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Madagascar National Supply Chain Assessment Report

Capability, Maturity and Performance

October 2022

PMI | **U.S. PRESIDENT'S MALARIA INITIATIVE**

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Contents

Acronyms

ACT	Artemisinin-Based Combination Therapy
ADR	Adverse Drug Reaction
ADR	Adverse Drug Reaction
AL	Artemether-Lumefantrine
ALu	Artemether-Lumefantrine
ART	Antiretroviral Therapy
ARV	Antiretroviral
ASAQ	Artesunate + Amodiaquine
CHRD	District Hospitals
CHRR	Regional Referral Hospital
CMM	Capability Maturity Model
CSB	Health Centers
DPEV	Expanded Program on Vaccinations
DPLMT	Directorate of Pharmacy, Laboratories and Traditional Medicine
DSFa	Family Health Directorate
eLMIS	Electronic Logistics Management Information System
FANOME	Funding For Non-Stop Drug Supply
FASP	Forecasting And Supply Planning
FP	Family Planning
GHSC-PSM	Global Health Supply Chain-Procurement and Supply Management
GoM	Government of Madagascar
HR	Human Resource
HR	Human Resources
KPI	Key Performance Indicators
LMIS	Logistics Management Information System
M&E	Monitoring and Evaluation
MDG	Millennium Development Goals
MMA	Madagascar Medicines Agency
MoS	Months of Stock
MINSANP	Ministry of Public Health
NDQCL	National Drug Quality Control Laboratory
NEML	National Essential Medicines List
NPP	National Pharmaceutical Policy
NSCA	National Supply Chain Assessment
ORS	Oral Rehydration Salts
PhaGDis	District Pharmacies
PNLIST	National Program for The Control of AIDS And Sexual Infections
PNLP	National Malaria Control Program
PNLT	National Tb Control Program
PoD	Proof of Delivery
PPP	Public-Private Partnership

QA	Quality Assurance
RDT	Rapid Diagnostic Test
RH	Reproductive Health
SATP	Stocking According To Plan
SDP	Service Delivery Point
SNUT	National Office for Nutrition
SOA	State of the Art
SOP	Standard Operating Procedure
SOW	Scope Of Work
SP	Sulphadoxine Pyrimethamine
SPM	Strategic Planning and Management
STG	Standard Treatment Guidelines
TA	Technical Assistance
UNFPA	United Nations Population Fund
UNICEF	United Nations Children's Fund
USAID	United States Agency For International Development
WHO	Wealth Health Organization

Executive Summary

The Ministry of Public Health (MINSANP), National Supply Chain Assessment (NSCA) Steering Committee, United States Agency for International Development (USAID), UNICEF, USAID IMPACT project and USAID Global Health Supply Chain Program-Procurement and Supply Management (GHSC-PSM) project conducted fieldwork in Madagascar for the NSCA 2.0 from July 25 to August 12, 2022. The NSCA measures the capability, functionality, and performance of supply chain functions at all desired levels of a national health supply chain system. The assessment collects information through three primary methods: a supply chain system mapping exercise, the capability maturity model (CMM) questionnaire, and the collection of key performance indicators (KPIs). The 11 functional areas of effective supply chains assessed by the CMM survey are shown in Exhibit 1.

Exhibit 1. NSCA 2.0 CMM Functional Areas
Strategic Planning and Management
Policy and Governance
Human Resources (HR)
Financial Sustainability
Forecasting and Supply Planning
Procurement and Customs Clearance
Warehousing and Storage
Distribution
Logistics Management Information System (LMIS)
Quality and Pharmacovigilance
Waste Management

The primary objectives of this assessment were to:
1. Analyze and measure the performance, operational capacity, and capability of the national public sector-financed health commodity supply chain
2. Identify the performance gaps (bottlenecks, root causes, and opportunities for improvement) to guide system-strengthening investments
3. Identify progress made by the Government of Madagascar (Ministry of Public Health) in implementing strategic supply chain interventions.
4. A comprehensive visual representation of the supply chain that clarifies product flow, information flow, and sources of funds.
5. Identify key inputs to guide 2023 to 2027 strategic plan development processes

