are manually tracked as they move through the supply chain.	83%
Procedures and systems are in place for capturing and maintaining transportation data.	89%
INDICATORS FOR THE REFERRAL HOSPITAL LEVEL	% OF FACILITIES ACHIEVED
Proofs of delivery records are maintained.	100%
INDICATORS FOR THE MPPD LEVEL	% OF FACILITIES ACHIEVED
An approved Distribution plan is in place.	100%
Distribution routes are pre-planned.	100%
Commodities are manually tracked as they move through the supply chain.	100%
Procedures and systems are in place for capturing and maintaining transportation data.	100%

Key Capability Gaps – Distribution

TABLE 18. DISTRIBUTION – SELECT KEY CAPABILITY GAPS

INDICATOR FOR DISTRICT PHARMACY LEVEL	% OF FACILITIES WITH GAP	POSSIBLE SOLUTIONS
Transportation risks are assessed, identified, and documented continuously.	94%	Distribution planning should be comprehensive and involve senior management to ensure that adequate resources and risks assessment.
Distribution operations are reviewed at least annually for security compliance.	83%	Establish new SOP for annual review.
INDICATOR FOR REFERRAL HOSPITAL LEVEL (INCLUDES RECEIVING FOR HC, DH, RH)	**% OF FACILITIES WITH GAP**	**POSSIBLE SOLUTIONS**
Distribution schedules are received in advance from the DPs.	100%	SOPs should be drafted, reviewed, and approved for use to guide Distribution activities, including all processes supporting good Distribution practices and global best practices.
Requirement for controlled substance transported from DPs to HCs is monitored.	100%	Document and monitor process for transportation of controlled substances
INDICATOR FOR MPPD LEVEL	**% OF FACILITIES WITH GAP**	**POSSIBLE SOLUTIONS**
Distribution cost data is collected, including asset depreciation, HR, maintenance, outsourcing fleet costs, and fuel.	100%	Revise the M&E plan and budget process.
Transportation risks are assessed, identified, and documented continuously.	100%	Distribution planning should be comprehensive and involve senior management to ensure that adequate resources and risks assessment.
Distribution security measures are in place, including performing unannounced inspections, having security guards, documentation of minimum security requirements for truck and personnel, and all requirements are reviewed for compliance.	100%	Establish new SOP for security arrangements, including annual review.

TABLE 19. KEY PERFORMANCE INDICATOR 13: ON-TIME DELIVERY TO FACILITY

ROUTINE ORDERS

Unit receiving the order	Number orders sampled	Number of orders with full data	Percentage delivered on or before promised delivery date	Percentage delivered within 2 days of promised delivery date
Health Centers	385	242	55%	71%
District Hospitals	138	89	52%	65%
Referral Hospitals[1]	9	6	17%	67%
District Pharmacies[2]	14	13	31%	100%

EMERGENCY ORDERS

Unit receiving the order	Number orders sampled	Number of orders with full data	Percentage delivered on promised delivery date	Percentage delivered within 2 days of promised delivery date
Health Centers	122	76	87%	92%
District Hospitals	36	28	61%	86%
Referral Hospitals	11	11	64%	100%

TABLE 20. KEY PERFORMANCE INDICATOR 8: ORDER ADJUSTMENT RATE

INDICATOR	HCS	DHS	RHS	DPS	MPPD	MOH
KPI 8 – Order Adjustment Rate (range)				3 - 10%*	6 - 38%**	

*DPS: data represents downstream (to health facilities) percentage of orders adjusted
**MPPD: data represents mppd to district pharmacy (reception at dp) percentage of orders adjusted

Summary of Results

Overall maturity scores range by level of services from ~25-65%. Referral Hospitals have the lowest score, although this might be related to how RHs are also set up as health care service delivery facilities rather than as distribution facilities. KPIs indicated that, for routine orders, on-time deliveries ranged from 17%-55% of the time, with 65%-100% of routine orders arriving within two days after the delivery date. For emergency orders, on-time delivery ranged from 61%-87% with between 86%-100% of emergency order arriving within two days of the promised delivery date. Higher rates of on-time emergency orders are expected as emergency orders presumed an urgency of the request. Order adjustment ranges downstream from DPs and MPPD, respectively, ranged from 3%-10% and 6%-38%.

[1] Data only available from one RH
[2] Received from the MPPD

Discussion

For the Distribution functional module, maturity scores are lowest at the Referral Hospital and MPPD levels. This outcome is unexpected since the distribution activity is highest at the MPPD. This lower level of maturity likely has an impact on other elements lower down in the supply chain such as DPs. Distribution of commodities to facilities was low for on-time delivery. However, the rates were higher within 2 days of delivery date and emergency orders are received more quickly than on-time orders. These findings suggest the distribution function is finding ways to continue to provide patients with access to medicines even as it struggles with bottlenecks. Possible reasons for this bottleneck effect include: infrastructure challenges (e.g., not enough transportation resources for delivery was reported anecdotally by respondents), lack of risk assessment and established routine distribution plans, and overuse of emergency ordering. Distribution plans can help support efficient distribution execution and optimize physical resources like transportation vehicles. The use of eLMIS can help supply chain staff map out when and where they should distribute commodities. It is possible that staff identify orders as an emergency order when they would be better labeled as a routine order; this situation can occur due to lack of awareness around labeling criteria or, more likely, it emerges as a way to get items more quickly when routine deliveries are consistently late. Solving the other bottlenecks in the system may have a downstream impact of reduced reliance on emergency orders.

Recommendations

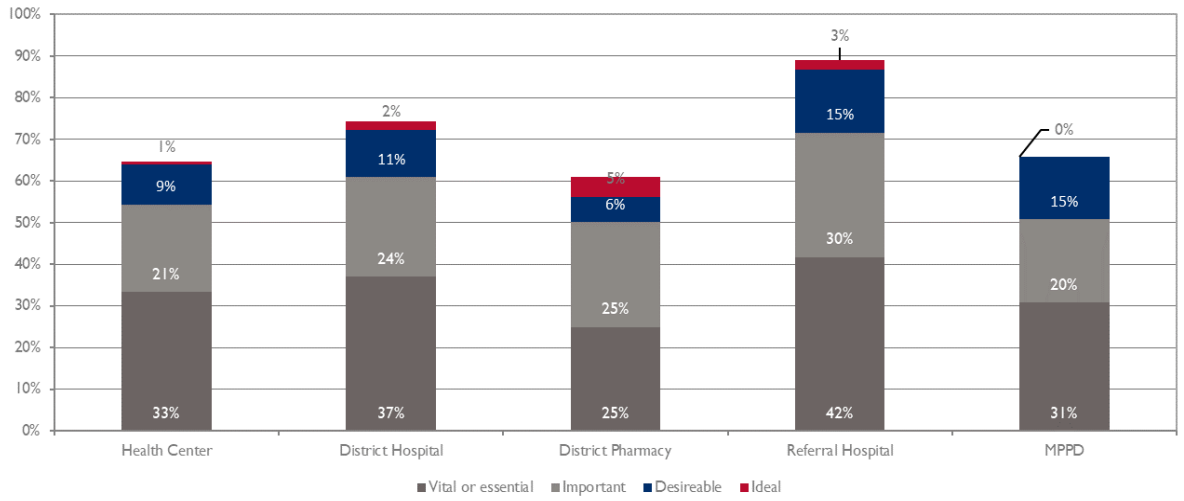
- It is recommended that the MOH support the development of routine, established distribution plans, training for supply chain staff on the plans and distribution planning, and monitoring implementation of these plans to identify bottlenecks in delivery and optimize the use of transportation resources. It may also be beneficial to explore the potential of purchasing off-the-shelf distribution planning software.

- It is recommended that the MOH place emphasis on capacity building around eLMIS (provision of adequate infrastructure such as IT/Internet equipment, as well as training of staff on the application of eLMIS tools) in order to improve distribution maturity

- It is recommended that the MOH provide refresher training for supply chain personnel regarding designation practices for routine and emergency orders, respectively.

POLICY AND GOVERNANCE

Figure 8. Policy and Governance Capability Maturity Model Score per Level of Achievement by Level



Maximum score for Vital or Essential is 50%; for important is 30%; for desirable is 15%; for ideal 5%. For instance, if Vital or Essential portion is actually 45%, it should be interpreted as 45/50. The Methodology section provides a more detailed explanation.

Select Key Capability Achievements – Policy and Governance

TABLE 21. POLICY & GOVERNANCE – SELECT KEY CAPABILITY ACHIEVEMENTS	
INDICATORS FOR THE DISTRICT HOSPITAL LEVEL	% OF FACILITIES ACHIEVED
STGs exist at this facility.	94%
INDICATORS FOR THE DISTRICT PHARMACY LEVEL	% OF FACILITIES ACHIEVED
A governing board, appointed by the local government is in place and meets annually.	100%
INDICATORS FOR THE REFERRAL HOSPITAL LEVEL	% OF FACILITIES ACHIEVED
STGs exist at this facility.	100%
INDICATORS FOR THE MPPD LEVEL	% OF FACILITIES ACHIEVED
Supply chain policies are in place that cover Waste Management, quality assurance, warehousing, storage, Procurement, financing, and HR.	100%
A governing board, appointed by the central government is in place.	100%
INDICATORS FOR THE HEALTH CENTER LEVEL	% OF FACILITIES ACHIEVED
Management policies or guidelines for the supply chain system are documented and in place.	100%
Supply chain policies cover Waste Management, quality assurance, Procurement, financing, & HR.	100%

Select Key Capability Gaps – Policy and Governance

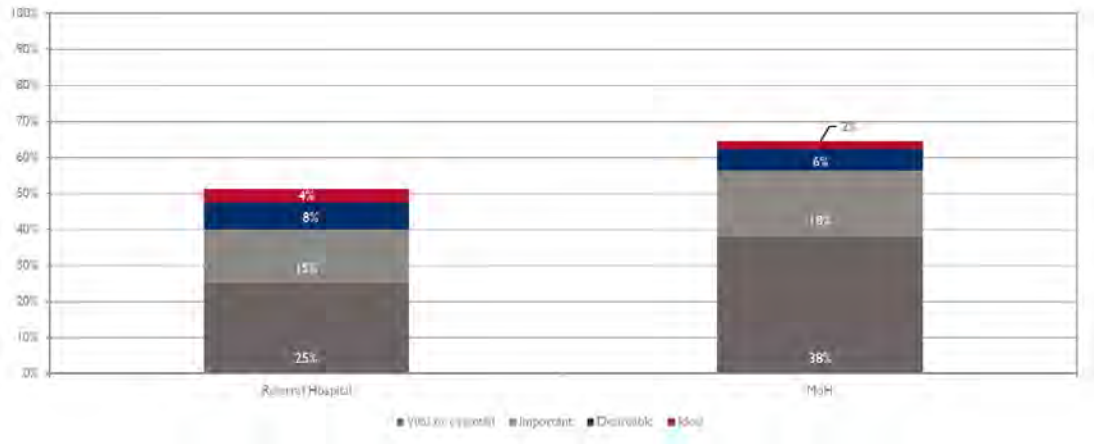
TABLE 22. CAPABILITY SCORE FOR POLICY AND GOVERNANCE BY MODULES BY LEVELS		
CAPABILITY MATURITY SCORES AT THE MPPD LEVEL	% NOT COMPLIANT	POSSIBLE SOLUTIONS
The owners appoint the governing board of the MPPD.	100%	The MPPD is wholly owned by government. All relevant stakeholders should be a part of the governance of MPPD
The board meets at least annually	100%	This Board of Directors should meet regularly to discuss and approve policy issues for the MPPD, at least annually.
The government plays a role on the governing board.	100%	The government should play a major role in the governance of the MPPD
Organization Directors play a role on the governing board.	100%	The Directors at the MPPD should also be involved in the governance of the MPPD.
CAPABILITY MATURITY SCORES AT THE HEALTH CENTER LEVEL	% NOT COMPLIANT	POSSIBLE SOLUTIONS
Supply chain policies covering warehousing storage are in place.	100%	SOPs should be reviewed for relevance to health centers; share, communicate, train, and ensure compliance by all staff.

Summary of Results

For Policy and Governance, maturity scores range between 62% - 84% for all levels of service of the total possible for Vital and Essential services. Over 90% of sites have in place Vital and Essential elements such as the existence of STGs, governing boards, and policies that address Waste Management, quality assurance, Procurement, financing, and HR. Management policies for the supply chain system are in place at the MOH level. Data on Policy and Governance were not collected at the MOH level of services as the Permanent Secretary's schedule did not align with the data collection period.

STRATEGIC PLANNING AND MANAGEMENT

Figure 9. Strategic Planning & Management Capability Maturity Model Score per Level of Achievement by Level



Maximum score for Vital or Essential is 50%; for important is 30%; for desirable is 15%; for ideal 5%. For instance, if Vital or Essential portion is actually 45%, it should be interpreted as 45/50. Understanding the CMM Results section provides a more detailed explanation.

Select Key Capability Achievements – Strategic Planning and Management

TABLE 23. STRATEGIC PLANNING & MANAGEMENT – SELECT KEY CAPABILITY ACHIEVEMENTS

INDICATORS FOR MOH LEVEL	% OF FACILITIES ACHIEVED
The health system has a supply chain strategic plan.	100%
The Supply Chain Implementation Plan includes a stakeholder map, strategic partnerships, SWOT analysis, long term goals, performance monitoring plan (PMP), and defined roles & responsibilities.	100%
The supply chain implementation plan status is reviewed by donors, central level staff, district level staff, and implementing partners.	100%

Select Key Capability Gaps – Strategic Planning and Management

TABLE 24. STRATEGIC PLANNING & MANAGEMENT– SELECT KEY CAPABILITY GAPS

INDICATOR FOR HEALTH CENTER LEVEL	% OF FACILITIES WITH GAP	POSSIBLE SOLUTIONS
Supply Chain Implementation Plan includes pharmacovigilance.	100%	Include pharmacovigilance as a key element in the Supply Chain Implementation Plan, addressing staffing, reporting, and monitoring.
Formal structure for monitoring the implementation of the strategic plan.	100%	Develop & implement an M&E Plan that is overseen by trained staff and includes regular reporting, review, and corrective action plans to close any identified gaps.
The supply chain risks are assessed every 1-2 years.	100%	Assemble a Risk Assessment Team to undertake a risk assessment and identify potential mitigation measures of the MOH regarding to supply chain at least every 1-2 years, reporting to the Board of Directors.

Summary of Results

Both referral hospitals and MOH levels of service have maturity scores of between 21-81% and 64%, respectively. All facilities at both levels have a strategic supply plan/implementation plan; however, facilities at both levels have not yet included Pharmacovigilance in that supply plan. Furthermore, neither level has established a formal structure for monitoring implementation of the strategic plan.

Discussion

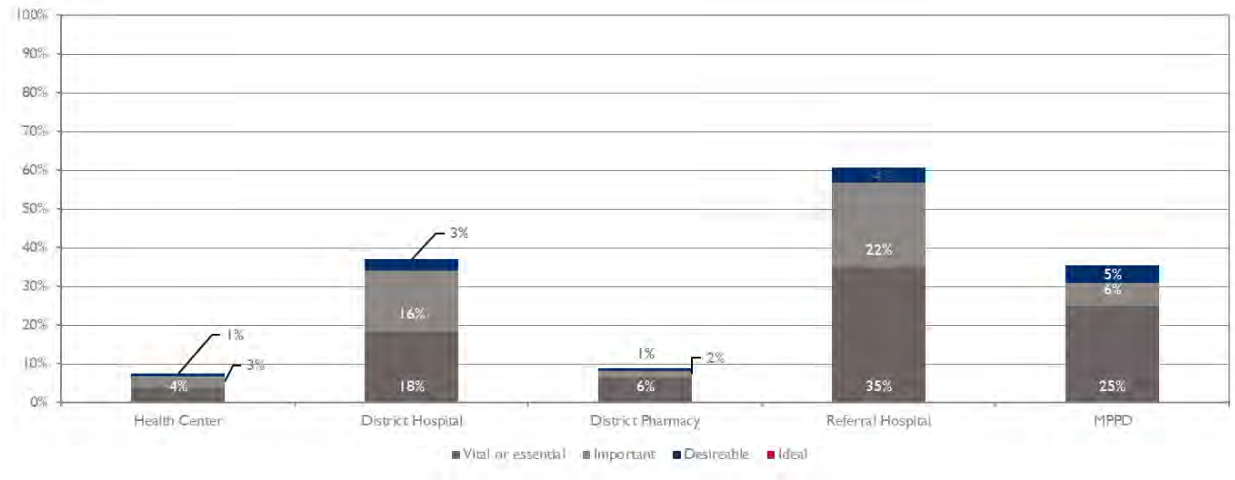
Strategic planning did not present with a high CMM score, despite there being a supply chain strategic plan in place. It is expected that the gap is related to implementation, i.e., that there is a plan, but it is not being implemented or monitored so as to deliver on the agreed upon strategy.