Based on the findings, the Government of Madagascar (GOM), in collaboration with key supply chain stakeholders, can set strategic priorities and operational plans, leverage a shared understanding of the current context to build stakeholder support for collective action, and follow up on identified areas of poor relative performance with targeted root-cause analyses. The NSCA focused on those parts of the Madagascar health supply chain directly financed or directed by the GOM. The assessment team collected capability and performance metrics on the DPLMT to be representative of the MINSANP and central-level capabilities, the central purchasing agency (SALAMA), vertical health programs, district pharmacies, referral hospitals, district hospitals, and health centers. The NSCA assessed 158

structures consisting of 87 basic health centers (CSBs), 21 district hospitals, 15 regional referral hospitals, 6 university hospitals and 29 district pharmacies (PhaGDis). The DPLMT, DSFa, SALAMA and 4 vertical programs (PNLP, PNLIS, DPEV, PNLT) were censused and interviewed.

Overall, the 2022 NSCA in Madagascar documented the presence of existing capabilities and levels of performance across 11 technical areas as they are applicable at each level of the supply chain. The mixture of strengths and weaknesses points to a set of priorities for the MINSANP and the DPLMT to consider as inputs for the development of a 5-year country supply chain strategic plan for the period 2023-2027 plan. The assessment noted that despite the strong presence of capabilities within the central medical stores (SALAMA), it does not necessarily transcend to other entities of the supply chain. Weaker system capabilities were found within the PhaGDis and service delivery points (SDPs) mainly due to the limited ability or absence of guidelines and tools to standardize procedures and minimize variability. The NSCA highlights the governance and administrative issues which must be resolved to optimize system performance. One such recommendation is the potential decoupling of supply chain responsibilities to a centralized technical agency which will have responsibility for end-to-end supply management and performance from the current situation where it is entirely supervised by the DPLMT. The NSCA team highlights findings below for consideration as the MINSANP and stakeholders:

Strategic planning and direction: A major deficiency of the Madagascar supply chain is the absence of a national-level supply chain specific strategic plan which defines the vision, mission, and objective of the supply chain within the context of the national health system. SALAMA does have a strategic plan for its operations but even this should be derived from a country-level plan which gives direction and sets the agenda for other entities. A strategic plan is important because identifies priorities, proposes interventions for their achievement within a defined time, and serves as an important tool for resource mobilization.

Redefining Country Leadership for Supply Chain Activities. From the NSCA it seems the DPLMT has functions beyond the health supply chain including pharmaceuticals management and traditional medicine practice. It is important within the context of redefining the role of the supply chain in health service to strongly consider the separation of supply chain functions from the DPLMT so that it focuses on the practice of pharmacy and traditional medicine. Choosing this option would require a separate entity to provide leadership for end-to-end management of the supply chain including functions such as quantification, procurement, logistics information management, waste management amongst others.

Strengthening Relationships: The results of the NSCA showed that SALAMA performed strongly in most of the technical areas in comparison to other entities in the supply chain. Although this is a phenomenon that is commonly observed in most public health supply chain systems, there is little evidence that capabilities within SALAMA are leveraged by other entities within the supply chain. SALAMA as an autonomous agency does not have clear supervisory responsibility for the other entities in the public supply chain. So, it is important to initiate steps that will ensure the best practices within SALAMA benefit other entities in the supply chain.

Centralizing Forecasting and Supply Planning: The NSCA team recognized the dispersion of forecasting and supply planning functions amongst the individual vertical programs with none of them exhibiting optimal capability or maturity. It is therefore plausible that centralizing this activity and others within a single supply chain technical unit while the vertical programs focus on defining program priorities.

Procurement and Customs Clearance: This is one of the areas where maturity capability scores were relatively low for SALAMA. And much lower for the DPLMT. Hence, it is important to review procurement procedures and systems for greater visibility and transparency. It is also important to

ensure procurement committees are functional, contract management systems are in place and performance monitoring is institutionalized.

Performance Monitoring: The SOPs for logistics management selected some indicators to track supply chain performance, however, these do not cover all supply chain functions. Generally, the NSCA showed that most entities did not actively monitor the performance of supply operations and calculation of performance indicators was mostly absent. Hence, there is a need to re-position performance monitoring as a key component of supply chain and logistics management function, so that performance indicators are actively monitored, and the results used for decision-making.

Downstream Distribution: There is an integrated distribution for most commodities from SALAMA to the district levels, university, and referral hospitals. However, there is no direct delivery to the over 2300 health centers and district hospitals that receive commodities from the district pharmacies. This situation should give way to a more organized and structured distribution system beyond the district levels to relieve facilities from the burden and risk of transporting health commodities. In selecting an option for a structured last mile distribution from the district pharmacies to lower levels, the role played by all 115 district pharmacies must be assessed, so that efficient and optimal options are selected

Develop, Update and Disseminate Resources: There is a need to develop new policies and procedures, and for supply chain activities, update existing ones and ensure proper dissemination to required levels of the supply chain. For instance, there is a need to develop guidelines for national quantification and procurement of health commodities and update manuals for supply chain quality assurance and the destruction and disposal of expired and damaged commodities. However, whether new manuals are developed, or old ones revised it is important that these documents are disseminated to required users so that they have an impact on the performance of supply chain tasks.

Globally, the NSCA presents a detailed up to date understanding of the dynamics within the Madagascar public health supply chain and makes targeted recommendations to help drive the system forward. The assessment team is confident that with empowered leadership, strategic targeting of supply chain weaknesses, and a commitment to equity within the health system, Madagascar can implement appropriate reforms to further strengthen the supply chain to help realize the vision of a Malagasy population in perfect health contributing to the development of a modern and prosperous nation.

Background
Madagascar's Public Health Context

Madagascar is an island of the African continent, located between the Mozambique Channel and the Indian Ocean. It is the fifth largest island in the world, with a surface area of 587,047 km² and 5000 kilometers of maritime coastline. The population of Madagascar is 28.4 million (2021 estimate) with an annual growth rate of 2.6 percent[1]. The country has a diverse ecosystem, unique wildlife, and extensive mineral resources; at least 80% of the plant and animal species found in Madagascar are unique to this vast island. Despite its rich natural resources, integration in the global economy, and young workforce, Madagascar has never been able to generate sufficient economic growth to increase living standards in a sustained fashion. Since its independence from the French in 1960, Madagascar's population has increased fivefold whereas economic activity has only tripled. As a result, real GDP per capita in 2020 was about 45 percent lower than in 1960, with most of the losses occurring during a long period of economic stagnation from the early 1970s to the mid-1990s. Since then, gains accumulated during modest growth episodes were reversed by severe shocks, including two major political crises (in 2001-02 and 2009-12) and, more recently, the COVID-19 pandemic that began in 2020. Madagascar is one of only six countries where real per capita incomes are lower today than they were around 1960, and the only country to have experienced declining incomes in the absence of armed conflict. This long-term fall in per capita income and the recent experience with stop-go growth episodes are the main reasons that an estimated 80 percent of the population still lives in extreme poverty (below the international poverty line of US$1.90 per day in 2011), up from 68 percent in the early 2000s, and 46 percent in the early 1980s. The correlation between income per capita and extreme poverty trends is particularly strong for Madagascar – 0.9 compared to an average of 0.6 for aspirational peers and around 0.2 across Sub-Saharan African countries[2].

Only 60%–70% of Madagascar's inhabitants have access to any form of primary healthcare, and travel distances of >10 km to the nearest health facility are not uncommon. The country is afflicted by a significant burden of several major infectious diseases, and vaccine coverage with the standard Expanded Program on Immunization vaccines is low in comparison with its peers. The groups of infectious diseases with the greatest estimated burden in Madagascar are lower respiratory tract infections, diarrheal diseases, malaria, neonatal sepsis, and syphilis, accounting for 36.7% of the years of life lost[3].