Recommendations

- The MOH should establish and disseminate a detailed implementation plan to achieve the objectives in the strategic plan, and create a monitoring and evaluation plan to routinely measure performance against plan.

QUALITY AND PHARMACOVIGILANCE

Figure 10. Quality Assurance & Pharmacovigilance Capability Maturity Model Score per Level of Achievement by Level



Maximum score for Vital or Essential is 50%; for important is 30%; for desirable is 15%; for ideal 5%. For instance, if Vital or Essential portion is actually 45%, it should be interpreted as 45/50. Understanding the CMM Results section provides a more detailed explanation.

Select Key Capability Achievements – Quality Assurance and Pharmacovigilance

TABLE 25. QUALITY ASSURANCE & PHARMACOVIGILANCE – SELECT KEY CAPABILITY ACHIEVEMENTS

INDICATORS FOR THE REFERRAL HOSPITAL LEVEL	% OF FACILITIES ACHIEVED
Staffs are aware of the presence of SOPs for medicine quality assurance.	100%
INDICATORS FOR THE MPPD LEVEL	**% OF FACILITIES ACHIEVED**
Adherence to medicine quality assurance SOPs are monitored on-site.	100%

Key Capability Gaps – Quality Assurance and Pharmacovigilance

TABLE 26. QUALITY ASSURANCE & PHARMACOVIGILANCE – SELECT KEY CAPABILITY GAPS

INDICATOR FOR HEALTH CENTER LEVEL	% OF FACILITIES WITH GAP	POSSIBLE SOLUTIONS
HCs regularly collect standard KPIs on adherence to SOPs related to medicine quality assurance.	94%	- Develop, disseminate, and support a comprehensive M&E Plan for all supply chain functions, including the monitoring of product quality through established KPIs. - Designate and train a specific staff person to coordinate M&E and quality assurance activities. - Collect, report, and analyze data on a regular basis to inform supply chain decisions.
SOPs for pharmacovigilance are in place.	96%	Develop SOPs for pharmacovigilance, share, train, and ensure compliance by all staff.
INDICATOR FOR DISTRICT HOSPITAL LEVEL	% OF FACILITIES WITH GAP	POSSIBLE SOLUTIONS
SOPs for pharmacovigilance are in place.	83%	Develop SOPs for pharmacovigilance, share, train, and ensure compliance by all staff.
DHs regularly collect standard KPIs on adherence to SOPs related to medicine quality assurance.	89%	-Develop, disseminate, and support a comprehensive M&E Plan for all supply chain functions, including the monitoring of product quality through established KPIs. -Designate and train a specific staff person to coordinate M&E and quality assurance activities at the DP level. -Collect, report, and analysis data on a regular basis to inform supply chain decisions.
INDICATOR FOR THE DISTRICT PHARMACY LEVEL	% OF FACILITIES WITH GAP	POSSIBLE SOLUTIONS
SOPs for pharmacovigilance are in place.	100%	Develop SOPs for pharmacovigilance, share, train, and ensure compliance by all staff.
Quality & pharmacovigilance data are shared with the central level.	89%	-Develop, disseminate, and support a comprehensive M&E Plan for all supply chain functions, including the monitoring of product quality through established KPIs. -Designate and train a specific staff person to coordinate M&E and quality assurance activities. -Collect, report, and analysis data on a regular basis to inform supply chain decisions.
INDICATOR FOR THE MPPD LEVEL	% OF FACILITIES WITH GAP	POSSIBLE SOLUTIONS
SOPs for pharmacovigilance are in place.	100%	As above.
Quality & pharmacovigilance data are shared with the central level.	100%*	-Develop, disseminate, and support a comprehensive M&E Plan for all supply chain functions, including the monitoring of product quality through established KPIs. -Designate and train a specific staff person to coordinate M&E and quality assurance activities at the DP level. -Collect, report, and analyze data on a regular basis to inform supply chain decisions.

* The gaps and possible solutions relate to quality, as pharmacovigilance is not relevant to MPPD. The central warehouse would not report adverse events because it is not a service delivery level facility.

Summary of Results

Quality and Pharmacovigilance is an area that appears to be low in maturity as no levels of service exceed 60% and health centers and district pharmacy levels are very immature with scores of less than 10%. At all levels of service, staff are aware that SOPs exist for medicine quality assurance and monitoring compliance with medicine quality assurance SOPs. However, KPIs are not regularly collected for adherence to medicine quality SOPs and SOPs for pharmacovigilance are not in place. Additionally, Quality and Pharmacovigilance data are not shared with the central level.

Discussion

The results for this function point to a gap in the system from the absence of both routine quality control testing of products and a structured pharmacovigilance system. While there are SOPs in place at the RH and MPPD levels, and there was no evidence of poor quality medicines in the system, there was also no evidence of an overarching policy or process(es) to ensure that any quality failures are detected. Equally there was no evidence provided to the assessment team of a consistent approach to pharmacovigilance or a standard reporting structure for pharmacovigilance events.

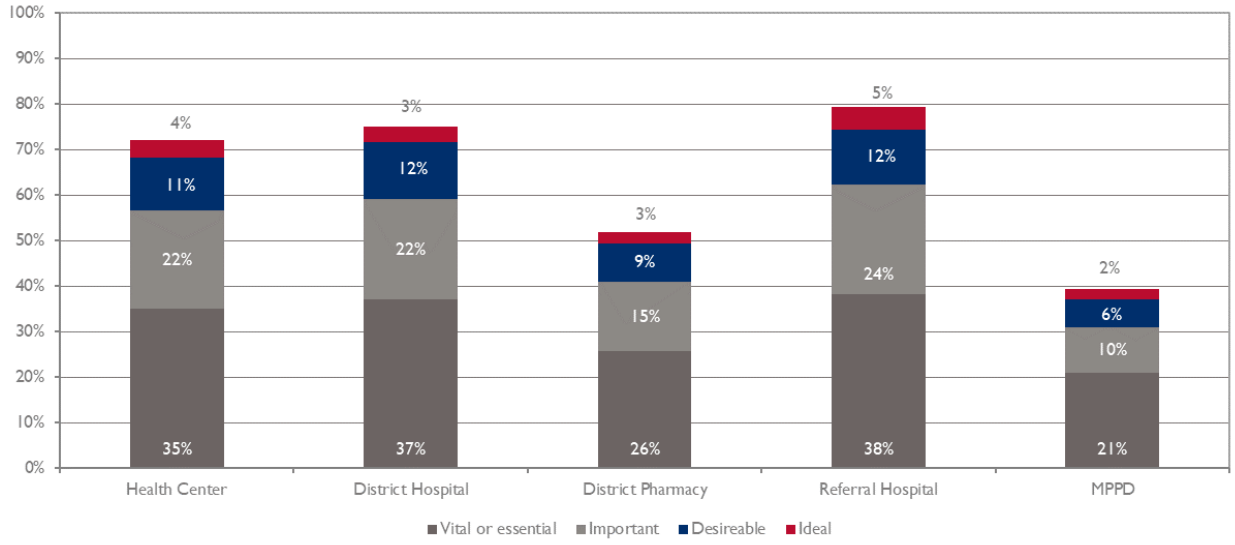
Recommendations

- It is recommended that the MOH seeks support from WHO or donor partners in quality assurance and pharmacovigilance to reduce patient risk and ensure quality medicines continued to be supplied.

- It is recommended that the government work with its development partners to institute a robust quality testing and pharmacovigilance system. Doing so will contribute to the protection of patients from poor quality medicines that may leak through the system as well as contribute to global policies to tackle antimicrobial resistance.

LOGISTICS MANAGEMENT INFORMATION SYSTEM

Figure 11. Logistic Management Information Systems Capability Maturity Model Score per Level of Achievement by Level



Maximum score for Vital or Essential is 50%; for important is 30%; for desirable is 15%; for ideal 5%. For instance, if Vital or Essential portion is actually 45%, it should be interpreted as 45/50. Understanding the CMM Results section provides a more detailed explanation.

Select Key Capability Achievements – Logistics Management Information system

TABLE 27. LOGISTICS MANAGEMENT INFORMATION SYSTEMS – SELECT KEY CAPABILITY ACHIEVEMENTS	
INDICATORS FOR THE HEALTH CENTER LEVEL	% OF FACILITIES ACHIEVED
Data-points are recorded in the Paper LMIS, including stock-on-hand, consumption, losses and adjustments, expiries, issues and receipts, quality of reordering, and # of days of stock out.	100%
Data-points are recorded in the eLMIS, including stock-on-hand, consumption, losses and adjustments, expiries, issues and receipts, safety stock for each commodity, quality of recording, expiration dates, and # of days of stock out.	100%
INDICATORS FOR THE DISTRICT HOSPITAL LEVEL	% OF FACILITIES ACHIEVED
Data-points are recorded in the paper-based LMIS, including stock-on-hand, consumption, losses and adjustments, expiries, issues and receipts, quality of reordering, and # of days of stock out.	100%
INDICATORS FOR THE DISTRICT PHARMACY LEVEL	% OF FACILITIES ACHIEVED
Data-points are recorded in the eLMIS, including stock-on-hand, consumption, losses and adjustments, expiries, issues and receipts, safety stock for each commodity, quality of recording, expiration dates, and # of days of stock out.	100%
Tracks stock at lower health facilities/service delivery points in the catchment area.	94%
INDICATORS FOR THE REFERRAL HOSPITAL LEVEL	% OF FACILITIES ACHIEVED
Data-points are recorded in the paper-based LMIS, including stock-on-hand, consumption, losses and adjustments, expiries, issues and receipts, quality of reordering, and # of days of stock out.	100%
Data-points are recorded in the eLMIS, including stock-on-hand, consumption, losses and adjustments, expiries, issues and receipts, safety stock for each commodity, quality of recording, expiration dates, and # of days of stock out.	100%
INDICATORS FOR THE MPPD LEVEL	% OF FACILITIES ACHIEVED
Data-points are recorded in the eLMIS, including paper-based LMIS, stock-on-hand, losses and adjustments, expiries, issues and receipts, and expiration date.	100%

Select Key Capability Gaps – Logistics Management Information System

TABLE 28. LOGISTICS MANAGEMENT INFORMATION SYSTEMS – SELECT KEY CAPABILITY GAPS

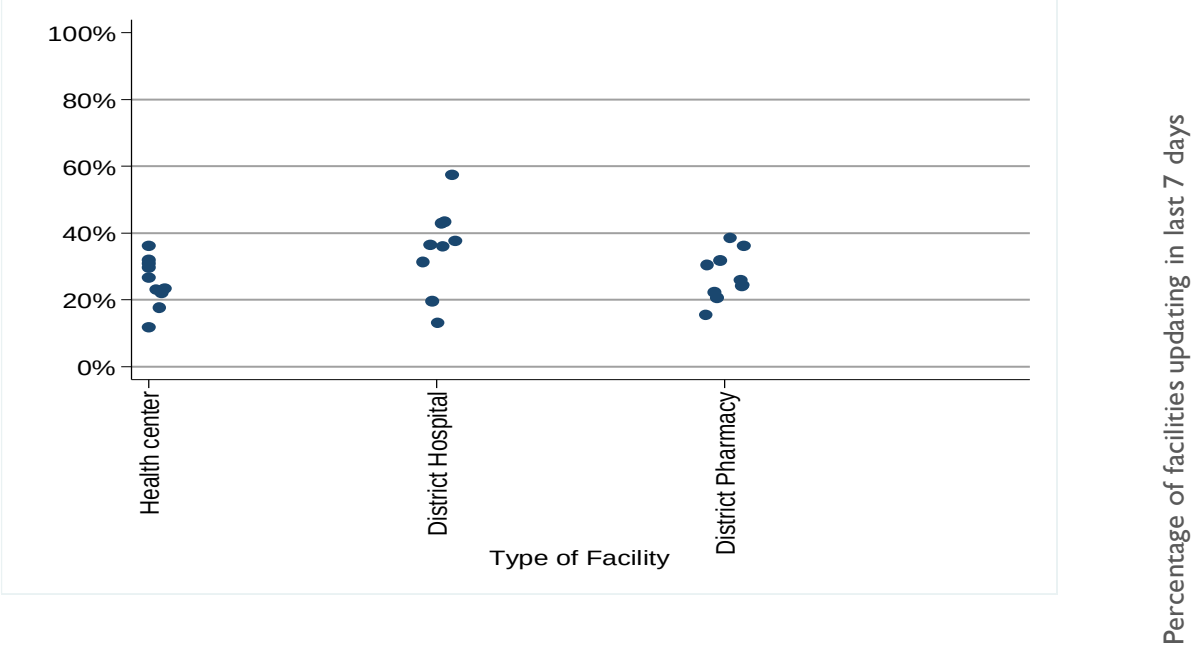
INDICATOR FOR HEALTH CENTER LEVEL	% OF FACILITIES WITH GAP	POSSIBLE SOLUTIONS
Training for LMIS, data analysis, and quality reviews are detailed in a SOP.	81 - 96%	The SOPs for LMIS should clearly outline the processes included in each SOP, including training, data analysis and quality review. SOPs should be clearly visible with regular communication/training on what is included in SOPs and recent SOP updates.
INDICATOR FOR DISTRICT HOSPITAL LEVEL	% OF FACILITIES WITH GAP	POSSIBLE SOLUTIONS
Training for LMIS, data analysis, and qualitative reviews are detailed in SOP.	83%	As above
INDICATOR FOR THE DISTRICT PHARMACY LEVEL	% OF FACILITIES WITH GAP	POSSIBLE SOLUTIONS
eLMIS SOPs exist, but may not include or be clearly labeled for LMIS training, data collection, data analysis, quality reviews, and reporting.	83-100%	As above
INDICATOR FOR THE MPPD LEVEL	% OF FACILITIES WITH GAP	POSSIBLE SOLUTIONS
Data points recorded in the eLMIS include consumption, safety stock for each commodity, and quantity of reordering, #of days of stock out.	100%	Training, documentation and regular review to inform staff of the important data points recorded or calculated in the eLMIS system and where to find the information if needed. Include a discussion on how data is reported, when data could come from other systems (ERP) or if there are multiple terms for the same data (ex. consumption may be referred to as "distribution" at the MPPD level)
eLMIS SOPs exist , but may not include or be clearly labeled for LMIS training, data collection, data analysis, quality reviews, summary reporting, and frequency of reporting.	100%	As above.
eLMIS reports include performance data from all levels of the supply chain on facility level performance.	100%	KPIs are Vital for any eLMIS system and should be reported regularly. Routine management and decisions on improvements or changes in the supply chain system should be based on the data obtained from all levels.

TABLE 29. LOGISTICS MANAGEMENT INFORMATION SYSTEMS KEY PERFORMANCE INDICATOR SCORES BY LEVEL

INDICATOR	HCS	DHS	RHS	DPS	MPPD	MOH
KPI 15 – eLMIS Data Updated in the Last 7 Days (Average)	26%	36%	N/A	27%	26%	-
KPI 5a – Stock Accuracy for eLMIS (Average)	33%	42%	N/A	30%	N/A	-
KPI 5b – Average Deviation from 100% Accuracy	48-6013%	36-2050%	N/A	24-15510%	N/A	-

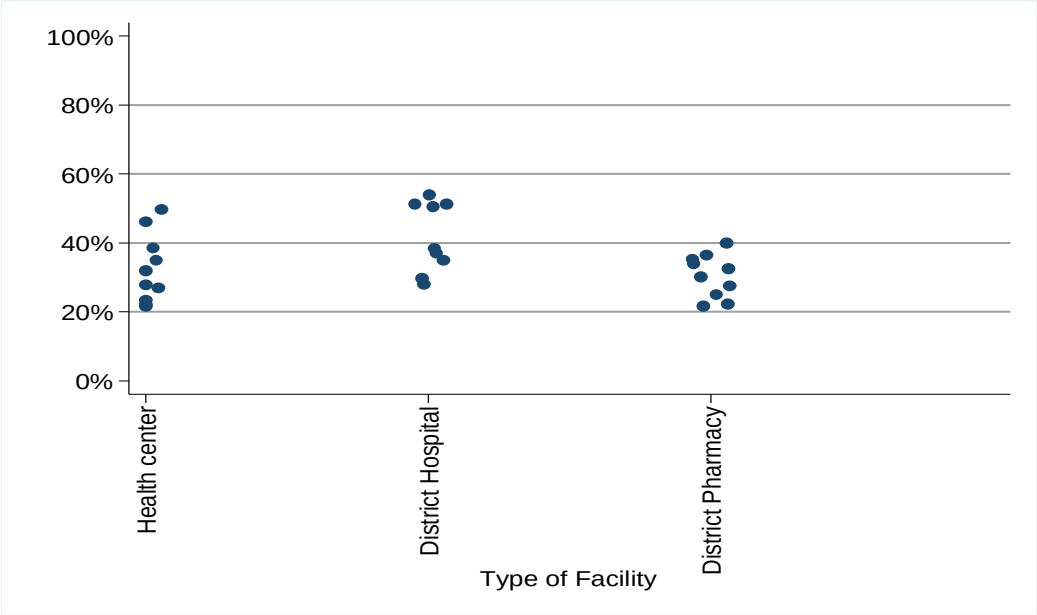
*Paper-based results are on page 23

Figure 12. Key Performance Indicator 15: Logistics Management Information Systems Updated in the Last 7 Days.



Each dot represents a single tracer commodity, reflecting the percentage of facilities visited in the assessment that had updated the eLMIS record for that commodity within the seven days prior to the assessment teams' visits.

Figure 13. Key Performance Indicator 5B: Logistics Management Information Systems Accuracy (% of Facilities where the Electronic Logistics Management Information System record listed the observed number of commodity in stock)



Each dot represents a single tracer commodity, reflecting the percentage of facilities visited in the assessment for which the value recorded in the eLMIS matched the amount of commodity found in a physical count.

Summary of Results

Average CMM score for LMIS ranges from 39%-79%. The key capability achievements indicate that data elements are recorded in both the LMIS and eLMIS system and the district pharmacies are responsible for tracking stock at lower health facilities/service delivery points in the service area. The gaps show that only few facilities are engaging in training for LMIS (and eLMIS), data analysis, and quality reviews. At the MPPD level, staff may not be familiar with all the important data points recorded or calculated in the eLMIS system and where to find the information if needed, such as consumption, safety stock for each commodity, and timeliness of reporting. The LMIS reports also do not currently include performance data from all levels of the supply chain on facility level performance. For KPIS across the levels of service, updating data in the eLMIS in the last 7 days varied from 26%-36% and average stock accuracy ranged from 30%-42%.

Discussion

While scores for eLMIS capability are generally low across the SC levels in Rwanda, they are lowest at the DPs and the MPPD, again suggesting a need for improvement in capacity for use of eLMIS at these facilities. In situations where the eLIMS is in place, it was also not being routinely updated within 7 days of activity.

The increased use of eLMIS will improve response/service delivery to lower level facilities, and support improved supply chain planning. Efforts should be made to ensure availability of infrastructure for eLMIS, capacity building, and confidence in the use of the eLMIS by all supply chain staff.

A combination of eLMIS and paper based LMIS is used across all levels of healthcare system and the main driver of this duplication is the existing Policy/Regulation that requires the existence of both systems. The, eLMIS is the preferred system across all levels of healthcare. It is considered by staff to be more efficient, faster, has better capabilities for analysis, reporting and ease of data retrieval.

The key challenges with the use of eLMIS reported by respondents are internet connectivity, lack of time to enter data into the system due to conflicting priorities/tasks, and lack of skilled staff. Facilities, however, noted that both LMIS systems could provide reliable data, but eLMIS offered more advantages such as ease of use and better capabilities for analysis and reporting. MPPD indicated saving time using eLMIS alone (estimated by some respondents to be more than 15 hours per month).

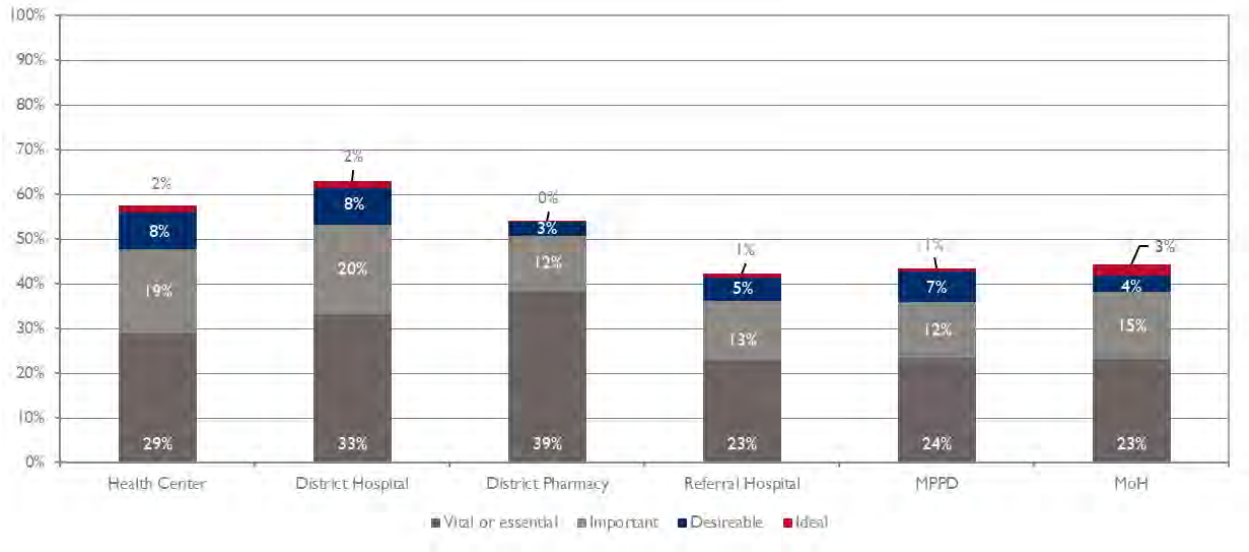
Possibly as a result of the time and resource needed to maintain dual systems, facilities at all levels are not utilizing the analytical capacity within the eLMIS system as a decision-making tool in making supply chain decisions. A focused program of capacity building and training in use of the eLMIS at all levels will build capacity and confidence in this powerful tool, enabling the MOH to retire the paper-based system.

Recommendations

- It is recommended that the MOH develop and implement staff (re)training on how to use eLMIS software
- It is recommended that the MOH support additional infrastructure (e.g., internet connectivity) to facilitate the transition to eLMIS as standard practice.
- It is recommended that the MOH develop a timeline and roadmap to fully converting to eLMIS, retiring the policies that require duplicative paper-based LMIS activities.

HUMAN RESOURCES

Figure 14. Human Resources Capability Maturity Model Score per Level of Achievement by Level



Maximum score for Vital or Essential is 50%; for important is 30%; for desirable is 15%; for ideal 5%. For instance, if Vital or Essential portion is actually 45%, it should be interpreted as 45/50. Understanding the CMM Results section provides a more detailed explanation.

Select Key Capability Achievements – Human Resources

TABLE 30. HUMAN RESOURCES – SELECT KEY CAPABILITY ACHIEVEMENTS	
INDICATORS FOR THE HEALTH CENTER LEVEL	% OF FACILITIES ACHIEVED
All supply chain personnel have a job description.	83%
All staffs have access to their job descriptions.	93%
Supportive supervision takes place at least twice a year.	98%
INDICATORS FOR THE DISTRICT HOSPITAL LEVEL	% OF FACILITIES ACHIEVED
All supply chain personnel have a job description.	94%
All staffs have access to their job descriptions.	100%
The facility provided supportive supervision to health posts and/or community health workers.	94%
INDICATORS FOR THE DISTRICT PHARMACY LEVEL	% OF FACILITIES ACHIEVED
Staff competencies and experiences match the job requirements in the areas of Distribution, MIS, ordering, reporting, and medicines management.	94%
All supply chain personnel have a job description.	100%
All staffs have access to their job descriptions.	100%
Capacity building trainings covered warehousing Distribution, LMIS, ordering, reporting, and medicine management.	89-100%*
INDICATORS FOR THE REFERRAL HOSPITAL LEVEL	% OF FACILITIES ACHIEVED
All supply chain personnel have a job description.	100%
All staffs have access to their job descriptions.	100%
Staffs undergo performance reviewed on an annual basis.	100%
INDICATORS FOR THE MPPD LEVEL	% OF FACILITIES ACHIEVED
Staff competencies and experiences match the job requirements in the areas of Distribution, LMIS, ordering, reporting, Procurement, forecasting & quantification, Waste Management, finance, quality & pharmacovigilance, and medicines management.	100%
All supply chain personnel have a job description.	100%
All staffs have access to their job descriptions.	100%
A capacity building plan covers forecasting quantification, Procurement, supply planning, ordering, reporting, Waste Management, medicine management, quality, pharmacovigilance, financial management, treatment guidelines, pharmacy store management, warehousing, Distribution, LMIS, and changes in national policy.	100%

INDICATORS FOR THE MOH LEVEL	% OF FACILITIES ACHIEVED
A workforce plan is in place for HR management that addresses supply chain personnel.	100%
Staff competencies and experiences match the job requirements in the areas of Distribution, LMIS, ordering, reporting, Procurement, forecasting & quantification, Waste Management, finance, quality & pharmacovigilance, and medicines management.	100%

* This line represents multiple questions / indicators. The % of facilities achieving these multiple indicators is shown as a range.

Select Key Capability Gaps – Human Resources

TABLE 31. HUMAN RESOURCES – SELECT KEY CAPABILITY GAPS

INDICATOR FOR HEALTH CENTER LEVEL	% OF FACILITIES WITH GAP	POSSIBLE SOLUTIONS
Workforce capacity building plans cover ordering and reporting.	96%	Develop a capacity building plan including ordering, reporting, treatment guidelines, and financial management. A pool of Master Trainers should be developed to ensure sustainability of capacity building and they should be involved in supportive supervision on an on-going basis.
INDICATOR FOR DISTRICT HOSPITAL LEVEL	% OF FACILITIES WITH GAP	POSSIBLE SOLUTIONS
Supportive supervision is provided by central warehouse staff.	89%	Develop guidelines for the MPPD to provide supportive supervision to DHs.
INDICATOR FOR THE DISTRICT PHARMACY LEVEL	% OF FACILITIES WITH GAP	POSSIBLE SOLUTIONS
Supportive supervision is provided by central warehouse staff.	94%	Develop guidelines for the MPPD to provide supportive supervision to DPs.
INDICATOR FOR THE REFERRAL HOSPITAL LEVEL	% OF FACILITIES WITH GAP	POSSIBLE SOLUTIONS
Supportive supervision is provided by MOH staff, central warehouse staff, and district pharmacy staff at least twice per year.	100%	Develop and implement a protocol that ensures that supportive supervision is provided at least twice a year.

INDICATOR FOR THE MPPD LEVEL	% OF FACILITIES WITH GAP	POSSIBLE SOLUTIONS
A HR management plan exists and incorporates future needs for supply chain personnel.	100%	Develop an HR plan at the MPPD level that incorporates future needs for supply chain personnel and recommend possible funding requirements.
Supportive supervision is provided by MOH staff, and central warehouse staff, at least twice per year.	100%	Develop and implement a protocol that ensures that supportive supervision is provided at least twice a year to lower level operational staff of the MPPD.
Managers and other high-level staff receive annual supportive supervisions from the MOH.	100%	Develop and implement a protocol that ensures that supportive supervision is provided at least annually to higher level staff at the MPPD.
INDICATOR FOR THE MINISTRY OF HEALTH LEVEL	% OF FACILITIES WITH GAP	POSSIBLE SOLUTIONS
Staff has access to their job descriptions.	100%	Develop and implement a policy for staff to receive a copy of their job description in a documented process to ensure full understanding of roles and responsibilities.
A supply chain management training plan exists and is aligned to training needs assessments.	100%	Develop and implement a supply chain management training plan, informed by regular training needs assessments, to guide capacity development of supply chain staff at all levels.

TABLE 32. HUMAN RESOURCES KEY PERFORMANCE INDICATOR SCORE BY LEVEL

INDICATOR	HCS	DHS	RHS	DPS	MPPD	MOH
KPI 14a - % of Key Positions Filled on Day of Visit	82%	88%	83%	87%	86%	-
KPI 14b - % of Staff Leaving (2016)*	10%	13%	8%	10%	7%	-
% of Facilities with No Vacancies	78%	72%	50%	61%	N/A	-

*Of those staff working in January 2016, the percentage that were no longer working at the facility at the end of 2016.

Summary of Results

Human Resources displayed maturity scores ranging from 39-63% across all levels of service. Key achievements include the existence of job descriptions for varying roles within the supply chain, access to job descriptions for staff, supportive supervision provided at least twice a year, staff competencies and experience match the job requirements for roles, and capacity building trainings are completed. Other achievements are the presence of a capacity building plan and a workforce plan. Few facilities have supportive supervision from central warehouse staff, MOH staff, and district pharmacy staff. Generally, workforce capacity building plans were not present (only 4% had them). Further, there were no HR management plans to incorporate future needs for supply chain personnel and there was no supply chain management training plan. On the KPIs, the number of key positions that were filled on the day of the visit ranged between 82%-88%. In 2016, turnover ranged between 7% and 13%.

Discussion

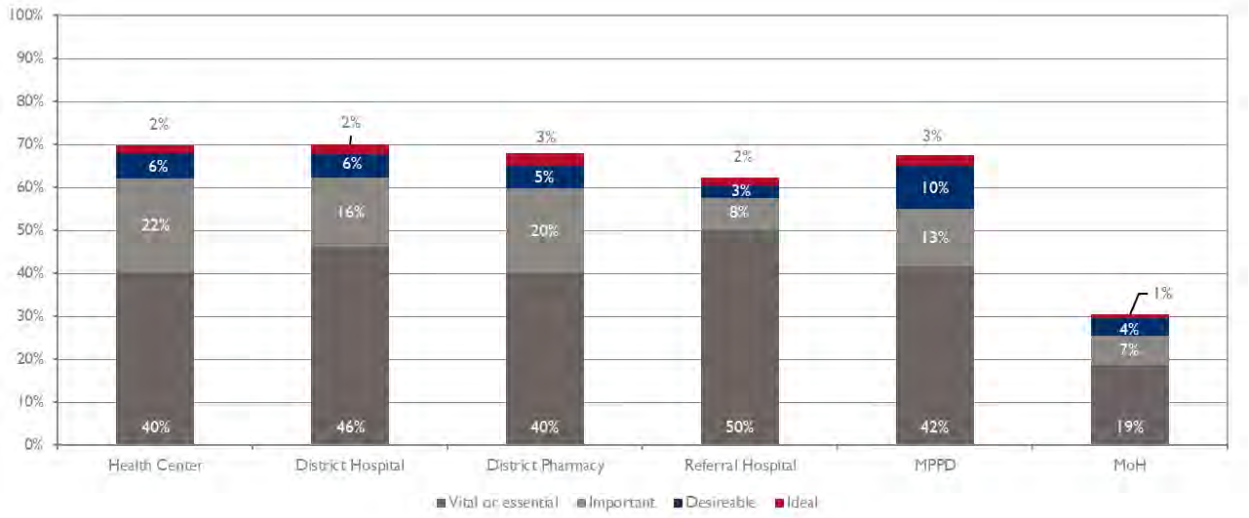
The HR capability scores fall below 60 for all levels of service except DHs. The lowest overall CMM scores were at the RHs and the highest average scores were at the DHs. DPs had the strongest Vital and Essential capabilities, but limited advanced or state of the art capabilities. This may be due to the fact that, there is no direct policy to recruit Supply Chain staff, but rather, staff are generally recruited for the Public Service and then posted to Supply Chain functions. There needs to be an immediate policy to recruit and retain trained Supply Chain experts, with clear job descriptions and capacity building plan developed to ensure continuous personnel development for Supply Chain. However, the KPI results are generally good, with the level of staff in position in key roles, staff departure and staff turnover all at target levels, and consistent with levels seen at well performing organizations, as per evidence from HR professional organizations.

Recommendations

- It is recommended that the MOH implements a policy to recruit and retain supply chain experts.
- It is recommended that the MOH develop clear job descriptions for all supply chain staff roles.
- It is recommended that the MOH develop and implement a capacity building plan to ensure continuous personnel development for the supply chain.

FINANCIAL SUSTAINABILITY

Figure 15. Financial Sustainability Capability Maturity Model Score per Level of Achievement by Level



Maximum score for Vital or Essential is 50%; for important is 30%; for desirable is 15%; for ideal 5%. For instance if Vital or Essential portion is actually 45%, it should be interpreted as 45/50. Understanding the CMM Results section provides a more detailed explanation.