The Ministry of Public Health (MINSANP) is the central coordinating unit of all the facilities at the different levels of the healthcare system in the country The current healthcare structure in Madagascar consists of 2723 primary healthcare facilities, comprised of 1,003 Centres de Santé de Base level 1 (CSB1), equivalent to health posts in anglophone African countries, and 1,720 CSB level 2 (CSB2), equivalent to health centers. In Madagascar's healthcare system, CSBs are the primary point of contact and provide the lowest level of healthcare. At the district level, there are 115 district referral hospitals (CHRD) categorized as CHRD1 (24) or CHRD 2 (77) based on the level of delivery. CHRD1 has smaller hospitals in comparison to CHRD2 which are larger and provide more specialized services. 16 regional referral hospitals provide advanced diagnostics as well as surgical and obstetric services and 22 university teaching hospitals offer the highest level of patient care. Most of the doctors practice in larger municipalities, leaving most rural healthcare facilities without qualified medical personnel. The situation is further aggravated by a limited number of nurses and midwives and the lack of medicines at healthcare centers due to frequent interruptions in supply. Health efforts are largely fragmented, and aid has been directed to individual health centers and hospitals or to local NGOs rather than to,

[1] Worlddata.info retrieved from https://www.worlddata.info/africa/madagascar/index.php, October 2022
[2] https://documents1.worldbank.org/curated/en/699781575279412305/pdf/Madagascar-Country-Economic-Memorandum-Scaling-Success-Building-a-Resilient-Economy.pdf
[3] Florian, M., et al (2016). A Way Forward for Healthcare in Madagascar? *Clinical Infectious Diseases*, Volume 62, Issue suppl_1, March 2016, Pages S76–S79, retrieved from https://doi.org/10.1093/cid/civ758

and through, the MINSANP. This has led to the development of a small private health sector that is supported by local NGOs and faith-based organizations, as well as private for-profit health centers and general physician offices[4].

The MINSANP has a vision of "A Malagasy population in perfect health contributing to the development of a modern and prosperous nation" as expressed in its strategic plan for 2020- 2024. The strategic plan defines eight key areas for future interventions:

- Strengthening the institutional framework, governance, and coordination of the health system
- Good management and rational use of available resources oriented towards results and efficiency.
- Strengthening human capital.
- Improving equitable access of the population to quality integrated essential services and care for all, including remote/indigent people, and stimulating effective demand for essential services by the community.
- Strengthening preventive medicine, health promotion, and healthy behaviors targeting the determinants of health, management of health emergencies, including epidemics and disasters
- Development of adequate and equitable health financing to protect the population from financial difficulties in accessing health care.
- Strengthening of the health information system and health research for effective planning
- Strengthening community health.

The effective implementation of interventions related to these areas will contribute to the attainment of universal health coverage for the population and protection in case of health emergencies such as emerging pandemics.

Madagascar's Public Health Supply Chain

The supply of health commodities to the public sector and non-profit non-governmental health facilities is the responsibility of the Directorate of Pharmacies, Laboratories and Traditional Medicine (DPLMT) of the Ministry of Public Health (MINSANP). The public health supply chain is composed of four (4) operational levels which are the central level, regional, district level, and commune level.

- A central medical store for medicines and medical consumables: SALAMA
- 38 Regional referral hospitals & university hospitals.
- 115 district pharmacies (PhaGDis) and 105 district hospitals (CHRD1 & CHRD2)
- 2,778 health centers (CSB1 & CSB2), and 17, 000 + community sites staffed by community health workers (CHWs) who are supervised by the CSB

There are also 74 Community Supply Points (PARC) and1,028 Supply Points (PA) for social marketing, 870 Private Health Centers (CSBP) belonging to non-profit NGOs[5].