Select Key Capability Achievements – Financial Sustainability

TABLE 33. FINANCIAL SUSTAINABILITY – SELECT KEY CAPABILITY ACHIEVEMENTS	
INDICATORS FOR THE HEALTH CENTER LEVEL	% OF FACILITIES ACHIEVED
The facility has the financial responsibility for maintaining its own drug stocks.	94%
Budgets are prepared annually.	98%
Budgets are updated in response to operations changes.	81%
INDICATORS FOR THE DISTRICT HOSPITAL LEVEL	% OF FACILITIES ACHIEVED
Budgets are prepared annually.	100%
Budgets are updated in response to operations changes.	94%
INDICATORS FOR THE DISTRICT PHARMACY LEVEL	% OF FACILITIES ACHIEVED
Budgets are prepared annually.	100%
The organization purchases its own medicines from the private sectors.	100%
INDICATORS FOR THE REFERRAL HOSPITAL LEVEL	% OF FACILITIES ACHIEVED
The organization has the financial responsibility for maintaining its own drug stocks.	100%
The government addresses any budget shortfalls.	100%

Budgets are prepared annually.	100%
INDICATORS FOR THE MPPD LEVEL	% OF FACILITIES ACHIEVED
The government is the primary sources of funding or way of generating revenue.	100%
Budgets are prepared annually.	100%
The organization purchases its own medicines from the private sectors.	100%
The organization has the financial responsibility for maintaining its own drug stocks.	100%
INDICATORS FOR THE MOH LEVEL	% OF FACILITIES ACHIEVED
Supply chain costs are funded by the Government through health insurance and user fees.	100%
Budgets are prepared more than once a year.	100%
There is a cost share plan in place for the supply chain.	100%
Cost-sharing is in the form of financial support.	100%

Select Key Capability Gaps – Financial Sustainability

TABLE 34. FINANCIAL SUSTAINABILITY – SELECT KEY CAPABILITY GAPS

INDICATOR FOR THE DISTRICT PHARMACY LEVEL	% OF FACILITIES WITH GAP	POSSIBLE SOLUTIONS
The cost of supply chain activities, including products, warehousing, Distribution, personnel, overhead, service deliver (etc.) are tracked.	100%	Develop and implement a system to track and monitor all supply chain costs for the DPs as discussed previously elsewhere.
INDICATOR FOR THE MPPD LEVEL	% OF FACILITIES WITH GAP	POSSIBLE SOLUTIONS
Budgets are updated in response to changes in operations.	100%	Perform budget reviews against target at least annually to correct shortfalls and to identify new and emerging issues in the budgets.
The cost of supply chain activities, including products, warehousing, Distribution, personnel, overhead, service deliver (etc.) are tracked.	100%	Develop and implement a system to track, disaggregate, and monitor all supply chain costs across all levels.
Facilities purchase their own medicines and if so, these are benchmarked against market indices.	100%	Ensure a system of Procurement that guarantees value for money, whereby facilities benchmark prices against market indices and allow for competition among selected vendors.

Summary of Results

For financial sustainability, CMM scores ranged between 31%-70%. All levels of service, except the MOH, presented with high maturity scores within the Vital and Essential services level of achievement. Key achievements include having the financial responsibility to maintain its own drug stocks, purchasing

medicines from the private sector, and a cost share plan is both in place and used as the form of financial support. Other achievements include having annually prepared budgets and updating these documents in response to operations changes. The government also addresses any shortfalls, is the primary source of funding or way of generating revenue, and supply chain costs are funded by the government through health insurance and user fees. Few facilities track the cost of supply chain activities and that facilities are not purchasing their own medicines and benchmarking these against market indices.

Discussion

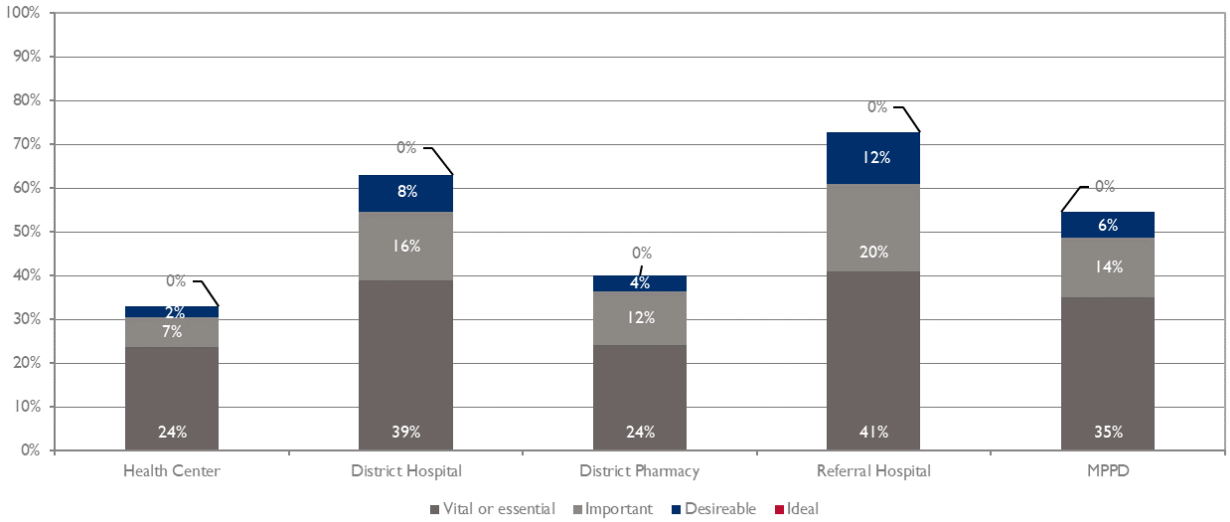
The maturity of Financial Sustainability ranges between 62-70% in the main body of the system. The MOH score is low due to the lack of a sustainability plan to address the current level of donor dependency. Elsewhere, the main weakness is the lack of knowledge or control of management costs for distribution and warehousing

Recommendations

- MOH should establish a Financial Sustainability plan with development partners to address the issue of Financial Sustainability over the medium- to long-term.
- MOH should establish a system of costs and budget monitoring and analysis for the key cost centers in the public supply chain, e.g. warehouse costs, distribution costs and personnel overhead.

WASTE MANAGEMENT

Figure 16. Waste Management Capability Maturity Model Score per Level of Achievement by Level



Maximum score for Vital or Essential is 50%; for important is 30%; for desirable is 15%; for ideal 5%. For instance, if Vital or Essential portion is actually 45%, it should be interpreted as 45/50. Understanding the CMM Results section provides a more detailed explanation.

Select Key Capability Achievements – Waste Management

TABLE 35. WASTE MANAGEMENT – SELECT KEY CAPABILITY ACHIEVEMENTS	
INDICATORS FOR THE DISTRICT HOSPITAL LEVEL	% OF FACILITIES ACHIEVED
Approved SOPs for Waste Management are in place and accessible to staff.	94%
The Waste Management SOP includes disposal procedures.	83%
Unusable pharmaceutical products stored separately.	89%
INDICATORS FOR THE REFERRAL HOSPITAL LEVEL	% OF FACILITIES ACHIEVED
Approved SOPs for Waste Management are in place and accessible to staff.	100%
INDICATORS FOR THE MPPD LEVEL	% OF FACILITIES ACHIEVED
Approved SOPs for Waste Management are in place and accessible to staff.	100%
The Waste Management SOP includes disposal procedures.	100%
Unusable pharmaceutical products stored separately.	100%

Select Key Capability Gaps – Waste Management

TABLE 36. WASTE MANAGEMENT – SELECT KEY CAPABILITY GAPS

INDICATOR FOR THE HEALTH CENTER LEVEL	% OF FACILITIES WITH GAP	POSSIBLE SOLUTIONS
Formal internal audits of Waste Management system take place at least every 2 years.	87%	Establish a policy for internal & external audit of Waste Management. Ensure supervision of incineration by a regulatory authority.
INDICATOR FOR THE REFERRAL HOSPITAL LEVEL	% OF FACILITIES WITH GAP	POSSIBLE SOLUTIONS
Incineration is supervised by a regulatory authority.	100%	As above
INDICATOR FOR THE MPPD LEVEL	% OF FACILITIES WITH GAP	POSSIBLE SOLUTIONS
Formal, external audits of the Waste Management system take place at least every 2 years.	100%	As above

Summary of Results

Variable levels of maturity existed within Waste Management, with scores ranging from 0-92%. Key achievements include having approved Waste Management SOPs in place, including disposal procedures. Other achievements include storing unusable pharmaceutical products separately. Few formal internal/external audits and incineration supervision activities were reported.

Discussion

The CMM scores indicate that except for the referral hospitals, capability 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.

Recommendations

- The MOH should establish an annual plan for the routine collection and disposal of pharmaceutical waste from all levels of the system, with an increased awareness of the existing SOPs by key managers.

In the next section, CMM and KPI results are presented by level of service.

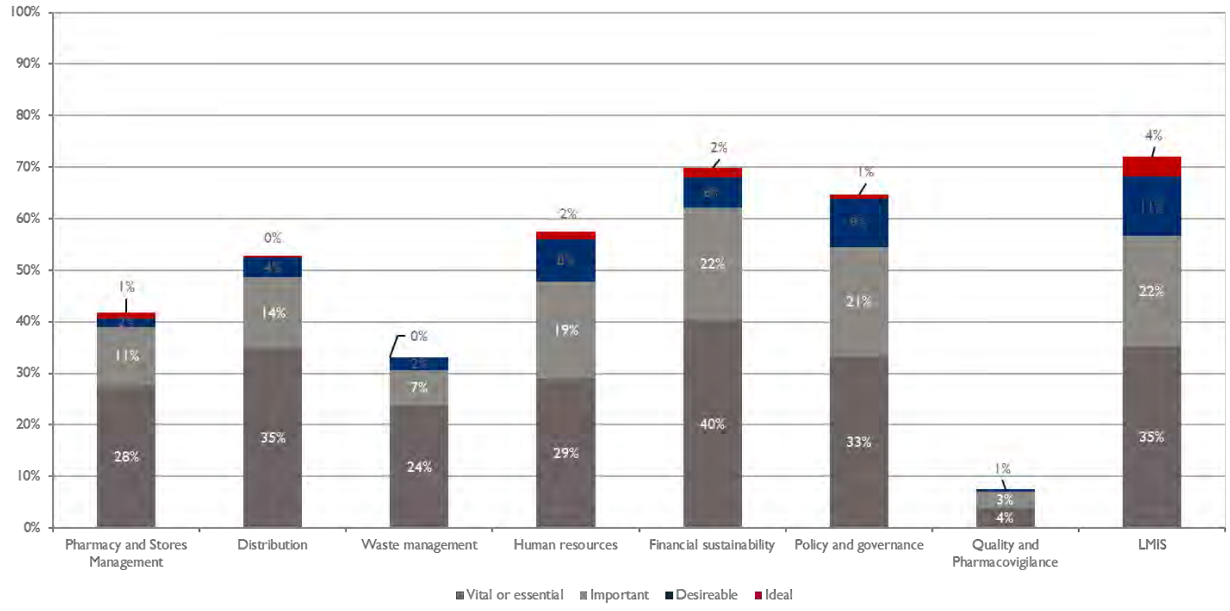
BY LEVEL OF SERVICE: OVERALL CAPABILITY MATURITY MODEL AND KPI RESULTS

HEALTH CENTER

TABLE 37. HEALTH CENTERS CAPABILITY MATURITY MODEL SCORE BY MODULE (AVERAGE SCORE & RANGE) (N=54)

MODULE	AVERAGE %	MODULE	AVERAGE %
Forecasting and Supply Planning	-	Human Resources	58% (10 79%)
Procurement	-	Financial Sustainability	70% (33 98%)
Pharmacy and Stores Management	42% (12 - 54%)	Policy and Governance	65% (0 - 100%)
Distribution/Receiving	53% (13 - 100%)	Quality and Pharmacovigilance	8% (0 - 53%)
Waste Management	33% (0 - 92%)	LMIS	72% (23 - 93%)
Strategic Planning & Management	-		

Figure 17. Health Center Level of Achievement by Module Area



Maximum score for Vital or Essential is 50%; for important is 30%; for desirable is 15%; for ideal 5%. For instance if Vital or Essential portion is actually 45%, it should be interpreted as 45/50. Understanding the CMM Results section provides a more detailed explanation.

TABLE 38. SELECT KPI RESULTS FOR HEALTH CENTERS	
INDICATORS	HC
Average # of days per month with stock outs (Overall for Tracer Commodities)	15.7
% of tracer commodities, out-of-stock on day of visit (Overall)	5%
% of orders delivered on promised delivery date	63%
% of Emergency orders, out of all orders	23%
% of facilities with any stock outs of any of the 10-tracer commodities October 2016-March 2017	69%

Select Key Capability Achievement – Health Center Level

TABLE 39. HEALTH CENTER LEVEL – SELECT KEY CAPABILITY ACHIEVEMENTS	
INDICATORS FOR HUMAN RESOURCES	% OF FACILITIES ACHIEVED
All supply chain personnel have a job description and have access to the job description.	83% & 93%
The facility is assessed monthly under the Performance Based Financing (PBF) scheme.	91%
INDICATORS FOR PHARMACY & STORES MANAGEMENT	% OF FACILITIES ACHIEVED
Items are checked against shipping documentation when received by facility staff.	100%
The inventory management system includes min-max set points.	91%
Contingency plans are in place to maintain the cold chain in the event of a power or equipment failure, including secondly/tertiary power source (e.g. inverters, generators)	81%
INDICATORS FOR LOGISTICS MANAGEMENT INFORMATION SYSTEM	% OF FACILITIES ACHIEVED
Data-points are recorded in the paper-based LMIS including stock-on-hand, consumption, losses and adjustment, expiries, loss and receipts, safety stock for each commodity, quantity of reordering, expiration dates, and # of days of stock outs,	91 - 100%
Data-points are recorded in the eLMIS, including stock-on-hand, consumption losses and adjustments, issues a receipt, safety stock, quantity of reordering, and # of days of stock out.	100%

Select Key Capability Gaps – Health Center Level

TABLE 40. HEALTH CENTER LEVEL – SELECT KEY CAPABILITY GAPS		
INDICATORS FOR HUMAN RESOURCES	% OF FACILITIES WITH GAP	POSSIBLE SOLUTIONS
Capacity building sessions conducted covered quality, pharmacovigilance, and financial management.	97 & 91%	Institute a program of management briefings to cover these issues.
INDICATORS FOR PHARMACY & STORES MANAGEMENT	% OF FACILITIES WITH GAP	POSSIBLE SOLUTIONS
A KPI indicator is used to monitor storage capacity and the resulting data is used to inform decision-making at the strategic level.	100%	Conduct a storage space assessment study to include identification of opportunities for space optimization and medium to long term storage space needs for a fully functional supply chain. The assessment should recommend indicators for monitoring storage space utilization.
KPI indicators are recorded for stocked-according-to-plan and # and duration of temperature excursions.	81% & 94%	Institute a program of management briefings to cover these issues
INDICATORS FOR LOGISTICS MANAGEMENT INFORMATION SYSTEM	% OF FACILITIES WITH GAP	POSSIBLE SOLUTIONS
SOPs covering LMIS and eLMIS exist, but may not include or be clearly labeled for training for LMIS, data analysis, and quality reviews	94%, 81%, & 96%	SOPs for LMIS/eLMIS should clearly state what processes are covered within the SOPS, including training for LMIS, data analysis, and quality reviews, Share training and regularly communicate what is included in SOPS

Summary of Results

At the Health Center level, average CMM scores across the functional modules range from 8% to 72%. Key achievements at the Health Center level fall under the following functional areas: Human Resources, Pharmacy and Stores Management, and LMIS. For Human Resources, all staff have a job description and access to that description. Additionally, facilities are assessed monthly under the performance based finance scheme. For the Pharmacy and Stores Management, the Health Centers are using quality control measures, including contingency plans for the cold chain. For the LMIS functional area, Health Centers are recording data in both LMIS and eLMIS systems. Capabilities that are not as strong include capacity building sessions; KPIs are not being used to monitor storage capacity or being recorded for stocked according to plan, number and duration of temperature excursions, and SOPs covering the LMIS and eLMIS. At the Health Center level, KPIs indicated that despite the strain on resources from increased demand from patients, and some delays in deliveries, stock outs are of limited duration and patient service is therefore strong.

Discussion

The main observation is that the range of scores varies very widely across the health facilities, with some recording high scores, while others are worryingly low. These data suggest that there is the capability to achieve high scores, but management and resources are probably inconsistently applied

across the system. For example, there is a lack of tools, SOPs and personnel capacity for reporting. Despite these challenges, stock outs are well-contained - indicating a commitment to patient care and service levels.

Recommendations

- Health Centers need increased levels of supportive supervision and support to maintain stock according to plan, improve the use of the eLMIS system, and reduce the level of emergency orders. All of these measures would further reinforce the quality of patient service.

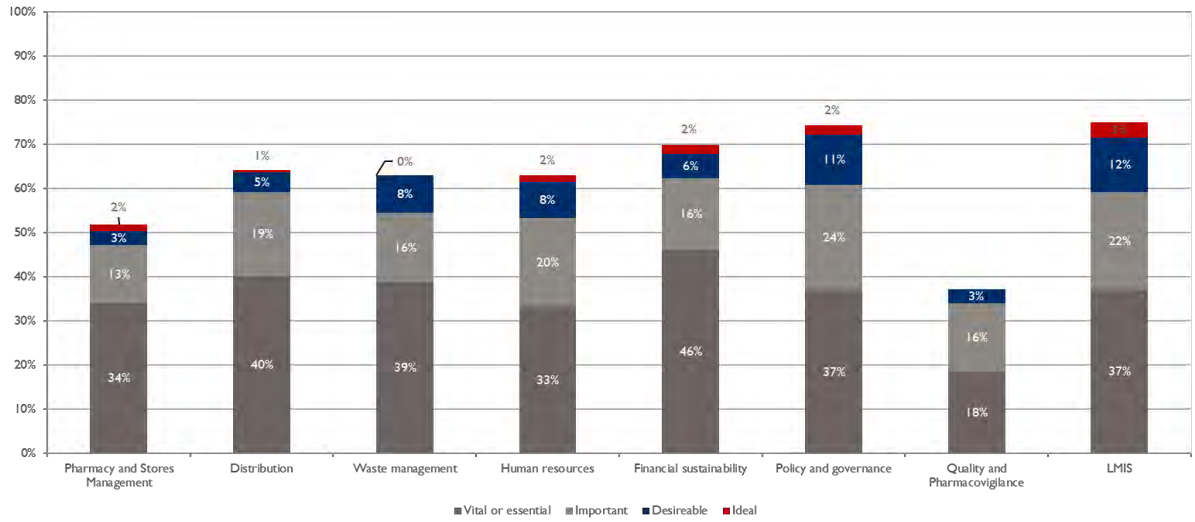
- It is recommended that the MOH develop a centrally managed Quality and Pharmacovigilance unit responsible for monitoring quality issues and adverse reports

DISTRICT HOSPITAL

TABLE 42. DISTRICT HOSPITALS CAPABILITY MATURITY MODEL SCORE BY MODULE (AVERAGE SCORE & RANGE) (N=18)

MODULE	AVERAGE %	MODULE	AVERAGE %
Forecasting and Supply Planning	-	Human Resources	63% (26-88%)
Procurement	-	Financial Sustainability	70% (43-98%)
Pharmacy and Stores Management	52% (43-64%)	Policy and Governance	74% (0-100%)
Distribution/ Receiving	64% (25 -100%)	Quality and Pharmacovigilance	37% (0-98%)
Waste Management	63% (16-100%)	LMIS	75% (51-93%)
Strategic Planning and Management	-		

Figure 18. District Hospital Levels of Achievement by Module Area



Maximum score for Vital or Essential is 50%; for important is 30%; for desirable is 15%; for ideal 5%. For instance, if Vital or Essential portion is actually 45%, it should be interpreted as 45/50. Understanding the CMM Results section provides a more detailed explanation.

TABLE 43. SELECT KPI RESULTS FOR DISTRICT HOSPITALS	
INDICATORS	DH
Average # of days per month with stock outs (Overall for Tracer Commodities)	11
% of tracer commodities, out-of-stock on day of visit (Overall)	2%
% of orders delivered on promised delivery date	54%
% of Emergency orders, out of all orders	21%
% of facilities with any stock outs of any of the 10-tracer commodities October 2016-March 2017	68%

Select Key Capability Achievements – District Hospital Level

TABLE 44. DISTRICT HOSPITAL LEVEL – SELECT KEY CAPABILITY ACHIEVEMENTS	
INDICATORS FOR HUMAN RESOURCES	% OF FACILITIES ACHIEVED
All supply chain personnel have a job description and have access to the job description.	94% & 100%
The facility is assessed under the PBF scheme on a monthly basis.	89%
INDICATORS FOR FINANCIAL SUSTAINABILITY	% OF FACILITIES ACHIEVED
Budgets are prepared annually and updated in response to operations changes.	100% & 94%
INDICATORS FOR PHARMACY & STORES MANAGEMENT	% OF FACILITIES ACHIEVED
Items are checked against shipping documentation when received by facility staff.	100%
Reordering is calculated on a min/max process.	100%
The inventory management system includes min-max set points.	94%
Controlled substances and high valued products are locked in a cage or cabinet.	100%
SOPs in place for handling controlled substances and high value products.	100%
INDICATORS FOR LOGISTICS MANAGEMENT INFORMATION SYSTEM	% OF FACILITIES ACHIEVED
Data-points are recorded in the paper-based LMIS including stock-on-hand, consumption, losses and adjustment, expiries, loss and receipts, safety stock for each commodity, quantity of reordering, expiration dates, and # of days of stock outs,	88 - 100%
Data-points are recorded in the eLMIS, including stock-on-hand, consumption losses and adjustments, issues receipts, safety stock, quality of reordering and # of days of stock out.	88 - 100%

Select Key Capability Gaps – District Hospital Level

TABLE 45. DISTRICT HOSPITAL LEVEL – SELECT KEY CAPABILITY GAPS

INDICATORS FOR QUALITY AND PHARMACOVIGILANCE	% OF FACILITIES WITH GAP	POSSIBLE SOLUTIONS
Adherence to SOPs for medicine quality assurance is monitored by regularly collecting data on the standard KPIs	89%	- Develop, disseminate, and support a comprehensive M&E Plan for all supply chain functions, including the monitoring of product quality through established KPIs. - Designate and train a specific staff person to coordinate M&E and quality assurance activities. - Collect, report, and analysis data on a regular basis to inform supply chain decisions.
SOPs for pharmacovigilance exist and are accessible to staff.	83%	Develop SOPs for pharmacovigilance, share, and train and ensure compliance by regular monitoring and supportive supervision.
INDICATORS FOR PHARMACY & STORES MANAGEMENT	**% OF FACILITIES WITH GAP**	**POSSIBLE SOLUTIONS**
A KPI indicator is used to monitor storage capacity and the resulting data is used to inform decision-making at the strategic level.	100%	Conduct a storage space assessment study to include identification of opportunities for space optimization and medium to long term storage space needs for a fully functional supply chain. The assessment should recommend indicators for monitoring storage space utilization.

Summary of Results

District hospitals have average CMM scores ranging from 37%-75% across the functional modules. Key achievements for district hospitals are presented in the functional modules of Human Resources, Financial Sustainability, Pharmacy Stores and Management and LMIS. For Human Resources, district hospitals do have job descriptions, staff have access to them, and the facilities are assessed under the PBF scheme monthly. In the Financial Sustainability module, budgets are prepared annually and updated in response to changes. Within the Pharmacy and Stores Management functional module, district hospitals are utilizing Quality Control systems, have SOPs in place for controlled substance and high value products, and are securing controlled substance and high value products. For the LMIS functional module, data points are being recorded in both the LMIS and eLMIS systems. Few facilities have SOPs for Pharmacovigilance and KPI monitoring on adherence to SOPS for medicine quality assurance. KPIS are also not being used to monitor storage capacity and drive strategic decision-making. For KPIs, district hospitals experience is broadly similar to that of the Health Centers. Stock outs are well-contained and promptly corrected in most cases, thus supporting good service to patients. On time delivery, and stocked according to plan measures are low, leading to a higher than expected level of emergency orders.

Discussion

Similar to the Health Centers, there is a wide range of scores against most functions. However, stock outs are again well contained. Of all orders, 21% are emergencies; these data indicate that action is necessary to avert, or correct, stock outs and to compensate for stock below the level of plans. Staff

supplying data to the assessment team indicated challenges with the space available to store the level of commodities needed. Quality Assurance and Pharmacovigilance is again very low.

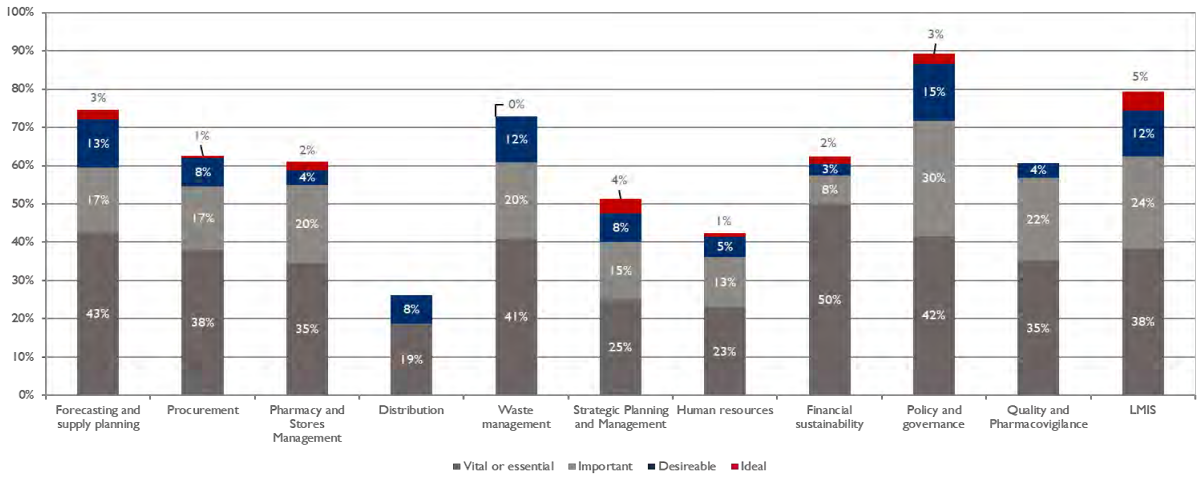
Recommendations

- It is recommended that the MOH develop a centrally managed Quality and Pharmacovigilance unit responsible for monitoring quality issues and adverse reports.
- District Hospitals would benefit from increased levels of supportive supervision, and support to maintain stock according to plan, improve the use of the eLMIS system, and reduce the level of emergency orders. All of these measures would further reinforce the quality of patient service.
- Noting the wide range of capability scores against most functions there are clearly some district hospitals that have very high capability maturity. The MOH may wish to leverage this strong capacity in selected facilities to provide support to those reporting lower capacity to bring all DHs to a consistent level across the system.

REFERRAL HOSPITAL

TABLE 46. REFERRAL HOSPITALS CAPABILITY MATURITY MODEL SCORE BY MODULE (AVERAGE SCORE & RANGE) (N=2)			
MODULE	AVERAGE %	MODULE	AVERAGE %
Forecasting & Supply Planning	75% (52-91%)	Human Resources	42% (33-52%)
Procurement	63% (62-63%)	Financial Sustainability	62% (52-75%)
Pharmacy & Stores Management	61% (54-68%)	Policy and Governance	89% (78-100%)
Distribution/ Receiving	26% (13-40%)	Quality & Pharmacovigilance	61% (58-64%)
Waste Management	73% (61-84%)	LMIS	79% 69-90%)
Strategic Planning & Management	51% (2-81%)		

Figure 19. Referral Hospital Levels of Achievement by Module Area



Maximum score for Vital or Essential is 50%; for important is 30%; for desirable is 15%; for ideal 5%. For instance if Vital or Essential portion is actually 45%, it should be interpreted as 45/50. Understanding the CMM Results section provides a more detailed explanation.

TABLE 47. SELECT KPI RESULTS FOR REFERRAL HOSPITALS	
INDICATOR	RH
Average # of days per month with stock outs (Overall for Tracer Commodities)	19.9
% of tracer commodities, out-of-stock on day of visit (Overall)	17%
% of orders delivered on promised delivery date	47%
% of Emergency orders, out of all orders	55%
% of facilities with any stock outs of any of the 10-tracer commodities October 2016-March 2017	100%

Select Key Capability Achievements – Referral Hospital Level

TABLE 48. REFERRAL HOSPITALS LEVEL – SELECT KEY CAPABILITY ACHIEVEMENTS	
INDICATORS FOR HUMAN RESOURCES	% OF FACILITIES ACHIEVED
All supply chain personnel have a job description and have access to the job description.	100%
Staff performance reviews are conducted annually.	100%
INDICATORS FOR FORECASTING AND SUPPLY PLANNING	% OF FACILITIES ACHIEVED
THE FOLLOWING METHODOLOGIES ARE USED DURING FORECASTING: MORBIDITY-BASED AND CONSUMPTION-BASED.	100%
FORECASTS ARE USED TO INFORM DRUG PROCUREMENT.	100%
THERE IS A SUPPLY PLAN.	100%
DATA USED TO INFORM THE SUPPLY PLAN INCLUDES FORECAST, STOCK-ON-HAND, CONSUMPTION, SHIPMENT STATUS, AND LEAD TIMES.	100%
ORDERS PLACED ARE CONSISTENT WITH THE SUPPLY PLAN.	100%
INDICATORS FOR PROCUREMENT	% OF FACILITIES ACHIEVED
Controls are in place to mitigate/prevent Procurement risks.	100%
SOPs for Procurement are in place.	100%
Tenders are evaluated on measures including price, quality, past performance, & lead time.	100%
The Procurement budget is funded from own resources.	100%
INDICATORS FOR PHARMACY AND STORES MANAGEMENT	% OF FACILITIES ACHIEVED
The store meets minimum acceptable design, layout, and construction requirements for storage of pharmaceutical products.	100%
The inventory management system includes min-max set points.	100%
Contingency plans are in place to maintain the cold chain in the event of a power or equipment failure incudes secondly/tertiary power sources.	100%
INDICATORS FOR DISTRIBUTION	% OF FACILITIES ACHIEVED
Point-of-Delivery records are maintained.	100%
Data-points are recorded in the paper-based LMIS and eLMIS regarding stock-on-hand; include consumption, losses and adjustments, expiries, issues and receipts, quality of reordering, and # of days of stock outs.	100%
INDICATORS FOR WASTE MANAGEMENT	% OF FACILITIES ACHIEVED
SOPs are in place for Waste Management.	100%

Select Key Capability Gaps – Referral Hospital Level

TABLE 49. REFERRAL HOSPITAL– SELECT KEY CAPABILITY GAPS		
INDICATORS FOR HUMAN RESOURCES	% OF FACILITIES WITH GAP	POSSIBLE SOLUTIONS
Supportive supervision received at least twice a year.	100%	Establish supportive supervision plan providing bi-monthly to bi-annual visits.
INDICATORS FOR PROCUREMENT	% OF FACILITIES WITH GAP	POSSIBLE SOLUTIONS
The Procurement system incorporates KPI monitoring.	100%	Define and monitor Procurement KPIs and reported after every Procurement process as part of the Procurement M&E process.
INDICATORS FOR PHARMACY & STORES MANAGEMENT	% OF FACILITIES WITH GAP	POSSIBLE SOLUTIONS
KPI indicators are recorded for stocked-according-to-plan, stock accuracy, order fill rate, wastage, and # and duration of temperature excursions.	100%	Collect, report, and monitor KPI data to ensure appropriate actions taken to correct discrepancies.

Summary of Results

Referral Hospitals had average CMM scores ranging from 26%-89% across the functional modules. It should be noted that only two Referral Hospitals were assessed, therefore averages are less significant than the range scores, which by and large indicate one well performing hospital and one with challenges. Key achievements at the Referral Hospital level span Human Resources, Forecasting and Supply Planning, Procurement, Pharmacy and Stores, Distribution, and Waste Management functional modules. For Human Resources, staff have job descriptions, access to them, and performance reviews are completed annually. For Forecasting and Supply Planning, Referral Hospitals are following forecasting methodologies, using forecasts to inform drug Procurement, and using data to inform the supply plan. RHs have a supply plan, and orders are placed in line with that plan. Procurement SOPs are in place and controls are established to mitigate risk. Tenders are assessed on clear criteria and the Procurement budget is funded from its own resources. For Pharmacy and Stores, the physical space is appropriate to store pharmaceutical products and quality controls are in place, including a contingency plan for cold chain interruption. For distribution, RHs are maintaining records. RHs also have SOPs in place for Waste Management. Gaps include a lack of biannual supportive supervision, the absence of a Procurement system that incorporates KPI monitoring, and KPI indicators are not used to record KPI data such as stocked-according-to-plan, stock accuracy, order fill rate, wastage, and number and duration of temperature excursions. For KPIs, RHs show the highest levels of emergency orders, over one half (55%) of all orders are placed as emergencies. The relatively high level of stock outs (17% day of assessment) compared to other levels of service is also indicative of a lack of management of stock levels and routine orders necessary to maintain stocks to planned levels.

Discussion

Except for distribution and strategic planning, the range of CMM scores is narrower than for HCs and DHs. Policy and Governance, Forecasting, LMIS, Procurement and Waste Management all score well for the Vital and Essential capabilities. The area of greatest concern is the high level of emergency orders (55%), and the apparent lack of attention to managing stock according to plan. It would appear that the placing of orders as emergencies has become routine for the Referral Hospitals. This pattern suggests that these hospitals are not planning their stocks and ordering, but instead reacting to stock out or near stock situations as and when they arise with the placement of emergency orders to correct the position.