The management of health supplies at the central level is entrusted to a central procurement agency - SALAMA - through a ten-year agreement that is renewable annually[6]. Created in 1996, SALAMA's main mission is the central purchasing of essential medicines and medical equipment to supply all health facilities—public and private nonprofit—with good quality, affordable essential medicines, and medical supplies. SALAMA has five regional branches located in Antsiranana, Mahajanga, Toamasina, Toliara, and Fianarantsoa. These branches receive health products from the central level according to a pre-established annual distribution schedule except for emergency shipments. SALAMA has financial autonomy[7]. Its revenue comes mainly from the sale of cost recovery (RC) products (FANOME) or services such as the storage and distribution of pharmaceuticals. In its 2020-2024 strategic plan, SALAMA plans to optimize its procurement methods and harmonize its pre-qualification system with

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[4] Marks F, Rabehanta N, Baker S, Panzner U, Park SE, Fobil JN, Meyer CG, Rakotozandrindrainy R. A Way Forward for Healthcare in Madagascar? Clin Infect Dis. 2016 Mar 15;62 Suppl 1:S76-9. doi: 10.1093/cid/civ758. PMID: 26933025.
[5] MSANP 2022; Manuel de procedures en gestion logistique des intrants de sante
[6] Plan-de-développement-du-secteur-santé (PDSS) 2020 - 2024 - Finalisé - 26 Janv 2020 | PDF | Promotion de la santé | Bien-être https://www.scribd.com/document/473577178/PDSS-2020-2024-Finalise-26-janv-2020-1-docx Accessed: 2022-09-10
[7] Rapport d'analyse du coût total de la chaîne d'approvisionnement du secteur publique, Madagascar, 202

that of the Madagascar Medicines Agency (DAMM) to improve the availability of quality to clients while reducing acquisition costs. To accomplish its mission of supplying commodities to health facilities in the country and avoid stock-outs, SALAMA intends to have in place efficient management systems, increase its working capital, and augment its buffer stock of commodities to guarantee regular supply to clients as needed[8].

The quantification of health commodities is conducted by the Logistics Management Technical Unit (UTGL) led by the DPLMT in collaboration with the procurement and supply management committee (GAS) established in each of the vertical programs [National Malaria Control Program (PNLP), National Program for the Control of Sexually Transmitted Infections (PNLIST), National Program for the Control of Tuberculosis (PNLT), Family Health Directorate (DSFa including the National Office for Nutrition (SNUT)), Directorate for Expanded Immunization Program (DPEV)] and validated by the Logistics Management Committee (CGL) of the Sécretaire General Office. Procured quantities are often less than the needs forecasted due to funding shortfalls resulting from over-reliance on external sources and limited contribution by government. The inability to satisfy estimated needs for procurement is one of the major reasons for the frequent stock-outs observed at service delivery points. Generally, different mechanisms are used to procure health commodities depending on the source of funding. Some technical and financial partners (PTFs) provide funding to cover the entire needs of the country whiles others procure commodities only for the regions in which they intervene. Quality assurance is the responsibility of the DAMM which houses the National Quality Control Laboratory (NQCL). The DAMM grants market authorizations for entry of medical products into the Malagasy market, conducts quality control as well as pharmacy and warehouse inspections.

Most commodities are distributed from the central to the region and district levels by SALAMA. SALAMA transports commodities to the PhaGDis which are the warehouses of the health districts according to a pre-established schedule (one delivery per quarter for the easy-to-access health districts and one per semester for the difficult-to-access health districts). SALAMA uses its own vehicles and subcontracts private transportation companies. Once the products arrive at the PhaGDis, they are transported by the SDPs (CSBs, CHRD1 and accredited NGO facilities) per the available means of transport (by taxi-bus, motorcycle, bicycle, canoes, bicycle, or on foot...). Some technical and financial Partners operate a parallel distribution network by transporting commodities directly to the district for downstream distribution or through designated district warehouses for supply to SDPs

SALAMA supplies products directly to the referral and university hospitals (CHRD2, CHRR, and CHU) however, these entities have conducted localized procurements to the private sector to fill all their needs. A PULL distribution system applies for the supply of commodities; so the quantities supplied are determined by the facility making the request to SALAMA. The managers of the health centers, NGO facilities, and CHRD1 determine the quantities of supplies to be ordered from the PhaGDis. The community sites obtain their supplies from the CSBs to which they are attached, so community health workers(CHWs) are supported by the staff of the CSB to determine their needs. SALAMA buys, sells, and delivers drugs on the National Essential Medicines List (NMEL).

The public health facilities are required to obtain their supplies from SALAMA. When supplies are not available at SALAMA, referral hospitals are allowed to buy from private pharmaceutical wholesalers with the concurrent authorization of the medicines and supplies committees within the hospitals and the DPLMT. SALAMA is also responsible for managing products for vertical programs, such as family planning, malaria, HIV/AIDS and maternal and child health. These products are usually purchased by donors and are distributed by SALAMA through a service contract between the donor and SALAMA . However, some of the donors have their own warehouses and contract private providers for distribution, leading to problems and duplications in the supply chain. The integration of the various warehouse and distribution networks within the supply chain would (1) enable better control of the distribution network and responsiveness to fluctuations in demand; (2) achieve economies of scale in

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[8] Plan Strategique du SALAMA, 2020 -2024

logistics costs; (3) optimize the use of scarce resources; (4) gain better access to information, and (5) build national capacity in a sustainable manner.

Financing is a key challenge throughout the supply chain and the larger health system. To respond to the issues of funding and its effect on the availability of medicines, the recovery system FANOME which is an acronym for "Funding for Non-stop Drug Supply", was created in 2003 as a mechanism to support the purchasing and distribution of drugs. The goal of FANOME is to make care available to indigents of the country and provide care and medication at low cost to the poorest in the communities. Two streams of funding exist for the funding of drugs, cost recovery drugs which falls within the FANOME framework, and non-cost recovery or free drugs which are funded by the state in theory but tend to be largely funded by financial and technical t partners. Free drugs are either curative drugs for long-term illnesses, such as HIV/AIDS, Tuberculosis, and Leprosy, epidemics, or for mass treatment of endemic diseases, like malaria other products such as vaccines, family planning products, and nutritional supplements among others[9].

The flow of information in the supply chain is designed to start from the base of where the community health workers are assisted by the staff of the CSBs to submit their reports and requisitions. The CSB, CHRD1, and facilities supported by NGOs in the district submit their monthly reports and requisitions to the PhaGDis and the district coordinators of the public health programs. At this level the reports are consolidated and entered in the LMIS The reports contain essential logistics data; consumption data, losses/adjustments, and stock on hand to inform the re-supply of products. The referral and specialized facilities (CHRD2, CHRD1 & CHRR) are expected to enter data directly into the eLMIS for consolidation into the central database which is managed by the logistics management technical unit (UGTL) of the DPLMT. Once the data is consolidated it becomes accessible to SALAMA , to inform the re-supply of products after approval of the public health programs. The UGTL also aggregates the data for feedback to the mid-level and peripheral level institutions to inform decision-making such as organizing and carrying out supervision activities[10].

Irrespective of the successes in recent years, key challenges continue to affect the performance of the supply chain. Forecasting and supply planning is dispersed amongst the vertical programs, funding for the procurement of program commodities is mainly donor-driven and the distribution network is truncated without reaching the last mile. Product availability is sub-optimal as stock-outs are frequently reported by service delivery points (SDPs) which lack the required numbers of skilled personnel, tools, and equipment to deliver a quality level of service to clients. Strategic and operational planning is non-existent to inform performance monitoring and evaluation. This NSCA responds to the requests by the country and stakeholders to determine the performance, maturity, and capabilities of the supply chain to inform a 5-year strategic and operational planning horizon.