Recommendations

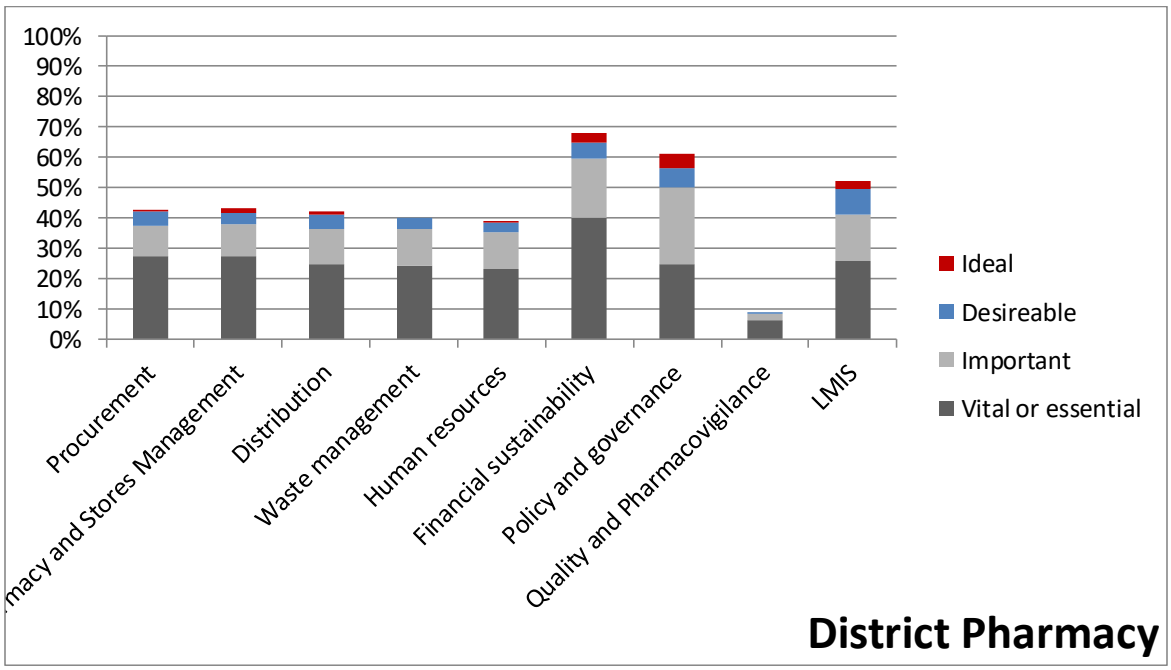
- The management of the Referral Hospitals should review their over-reliance on emergency orders, and the root causes driving this metric to significantly reduce the use of emergency orders, and establish an increased reliance on routine deliveries to maintain stocks according to planned levels.
- The MOH should review the variance in capability maturity and KPIs between the country's major hospitals to identify the root causes of the variation in performance, and establish a culture of high performance across the Referral Hospital network.

DISTRICT PHARMACY

TABLE 50. DISTRICT PHARMACIES CAPABILITY MATURITY MODEL SCORE BY MODULE (AVERAGE SCORE & RANGE) (N=18)

MODULE	AVERAGE %	MODULE	AVERAGE %
Forecasting and Supply Planning	-	Human Resources	39% (18-56%)
Procurement	43% (20-65%)	Financial Sustainability	68% (50-78%)
Pharmacy & Stores Management	43% (35-56%)	Policy and Governance	61% (42-85%)
Distribution	42% (28-6%)	Quality and Pharmacovigilance	9% (0-36%)
Waste Management	40% (3-71%)	LMIS	52% (28-75%)
Strategic Planning & Management	-		

Figure 20. District Pharmacy Levels of Achievement by Module Area



Maximum score for Vital or Essential is 50%; for important is 30%; for desirable is 15%; for ideal 5%. For instance, if Vital or Essential portion is actually 45%, it should be interpreted as 45/50. Understanding the CMM Results section provides a more detailed explanation.

TABLE 51. SELECT KEY PERFORMANCE INDICATOR RESULTS FOR DISTRICT PHARMACIES	
INDICATOR	DP
Average # of days per month with stock outs (overall for tracer commodities)	14.6 days
Stocked-according-to-plan (Tracer Commodities)	10% -34%
% of tracer commodities out-of-stock on day of visit (overall)	7%
% of orders delivered on promised delivery date	31%
% of facilities with any stock outs of any of the 10 tracer commodities October 2016-March 2017	94%

Select Key Capability Achievements – District Pharmacy Level

TABLE 52. DISTRICT PHARMACY LEVEL – SELECT KEY CAPABILITY ACHIEVEMENTS	
INDICATORS FOR HUMAN RESOURCES	% OF FACILITIES ACHIEVED
All supply chain personnel have a job description and have access to the job description.	100%
INDICATORS FOR FINANCIAL SUSTAINABILITY	% OF FACILITIES ACHIEVED
Budgets are prepared annually updated in response to operations changes.	100%
INDICATORS FOR PHARMACY AND STORES MANAGEMENT	% OF FACILITIES ACHIEVED
Items are checked against shipping documentation when received by facility staff.	100%
FEFO requirements are adhered to.	100%
Reordering is calculated on a min/max process.	94%
The inventory management system includes Buffer/Security stock.	100%
The inventory management system includes min-max set points.	94%
INDICATORS FOR DISTRIBUTION	% OF FACILITIES ACHIEVED
There are approved Distribution plans.	100%
INDICATORS FOR LMIS	% OF FACILITIES ACHIEVED
Stocks are tracked at lower health facilities/service delivery points in your catchment area.	94%

Select Key Capability Gaps – District Pharmacy Level

TABLE 53. DISTRICT PHARMACY LEVEL – SELECT KEY CAPABILITY GAPS

INDICATORS FOR HUMAN RESOURCES	% OF FACILITIES WITH GAP	POSSIBLE SOLUTIONS
Staff competencies and experiences match the job requirements, specifically quality & pharmacovigilance.	89%	Establish a Quality and Pharmacovigilance system and designate particular staff to be responsible for implementation as part of their job description.
INDICATORS FOR FINANCIAL SUSTAINABILITY	% OF FACILITIES WITH GAP	POSSIBLE SOLUTIONS
Supply chain costs are tracked (e.g. products, warehousing, Distribution, and personnel, over heads, service delivery etc.)	100%	Design an appropriate system for tracking and reporting of supply chain costs. This will be helpful for strategic planning purposes and sustainability.
INDICATORS FOR QUALITY AND PHARMACOVIGILANCE	% OF FACILITIES WITH GAP	POSSIBLE SOLUTIONS
Collected data is shared with the central level.	89%	Share all data collected with central levels (MOH & MPPD).
SOPs for pharmacovigilance exist and are accessible to staff.	100%	Develop SOPs for pharmacovigilance, share, train, and ensure compliance by all staff.
INDICATORS FOR PROCUREMENT	% OF FACILITIES WITH GAP	POSSIBLE SOLUTIONS
The Procurement system incorporates KPI monitoring.	94%	Establish KPIs for Procurement performance, including monitoring and reporting for all stages and processes.
INDICATORS FOR PHARMACY & STORES MANAGEMENT	% OF FACILITIES WITH GAP	POSSIBLE SOLUTIONS
KPI indicators are recorded for stocked-according-to-plan, stock turn per annum, warehouse, order turnaround time, and # and duration of temperature excursions.	89 - 94%	Collect KPI data, reported on, monitored and management actions taken to bring performance within target levels.
INDICATORS FOR DISTRIBUTION	% OF FACILITIES WITH GAP	POSSIBLE SOLUTIONS
Transportation risks identified, assessed, and documented	94%	Assess and document transportation risks and reviewed at least bi-annually.

INDICATORS FOR LMIS	% OF FACILITIES WITH GAP	POSSIBLE SOLUTIONS
Paper-based LMIS SOPs for quality reviews are in place.	89%	The SOPs for LMIS/eLMIS should clearly outline the processes included in each SOP, including training, data collection & analysis, quality review & frequency of reporting SOPs should be clearly visible with regular communication/training on what is included in SOPs and recent SOP updates.
eLMIS SOPs for training in LMIS are in place, including data collection & analysis, quality reviews, & frequency of reporting.	83 - 100%	As above

Summary of Results

District pharmacies had average CMM scores ranging from 9%-68% across the functional modules. Key achievements at the DP level spanned the Human Resources, Financial Sustainability, Pharmacy and Stores Management, Distribution and LMIS. For Human Resources, all supply chain staff have job descriptions and access to those descriptions. In Financial Sustainability, budgets are prepared annually and updated in response to operations changes. With Pharmacy and Store management, FEFO requirements are adhered to, quality controls are in place, and the inventory management system includes buffer/security stock. There is a distribution plan and for LMIS stocks are tracked at lower health facilities in the catchment area. Gaps at the DP level include challenges with staff competencies and experiences matching the job requirements, specifically Quality and Pharmacovigilance. Supply chain costs are not being tracked, data is not being shared with central level, SOPs for Pharmacovigilance do not exist and/or are not accessible to staff. The Procurement systems do not include KPI monitoring. KPI indicators are not recorded for key metrics in Pharmacy and Stores Management and transportation risks are neither identified nor assessed. For LMIS, SOPs are lacking. For KPIs, the measure of most concern at the DPs is the low level of orders (31%) delivered by the promised date. This is a key activity of the DPs, and delay in delivery will impact the performance of the health facilities they support. Impacts may include stock outs or compensatory actions by the health facilities assuming that deliveries will be late, such as increased stock levels or placement of emergency orders, where delivery times are better.

Discussion

Except for HR and Financial Sustainability, the reported capability at DPs is below the level expected. Of particular concern is the capability in distribution and performance on on-time delivery and stocked according to plan KPIs; these are key metrics for a well-performing distribution facility. The DP staff are hard-working and committed, and it is due to their efforts in response to emergency orders that health facilities are able to contain their levels of stock out. However, improvements in stocked according to plan and distribution management should make a significant difference to CMM and performance scores. DP management also report that risks are not regularly assessed, and that they do not actively manage distribution costs. It is important to note that the DPs are also the newest part of the supply chain. As a result, it is expected that DPs are still developing capacity. Given this reality, there is a real opportunity to build capacity in the DPs and see greater gains than may be possible in other levels of service.

Recommendations

- Urgent action is required to support the DPs in stocking according to plan, improved management of distribution and use of eLMIS to support data-driven decision making. MOH could leverage expertise already present in the system as identified by high CMM scores at some sites, to rapidly address the concerns identified by this NSCA.

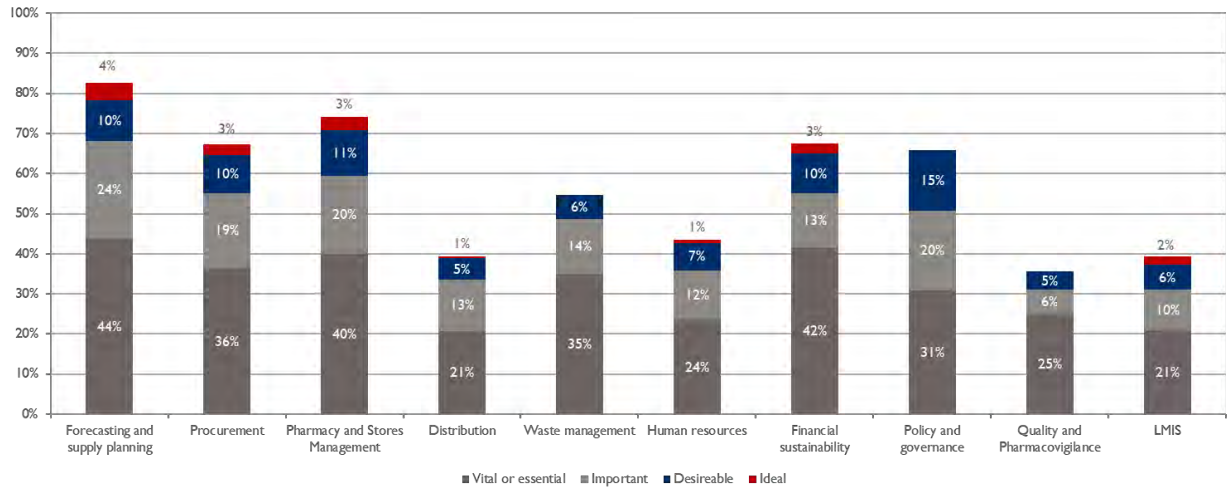
- A review should be undertaken to ensure that each DP has sufficient storage capacity for their planned stock levels, considering that stock should not dwell at the DP for a significant time, but should pass through to the health facilities promptly.

MPPD

TABLE 54. MEDICINE PROCUREMENT & PLANNING DIVISION LEVEL CAPABILITY MATURITY MODEL SCORE BY MODULE (AVERAGE SCORE) (N=1)

MODULE	AVERAGE %	MODULE	AVERAGE %
Forecasting and Supply Planning	83%	Human Resources	43%
Procurement	67%	Financial Sustainability	68%
Pharmacy and Stores Management	74%	Policy and Governance	66%
Distribution	39%	Quality and Pharmacovigilance	36%
Waste Management	55%	LMIS	39%
Strategic Planning and Management	-		

Figure 21. Medicine Procurement & Planning Division Levels of Achievement by Module Area



Maximum score for Vital or Essential is 50%; for important is 30%; for desirable is 15%; for ideal 5%. For instance if Vital or Essential portion is actually 45%, it should be interpreted as 45/50. Understanding the CMM Results section provides a more detailed explanation.

TABLE 55. SELECT KPI RESULTS FOR THE MPPD

INDICATOR	MPPD
Average # of days per month with stock outs (Overall for Tracer Commodities)	30.5
% of tracer commodities, out-of-stock on day of visit (Overall)	N/A
% of orders delivered on promised delivery date	N/A
% of Emergency orders, out of all orders	N/A
% of facilities with any stock outs of any of the 10-tracer commodities October 2016-March 2017	100%

Select Key Capability Achievements - MPPD

TABLE 56. MEDICINE PROCUREMENT & PLANNING DIVISION LEVEL – SELECT KEY CAPABILITY ACHIEVEMENTS	
INDICATORS FOR HUMAN RESOURCES	% OF FACILITIES ACHIEVED
Staff competencies and experiences match the job requirements in the areas of forecasting, quantification, Procurement, supply planning, Waste Management, Distribution, finance, LMIS, ordering & reporting, and medicine management.	100%
All supply chain personnel have a job description and have access to the job description.	100%
INDICATORS FOR FINANCIAL SUSTAINABILITY	% OF FACILITIES ACHIEVED
Budgets are prepared annually.	100%
The facilities have the financial responsibility for maintaining its own drug stocks.	100%
INDICATORS FOR POLICY AND GOVERNANCE	% OF FACILITIES ACHIEVED
Supply chain policies cover Waste Management, quality assurance, warehousing and storage, Procurement, financing, and HR.	100%
INDICATORS FOR FORECASTING AND SUPPLY PLANNING	% OF FACILITIES ACHIEVED
Forecasting is projected 2 years in the future.	100%
There is a supply plan that is updated annually with data inputs from forecasting, stock-on-hand, consumption, shipment status, and lead times.	100%
The supply plan is shared with external partners on an annual basis.	100%
Orders place are consistent with the supply plan.	100%
INDICATORS FOR PROCUREMENT	% OF FACILITIES ACHIEVED
SOPs are in place for Procurement.	100%
Measures used to do tender evaluations include price, quality, service, & past performance.	100%
Vendor performance is scored qualitatively.	100%
There an order and delivery management process in place.	100%
INDICATORS FOR PHARMACY AND STORES MANAGEMENT	% OF FACILITIES ACHIEVED
The store meets minimum acceptable design, layout, and construction requirements for storage of pharmaceutical products.	100%
FEFO requirements adhered to.	100%
FEFO principles are implemented for products without expiration dates or products with the same expiration dates.	100%
KPI indicators that are recorded include stock out rates, stock accuracy, order fill rate, stock turn per annum, cost of warehousing, warehouse utilization, wastage, turnaround time, # and duration of temperature excursions, and % of in-coming batches tested for quality.	100%

INDICATORS FOR DISTRIBUTION	% OF FACILITIES ACHIEVED
There an approved Distribution plan and data management system that captures Distribution plans and operations.	100%
Inbound shipments tracked through manual tracking.	100%
INDICATORS FOR LMIS	% OF FACILITIES ACHIEVED
Data-points are recorded in the Paper LMIS including stock-on-hand, consumption, losses and adjustment, expiries, loss and receipts, safety stock for each commodity, quantity of reordering, expiration dates, # of days of stock outs, issues, and receipts.	100%
Data-points are recorded in the eLMIS including stock-on-hand, consumption, losses and adjustment, expiries, loss and receipts, safety stock for each commodity, quantity of reordering, expiration dates, and #of days of stock outs, issues, and receipts.	100%
Stocks are tracked at lower health facilities/service delivery points in your catchment area	100%
INDICATORS FOR WASTE MANAGEMENT	% OF FACILITIES ACHIEVED
SOPs for Waste Management exist and are accessible to staff.	100%
INDICATORS FOR POLICY AND GOVERNANCE	% OF FACILITIES ACHIEVED
Documented management policies or guidelines for the supply chain system are in place.	100%
Supply chain policies cover Waste Management, quality assurance, warehousing and storage, Procurement, financing, and HR.	100%

Select Key Capability Gaps – Medicine Procurement & Planning Division Levels

TABLE 57. MEDICINE PROCUREMENT & PLANNING DIVISION LEVEL – SELECT KEY CAPABILITY GAPS

INDICATORS FOR HUMAN RESOURCES	% OF FACILITIES WITH GAP	POSSIBLE SOLUTIONS
The MOH and central warehouse staffs are responsible for providing supportive supervisions to the facility.	100%	The responses indicate that supportive supervision is not a common practice in the Rwanda Supply Chain system. It appears that no MOH, central warehouse, DP staff carry out the activity for the MPPD staff. Supportive supervision should be a major activity of a robust capacity building and Health System Strengthening plan for the MPPD.
INDICATORS FOR FINANCIAL SUSTAINABILITY	% OF FACILITIES WITH GAP	POSSIBLE SOLUTIONS
Supply chain costs are tracked (e.g. products, warehousing, Distribution, personnel, overheads, service delivery, etc.).	100%	Design an appropriate system for tracking and reporting of supply chain costs. This will be helpful for strategic planning purposes and sustainability.
INDICATORS FOR QUALITY AND PHARMACOVIGILANCE	% OF FACILITIES WITH GAP	POSSIBLE SOLUTIONS
SOPs for pharmacovigilance exist and are accessible to staff.	100%	Develop SOPs for pharmacovigilance, share, and train and ensure compliance by all staff.
INDICATORS FOR LMIS	% OF FACILITIES WITH GAP	POSSIBLE SOLUTIONS
Data-points that are recorded in the eLMIS include consumption, safety stock for each commodity, quantity of reordering, and # of days of stock out.	100%	Training, documentation and regular review to inform staff of the important data points recorded or calculated in the eLMIS system and where to find the information if needed. Include a discussion on how data is reported, when data could come from other systems (ERP) or if there are multiple terms for the same data (ex. consumption may be referred to as "distribution" at the MPPD level)
INDICATORS FOR WASTE MANAGEMENT	% OF FACILITIES WITH GAP	POSSIBLE SOLUTIONS
Waste Management SOPS are accessible to staff.	100%	SOPs should be made available to all relevant staff.

Summary of Results

MPPDs had average CMM scores that ranged from 36%-83% across the functional modules. Looking at the key achievements and gaps, the MPPD demonstrates more maturity capabilities in the direct management of products and operations. Gaps are present in second level capabilities for measuring the organization's performance such as supportive supervision, development of KPI measures for MPPD to track its own performance, and tracking of supply chain system costs.

Discussion

As one would expect, Forecasting and Supply Planning, Procurement, Stores Management, and Financial Sustainability all show strong Capability Maturity in Vital & Essential capabilities, but Distribution and LMIS are reported as surprising low considering how essential these functions are to MPPD. The absence of KPI data made available to the assessment team means that performance analysis for the MPPD is limited. Similarly, to the DPs, warehousing and distribution costs are not routinely monitored. The MPPD should be the high performing pivotal part of the national system; if this segment isn't working; other elements in the supply chain will be impacted negatively downstream. This issue may be pertinent when considering the lower performance of DPs; if the MPPD is poorly serving the DPs, then the DPs service to health facilities will be impacted.

Recommendations

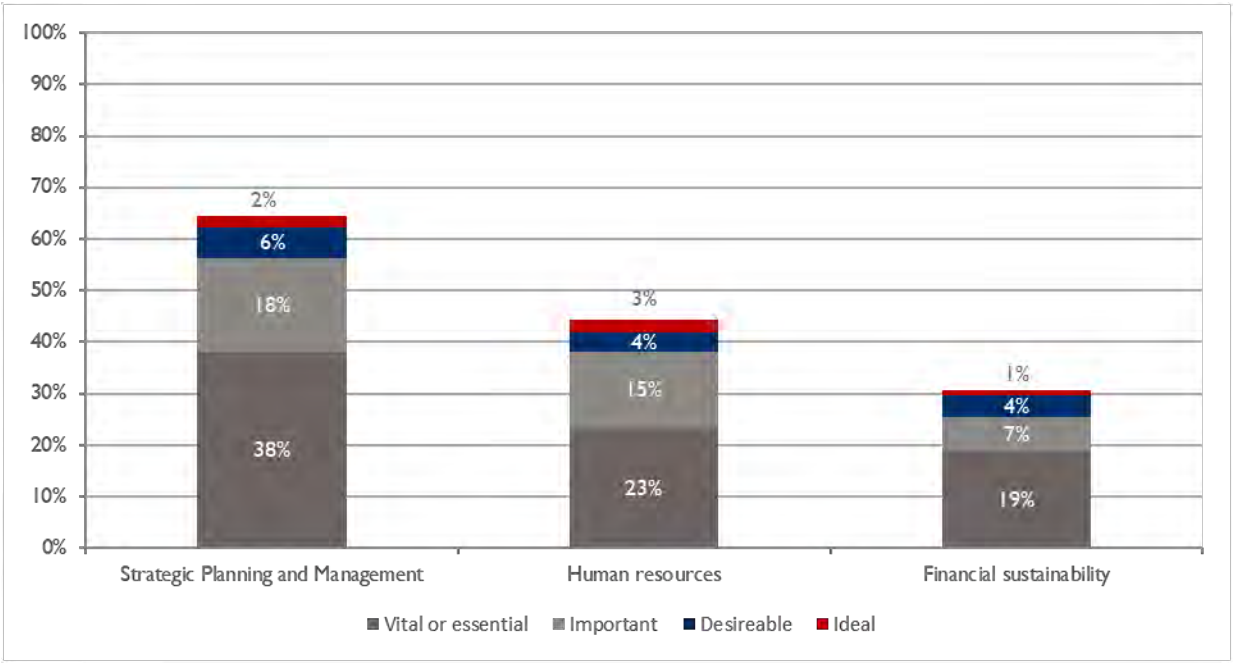
- MOH should obtain, and review, the KPI data that was not available to the NSCA team to compare performance to target, and to compare the performance to the capability maturity report here to identify any areas where improvement opportunity exists.
- MOH should work with MPPD management to establish financial performance targets for key areas such as warehousing and storage costs, distribution and HR overhead.
- MOH and MPPD managers should urgently review the root causes of the apparent low capability in distribution as this is a key function of MPPD to serve the district pharmacies and referral hospitals.
- MPPD management to create eLMIS training and continuous improvement plans to maximize the return from this important tool.
- MPPD has the potential to be a key resource in both pharmacovigilance and Waste Management across the national system. It is recommended that MOH and MOH management work with WHO and development partners to develop nationwide approaches across these two areas.

MOH

TABLE 58. MINISTRY OF HEALTH CAPABILITY MATURITY MODEL SCORE BY MODULE (AVERAGE SCORE & RANGE) (N=1)

MODULE	AVERAGE %	MODULE	AVERAGE %
Forecasting and Supply Planning	-	Human Resources	44%
Procurement	-	Financial Sustainability	31%
Pharmacy and Stores Management	-	Policy and Governance	-
Distribution	-	Quality and Pharmacovigilance	-
Waste Management	-	LMIS	-
Strategic Planning and Management	64%		

Figure 22. Ministry of Health Levels of Achievement by Module Area



Maximum score for Vital or Essential is 50%; for important is 30%; for desirable is 15%; for ideal 5%. For instance if Vital or Essential portion is actually 45%, it should be interpreted as 45/50. Understanding the CMM Results section provides a more detailed explanation.

Select Key Capability Achievements – Ministry of Health Level

TABLE 59. MINISTRY OF HEALTH LEVEL – SELECT KEY CAPABILITY ACHIEVEMENTS

INDICATORS FOR HUMAN RESOURCES	% OF FACILITIES ACHIEVED
Staff performance is reviewed on an annual basis.	100%
LMIS staff receives periodic supportive supervision bi annually.	100%
INDICATORS FOR STRATEGIC PLANNING AND MANAGEMENT	**% OF FACILITIES ACHIEVED**
The health system has a supply chain strategic plan that is updated >1 to 2 years.	100%
The implementation plan includes HR, LMIS, finance, policy & governance, forecasting and quantification, Procurement quality assurance, Distribution, warehousing, and Waste Management.	100%
INDICATORS FOR FINANCIAL SUSTAINABILITY	**% OF FACILITIES ACHIEVED**
Budgets are prepared annually.	100%
In past 2 years, there were no shortfalls in the health commodities budget.	100%
There a cost share plan in place for the supply chain that is financial (rather than in-kind).	100%

Select Key Capability Gaps & Possible Solutions - Ministry Of Health Level

TABLE 60. MINISTRY OF HEALTH LEVEL – SELECT KEY CAPABILITY GAPS

INDICATORS FOR STRATEGIC PLANNING AND MANAGEMENT	% OF FACILITIES WITH GAP	POSSIBLE SOLUTIONS
The supply chain implementation plan includes pharmacovigilance.	100%	The supply chain implementation plan should include pharmacovigilance as a key component, which should be well staffed and carefully monitored.
A formal structure is in place for monitoring the implementation of the strategic plan.	100%	Develop an M&E plan that is implemented by well trained staff, including regular report reviews and corrective actions taken to close identified gaps in implementation.
Staffs have access to their job descriptions.	100%	All supply chain staff should have job descriptions specific for their role and receive a copy of the approved job description.
Budgets are updated in response to operations changes.	100%	As a policy, budgets in the MOH are fixed for the year of operation and not changed, even when changes in operations occur. Consideration for modifications is done during the budgeting process for the following year.

Summary of Results

The MOH average CMM scores ranged from 31%-64% across the functional modules. The MOH had key achievements across the following functional modules: Human Resources, Strategic Planning and Management, and Financial Sustainability. Performance is reviewed annually, and LMIS staff receive biannual supportive supervision. There is a supply strategic plan and an implementation plan related to the supply chain. Budgets are prepared annually, there is a cost share plan in place, and for the past two years there were not shortfalls in the health commodities budget. Management policies and guidelines are in place for the supply chain that covers key supply chain areas of concern. Gaps include the lack of Pharmacovigilance in the supply chain implementation plan, lack of structure to monitoring the strategic plan implementation, budgets are not updated in response to operations changes, and staff don't have access to their job descriptions.

Discussion

The results show strong policy and strategic leadership by the Ministry, with firm grasp of budgets and local Financial Sustainability directed towards improved health outcomes for the people of Rwanda. There are indications, however, that this strong policy and strategic leadership is not always translated into robust implementation plans, and supportive supervision, capacity building and guidance to managers within the system. There are also important gaps in Quality Assurance and Pharmacovigilance, and Waste Management that should be addressed in the next planning cycle.

Recommendations

- In the next cycle of work planning it is recommended that the MOH revisit the strategic plan and institute implementation plans, supported by monitoring and evaluation plans, to advance the strategic objectives agreed.

- It is recommended that the MOH develops a medium- to long-term Financial Sustainability plan with the major development partners to address the current dependence on donor support.

- It is recommended that the MOH works with WHO and development partners to develop a comprehensive Pharmacovigilance strategy and implementation plan for Rwanda.

ADVANCED ANALYSIS: RELATIONSHIP BETWEEN THE CMM AND KPIS - RESULTS

To supplement the core assessment results from the NSCA 2.0 toolkit, Axios conducted a regression analysis to further explore the relationship between maturity scores and KPI performance (and amongst KPIs). This analysis identifies significant correlations that provide additional insights into Rwanda's supply chain, and that suggest hypotheses for future areas of investigation. The relationship between capabilities and KPIs was assessed based on a 'root-cause' type analysis, including several regression models.

One would expect that high capability scores would lead to good performance, as measured by the KPIs; however, this is not always the case. Some supply chain modules are found to have low maturity and high performance. This situation can occur because low capability scores present a *risk* to good performance; that risk may or may not be actualized within the timeframe of the assessment or compensatory actions are taken by managers. Areas of high risk (low capability maturity) that were not reflected in the KPIs scores (or that the KPIs did not measure) were also considered for improvements. Other supply chain modules have high maturity and low performance. In this case, for areas identified as 'poor performing' based on the KPIs, we assess the related capability modules to determine: (1) Whether this poor performance is captured in the overall capability maturity scores; and (2) If commonly missing key items (capabilities or infrastructure/systems) might explain the low performance. As a result, system-strengthening activities can be focused on weak areas identified either in the KPIs or the CMM.

In the analysis, the independent variables were KPIs that were related to important components of performance:

- The average number of days of drug stock outs per month (averaged across the 10 tracer commodities);
- The average number of commodities out-of-stock on the day of the assessment visit (out of the 10 tracer commodities);
- The percentage of orders delivered within 2 days of the promised delivery date over the 6 months prior to the assessment, and;
- Emergency orders as a percentage of all orders over the 6 months prior to the assessment. For the latter two KPIs, upstream data were used at HCs and hospitals, and downstream data were used for DPs.

These KPIs were regressed - using the ordinary least square with robust standard errors method - against the maturity scores for: each module in the capability survey, the percentage of key supply chain staff leaving their positions in 2016, the supply chain staff vacancy rate on the day of the assessment as well as the level (HC, DH, RH, or DP) of the facility. Regressions were re-assessed for each level separately. The regressions used a stepwise approach, where the regression was run with all variables, and the variable with the highest p-value was removed, and then the regression was re-run. This process was repeated until all variables remaining in the model had a p-value of <0.20. Because the data were clustered within districts, robust standard errors were used to calculate p-values.
The results present factors that are correlated with the selected performance measures. The intent of the analysis is to help determine which modules/factors seem to have a relationship with performance,

and at which levels these modules/factors are correlated with performance. That is, the intention was to highlight areas of strength and weakness, to prompt further investigation on underlying root causes when correlations are unexpected, and identify areas where interventions are most likely to have a relationship to performance. Below each table of regression results is a brief discussion of some of the most relevant results and recommendations for further exploration. These recommendations are consistent with or complementary to recommendations throughout the document and have been included in final conclusions and areas for further investigation. Cells with no data indicate that the p-value was >0.20 and less likely to have a direct association with the independent variable. The results of the regression analysis are not intended to reflect causal relationships. Therefore, interpreting the coefficients, for example, as 'an X increase in maturity score will result in a Y increase in a particular KPI' would be an inappropriate use of the data.

RESULTS OF MULTIVARIATE MODELS

The following Table 64 presents the results from the multivariate model. The intent of the analysis is to help determine which modules/factors seem to have a relationship with performance, and at which levels these modules/factors are correlated with performance.

TABLE 61. PERCENTAGE OF OUT-OF-STOCK AND PERCENTAGE OF EMERGENCY ORDERS*

	INDEPENDENT VARIABLE			
	% commodities out-of-stock on day of visit		% emergency orders	
TYPE OF FACILITY	COEFFICIENT	P	COEFFICIENT	P
District Hospitals	Comparator		Comparator	
District Pharmacies	0.05	0.06	N/A	
Health Center			-0.15	0.20
Referral Hospital	0.23	0.07	0.61	0.00
MATURITY SCORES[1]				
Waste Management				
LMIS				
Distribution	0.11	0.01		
Pharmacy & Stores Management			-1.47	0.06
Policy and Governance	-0.06	0.01		
Financial Sustainability				
Human Resources	0.09	0.16	0.55	0.03
KEY PERFORMANCE INDICATORS				
Staff Attrition[2]				
Staff Vacancies[3]	0.05	0.16		

1 The results for maturity scores and staff attrition/vacancies show the association between these factors and the independent variables averaged across all the different facility types included in the assessment.
2 The percentage of supply chain staff leaving in 2016
3 The percentage of supply chain staff positions that were vacant on the day of the assessment visit
*Cells with no data indicate that the p-value was >0.20 and less likely to have a direct association with the independent variable.

DISCUSSION OF SELECTED RESULTS - MULTIVARIATE ANALYSIS

- Although only two RH were included in the assessment, results indicated that central pharmacies at these hospitals were associated with higher stock outs on the day of the visit, and a higher % of emergency orders, than other types of facilities, despite the fact that RH tended to have higher maturity scores than facilities at other levels. One RH is the main driver of these findings, where most orders are emergency orders due to stock outs.

  Recommendation: Because there were only two RHs included in the assessment, a regression model focusing on RHs between maturity scores and KPIs was not possible. While overall RHs tended to have higher maturity scores than DHs or HCs, RHs had lower maturity scores on average for Human Resources and Financial Sustainability than DHs or HCs. However, there were

noticeable differences in the maturity scores for both Human Resources and Financial Sustainability (as well as some of the other capability modules). Thus, ensuring all RHs have well-staffed, well-financed, and functioning supply chain capability likely would help improve KPI performance at this level of the health system., These findings concur with the overall KPIs results for the RH.

- Human Resources capability questions focused mainly on capacity building, supervision, retention, and recruitment policies. Higher HR maturity scores are associated with higher stock outs on the day of the visit and a higher percentage % of emergency orders. While seeming counterintuitive, this association is consistent with the regression analyses done separately for each level of health facility and is discussed in further detail in the stepwise interpretation below.

  Recommendation: Further investigation is suggested to understand the correlation between staffing capabilities, staff allocations, and higher stock outs because different hypotheses exist that may explain this finding. For example, (i) more experienced staff may be placed in problem areas, or (ii) improvement of HR generates higher expectations along with the knowledge and confidence to use compensation mechanisms such as emergency orders while not necessarily addressing the root cause issues of stock outs.

- Higher Distribution maturity scores are correlated to the percentage of commodities out-of-stock on the day of the assessment visit.
- % of emergency orders is lower when Pharmacy Store Management maturity score is higher and in HCs (compared to DHs). This suggests that improving Pharmacy Store Management is a key area of improvement for reducing stock outs and decreasing emergency orders.
- Higher staff vacancies are linked to higher % commodities out-of-stock on the day of visit, which is consistent with what would be expected. Higher scores in Policy and Governance correlate with lower stock out levels, suggesting that the Policy and Governance practice is having a positive impact on performance.

STEPWISE REGRESSION RESULTS FOR THE PERCENT OF TRACER COMMODITIES OUT-OF-STOCK ON DAY OF VISIT

The following Table 65 presents the Stepwise Model, which shows the results of conducting a stepwise regression analysis of the % of tracer commodities out-of-stock on the day of the assessment visit. This analysis looked at health levels separately. Referral Hospitals were not included, since there are only two.

TABLE 62. STEPWISE MODEL: INDEPENDENT VARIABLE = PERCENTAGE OF TRACER COMMODITIES OUT-OF-STOCK ON DAY OF VISIT*

MODULES	DISTRICT HOSPITAL		HEALTH CENTER		DISTRICT PHARMACY	
	estimate	P	estimate	P	estimate	p
Waste Management	-0.16	0.01				
LMIS	0.38	0.01				
Distribution			0.09	0.00	0.48	0.03
Pharmacy and Stores Management					-1.04	0.01
Quality and Pharmacovigilance						
Policy and Governance			-0.10	0.00	0.26	0.09
Financial Sustainability						
Human Resources						
Staff Attrition			-0.05	0.02		
Staff Vacancies	-0.19	0.03			0.28	0.01

*Cells with no data indicate that the p-value was >0.20 and less likely to have a direct association with the independent variable.

DISCUSSION OF SELECTED RESULTS FOR THE PERCENT OF TRACER COMMODITIES OUT-OF-STOCK

- As identified in the multivariate model above, higher Distribution scores correlate with higher stock outs on the day of visit in HCs and DPs, when the analyses are run separately for each level.

  Recommendation: Determine RTKs accounted for 42% of stock out on the day of visit at DPs, and 50% of stock out on the day of visit at HCs. 40% of HCs in districts where the DP did not have Determine RTKs on the day of visit also did not have Determine RTKs on the day of visit, while 13% of HCs were out of stock on the day of visit in districts where the DP did have Determine RTKs. This shows a strong but not fully determinant relationship between stocks at DPs and the HCs they supply. The maturity of the distribution system **may** have a role in the ability of DPs to plan and move product to HCs, in that some HCs were out of stock in districts where the DPs had stock. Further exploration is recommended to better understand the impact the inter-relationships between emergency orders, distribution capacity, and stock outs. However, the potential impact of upstream stock outs on stock outs at SDPs remains a primary issue to address.

- The maturity scores for Pharmacy and Store Management were lowest at HCs and DPs (although somewhat similar to DHs, given the margin of error in the sampling calculations). The correlation between the low maturity scores and the stock out on day of visit and emergency orders (Table 57 below) is statistically significant for DPs. DPs with higher maturity scores for Pharmacy Store Management are correlated to lower stock out, as would be expected. The correlations are not statistically significant when it comes to Health Centers.

  Recommendation: District Pharmacies are the newest level in Rwanda's supply chain, and DPs are also exposed to volatility from both inbound and outbound emergency orders. The statistical significance at the DP level, coupled with the absence of such a correlation at health facility levels, suggests further investigation is needed to understand if **a primary driver of** such stock outs is at DP level, or if stock outs at DPs may be an indicator of problems elsewhere in the system.

STEPWISE REGRESSION RESULTS FOR THE PERCENT OF EMERGENCY ORDERS

The following table presents the Stepwise Model, showing the results of conducting a stepwise regression analysis of the % of emergency orders. This analysis also looked at health facility levels separately.

TABLE 63. STEPWISE MODEL: INDEPENDENT VARIABLE = % EMERGENCY ORDERS

	DISTRICT HOSPITAL		HEALTH CENTER		DISTRICT PHARMACY	
	Estimate	P	estimate	P	estimate	p
Waste Management					0.95	0.05
LMIS	-2.22	0.04			1.31	0.02
Distribution	1.69	0.03	-0.31	0.17	-1.57	0.04
Pharmacy and Stores Management			-1.28	0.08	-3.44	0.03
Quality and Pharmacovigilance						
Policy and Governance	1.81	0.01			1.10	0.06
Financial Sustainability						
Human Resources	1.28	0.02	0.40	0.14	1.83	0.01
Staff Attrition	0.65	0.01			0.26	0.19
Staff Vacancies	-1.35	0.04			-0.75	0.10

* Cells with no data indicate that the p-value was >0.20 and less likely to have a direct association with the independent variable.

For DH and HCs, % emergency orders refers to the orders received, while at the DP it refers to the of % emergency orders filled.

DISCUSSION OF SELECTED RESULTS FOR THE PERCENT OF EMERGENCY ORDERS

- The percentage of emergency orders appears to be the most sensitive indicator when linked to the maturity scores. This may be due to the fact that emergency orders are a direct compensatory solution to other problems in the supply chain, and generally good results for other KPIs are linked to ability of the health facility to manage such emergency orders or obviate the need for emergency orders.

- The most correlations appear for DPs, followed by DH. Very few correlations are statistically significant at HCs, despite a larger sample size than at the DH and DP levels.

  Recommendation: Further investigation is recommended to understand how the issues faced by HCs, and to some extent by DHs, are linked to performance challenges.

- It appears that higher scores on Pharmacy Stores Management and Distribution in HCs are linked to a lower percentage of emergency orders.

  Recommendation: In line with the module and level analyses, the data suggests that where maturity scores are low, Pharmacy Stores Management and Distribution need strengthening at the relevant HCs**.** This *could* serve to reduce the level of emergency orders.

- Stronger LMIS scores in DHs correlate with fewer emergency orders, which is a positive sign. Higher maturity scores in Distribution, HR, and Policy & Governance contribute to higher emergency orders; as a hypothesis, it may be that facilities with better maturity in these areas may be better able to place emergency orders.

  Recommendation: For DHs, we recommend strengthening and relying on LMIS (preferably eLMIS) for better management of stocks, with a focus on accurate ordering to keep stock levels according to plan (i.e. within max and min levels) and thereby reducing stock outs with fewer emergency orders.

- The correlation between higher maturity scores for Pharmacy Store Management & Distribution and lower percentage of emergency order is stronger for DPs than in HCs. This suggests that DPs with better maturity in stores management and distribution have fewer emergency orders (as expected). While there is some correlation between the pharmacy stores and management maturity score of a DP and the facilities supplied by the DP (correlation coefficient = 0.36), these findings suggest that better maturity in Stores Management and Distribution at DPs may lower the % of emergency orders independent from the capacity of the facilities they supply.

AREAS FOR FURTHER INVESTIGATION

Capability Maturity and KPI performance data collected in this assessment highlights achievements and opportunities to continue to strengthen the Rwandan supply chain. As a point in time assessment, it is to be expected that topics will arise that warrant future research and investigation. The regression analyses were completed to complement the core findings and provide insights on areas for future research and investigation.

A key area for further investigation is the relationship between MPPD KPIs (data were not available for this assessment), and performance elsewhere in the system. Essential MPPD KPIs for which data were not available to the NSCA team were: on-time delivery by vendors, emergency orders placed on vendors, stocked according to plan at MPPD, and downstream distribution performance to health facilities supported by MPPD. Examination of Forecast and Supply Chain accuracy may also be instructive to assess whether forecasts, and therefore plans and actions, reflect actual demand from patients and other users of the health system. Routine review of forecast accuracy is important as a feedback mechanism to the annual Forecasting and Planning exercise to support continuous improvement.

The use of emergency orders and the presence of stock out are core issues that cross-cut multiple elements of the supply chain system. For example, the percentage of emergency orders is lower when Pharmacy Store Management maturity score is higher in HCs (compared to DHs). This could suggest that improving Pharmacy Store Management is a key area of improvement for reducing stock outs and decreasing emergency orders. It will be important to identify all the possible factors that influence these core issues and explore how they are working together to create the stock out and emergency order challenges before action plans are implemented to avoid unforeseen consequences.

Human Resources capability questions focused mainly on capacity building, supervision, retention, and recruitment policies. Higher HR maturity scores are associated with higher stock outs on the day of the visit and a higher percentage of emergency orders. While seeming counterintuitive, this association is consistent with the multivariate analyses, which were done separately for each level of health facility. Further investigation is suggested to understand the correlation between staffing capabilities, staff allocations, and higher stock outs and greatest reliance on emergency orders.

Staffing is relevant to all areas of the supply chain in that it is necessary to both provide appropriate quantities of Human Resources, and the right type of Human Resources. The assessment focused on staff capability and turnover, but it did not directly measure if there were enough staff. The availability or lack of sufficient staff at a site might explain the wide ranges of performance and maturity at a site, or the correlation between high maturity and low KPI performance. With insufficient resources, even the most mature and capable organization cannot perform optimally. The MOH should further explore setting appropriate staffing levels. It is recommended that the MOH consider both staffing levels and staffing mix to ensure all elements in the supply chain are set up for success.

Timely, accurate data is critical to a well running system. The performance of a function or facility often depends on the accuracy and timeliness of the data it receives from others in the supply chain, whether that is LMIS, consumption data, transportation and route planning, or many others. This assessment had limited abilities to delve into the impact of data quality across modules. It is recommended that the MOH further explore how accurate and timely data (or lack thereof) impacts performance of functions and in facilities.

Insufficient warehouse and local storage capacity has effects on performance across every level of service, as the system is forced to adjust to lower inventory levels. Lower level sites must adjust to smaller, more frequent orders as well as more emergency orders which then affects the distribution function. DPs are particularly squeezed, as they have to manage both outbound requests from health centers, and the variability of inbound shipments from MPPD. It is recommended that the MOH consider how to address bottlenecks in the supply chain system in order to decrease the number of emergency orders.

While the assessment looked at sustainable funding capabilities, it did not capture information on the availability of near time finances at a site, funds that are used to pay employees, vendors or purchase drugs. Without access to reliable cashflow, even the most mature and high performing supply chain comes to a halt. It is recommended that the MOH further investigate how supply chain performance is affected by short term access to funds (liquidity).

SUMMARY

The National Supply Chain Assessment (NSCA) was conducted in Rwanda during April and May 2017 at the request of the Ministry of Health, Rwanda (MOH) by Axios International on behalf of USAID with the strong support of staff throughout the system to conduct surveys and gather data. The capability maturity of 11 functional modules of the supply chain and 14 key performance indicators (KPIs) were assessed at all relevant levels using NSCA 2.0 tools.

The assessment generally supports what the Ministry of Health (MOH) and development partners have achieved in recent initiatives in Policy & Governance, Human Resources (HR), introducing a sophisticated electronic Logistics Management Information Systems (eLMIS), Procurement, and Forecasting at the central level. This is reflected in the relatively high Capability Maturity Model (CMM) scores for these capabilities reported in this assessment.

Levels of stock out are relatively low, compared to many countries, especially as it is evident that stock outs are quickly corrected in most cases. This is a tribute to the staff, systems, and processes in place that are fully focused on the goal of providing reliable services to patients, and other users of the health service in Rwanda. The low level of staff turnover and the obvious commitment of staff to a successful system are very encouraging.

An important factor in achieving the low level of stocks-out appears is a high proportion of emergency orders at all levels, particularly at the referral hospitals (RH). The assessment suggests that emergency orders are used as a mechanism to offset weaknesses in on-time ordering at the peripheral level, and in Pharmacy and Store Management, however they are costly and drain significant financial, logistics, and Human Resources, and should not become ingrained as normal.

It is notable that both the capability and performance in regard to stocked according to plan are lower than stock out metrics across the system. Frequent order amendments are also reported; this appears to be largely driven by available stocks to fulfill the request. The data suggests that there is potential to further improve performance across the supply chain by maintaining stocks at planned levels, and by improved distribution management to service the District Hospitals (DHs) and health centers (HCs) at planned levels. We would expect improvements in these areas to be reflect in increased performance scores relate to reduced levels of stock outs, and less frequent resort to emergency orders.

In addition to Pharmacy and Store management operational components including, Distribution, Waste Management, and Quality & Pharmacovigilance, showed relatively low maturity scores at all levels. However, it is important to note the range of scores recorded. When some facilities record maturity scores at the top of the range, it shows that capabilities exist within the system. It signals that higher performance is possible across the supply chain, by bringing more facilities up to the level of the more mature facilities.

Though information is being recorded in the eLMIS, it is not always updated in a timely manner. Facilities, including DPs, seem to continue to rely on a paper-based system. The challenge around regular and appropriate utilization of LMIS is an important one to address as the increased appropriate use of eLMIS can be expected to improve response/service delivery, supporting timely and accurate reordering and distribution to health facilities, and to contribute to high performance in supply chain planning. By

tracking and predicting consumption, improved use of eLMIS would contribute to reducing stock outs and emergency orders through better capabilities for data retrieval, analysis, and reporting.

The assessment indicates that forecast accuracy is not routinely reviewed. It is recommended that a review process be instituted and fed back into the system prior to creating the next forecast. In other environments this has proved to be a powerful learning tool for continuous improvement in the quality and accuracy of demand Forecasting and Supply Planning.
Observations made to the assessment team about the lack of available storage space, and the amount/types of commodities stocked suggest this is a factor in limiting the achievement of the stocked according to plan measure. The MOH should work to identify where these issues and other factors impact the distribution chain to explore how these challenges may be ameliorated

CONCLUSIONS

This assessment of the Government of Rwanda's national public health supply chain shows a well-functioning system that is driven by an ethos to serve patients and improve the health of the nation. It also shows the challenges of a system that is in the process of maturing, while also simultaneously adapting to an increased volume and variety of products, and the emergence of new technologies with expectations of ever faster response times.

As with all assessments, it has the limitation of being a snapshot in time of the reported Capability Maturity of the system at all levels, and the results from an agreed set of key performance indicators. The assessment does not seek to be an in-depth diagnostic tool, but it was able to draw conclusions on the potential relationships between Capability Maturity and performance in a number of areas, which point to potential actions that could further improve the performance of the system, or where a deeper diagnostic analysis may be appropriate.

It is encouraging to be able to report a relatively low level of stock outs in the tracer commodities assessed, although it must be acknowledged that this performance relies on a relatively high level of emergency orders to correct or avoid stock outs. A tighter focus on the management of planned stock levels, including a greater use of the eLMIS system for data-driven decision-making and distribution of routine orders to maintain planned stock levels, could be expected to reduce both the risk of stock outs, and the need for emergency orders.

The Capability Maturity Model results show a need for increased capacity in the quality assurance of commodities received from suppliers, and the Pharmacovigilance of drugs in the system.
The Axios team would like to thank the Ministry of Health, Rwanda for their leadership and for initiating this assessment, USAID for their support throughout the assessment, and to pay tribute to the level of support received from the management and staff at all levels of the government system. This level of support further demonstrates the strong HR capability recorded in the assessment, and the commitment of the staff and management to serving the population of Rwanda.