[9] Diallo, Abdou, Norbert Pehe, Julia Bem, and Andrew Inglis. 2015. *Supply Chain Network and Cost Analysis of Health Products in Madagascar: Results*. Arlington, Va.: USAID | DELIVER PROJECT, Task Order 4.
[10] Olds, Peter, "Accès aux Médicaments à Madagascar : L'Etat, La Pharmacie, et L'Usager" (2006). *Independent Study Project (ISP) Collection*. 259. https://digitalcollections.sit.edu/isp_collection/259

Overview of the Supply Chain Assessment Activity

Under the leadership of the MINSANP, the DPLMT, NSCA Steering Committee, USAID, UNICEF, and UNFPA, the USAID GHSC-PSM project and the USAID IMPACT project provided support for the preparatory activities and fieldwork for the National Supply Chain Assessment in Madagascar from April to September 2022. The assessment had five primary objectives:

1. Analyze and measure the performance, operational capacity, and capability of the national public sector-financed health commodity supply chain
2. Identify the performance gaps (bottlenecks, root causes, and opportunities for improvement) to guide system-strengthening investments
3. Identify progress made by the Government of Madagascar (Ministry of Public Health) in implementing strategic supply chain interventions.
4. A comprehensive visual representation of the supply chain that clarifies product flow, information flow, and sources of funds.
5. Identify key inputs to guide 2023 to 2027 strategic plan development processes

The NSCA 2.0 includes three distinct elements:

1. Results in a visual representation of the country's supply chain

2. Measures of the overall capability, resources, processes, and functionality of the country's supply chain

3. Collection of site-level data on key performance indicators to measure supply chain performance

Based on the findings, the Government of Madagascar (GOM), in collaboration with key supply chain stakeholders, can set strategic priorities and operational plans, leverage a shared understanding of the current context to build stakeholder support for collective action, and follow up on flagged areas of poor relative performance with targeted root-cause analyses. The NSCA focused on those parts of the Madagascar health supply chain directly financed or directed by the GOM. The assessment team collected capability and performance metrics on the DPLMT to be representative of the MINSANP and central-level capabilities, SALAMA, vertical health programs, district pharmacies, referral hospitals, district hospitals, and health centers. Donors play a key role in Madagascar's public health system, especially in procuring key commodities, and their actions certainly affect the public system. However, to the extent that donors feature in the NSCA, it is to assess how Madagascar's public health actors effectively manage relations with them, rather than to assess donor capabilities or performance directly. Similarly, the private health market and social marketing are influential actors in the Madagascar health system, but one that remained mostly outside the scope of this assessment. Future assessments on donor effectiveness and the private health market would certainly be welcome complements to the NSCA. As is, the NSCA's value is in focusing on the public dimensions, across 11 technical areas and multiple levels, to inform future public health supply chain system strengthening.

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

Methodology

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

The National Supply Chain Assessment Toolkit

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

Exhibit 2. Overview of the Three Elements of NSCA 2.0 Assessment	
ACTIVITY	DESCRIPTION
Supply chain mapping	The objective of mapping is to obtain an in-depth understanding of the supply chain, including the roles and responsibilities of key supply chain actors. This is achieved through facilitated group work to identify similarities and differences among various product groups flowing through the system.
CMM diagnostic tool	The CMM diagnostic tool assesses capability and processes across functional areas and cross-cutting enablers (e.g., HR, financial sustainability) using interviews and direct observation.
Supply chain KPIs	The KPIs include a set of indicators that measure supply chain performance in selected functional areas.

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

Scope of Work

The scope of work for this assessment required the assessment team to conduct a comprehensive assessment of Madagascar's public health system across levels: central, district, and service delivery levels. Also, the assessment disaggregates data across multiple facility types: CSBs; district hospitals; referral hospitals, university hospitals, and SALAMA. At the central level, the team carried out assessments at the DPLMT, the Department of Expanded Program for Immunization (DPEV), and the Vertical health programs [National Program for HIV/AIDS and Sexually Transmitted Infections (PNLIST), National Malaria Control Program (PNLP), National TB Control Program(PNLT), and the Department of Family Health (DSFa)]. Exhibit 3 in the following section lists all sites where data were collected. The complete SOW is attached to this report in the Annex.

Sampling

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

The sampling frame thus consisted of 2303 facilities - 2126 CSBs, 15 CHR, 22 university hospitals, 72 district hospitals, 67 district pharmacies, and the central medical stores . The sample frame excluded fully private and NGOs facilities, as this assessment focused on public-sector entities.

The assessment team determined the minimum sample size using the hypergeometric sample size formula, assuming a margin of error of +/– 10 percent, and a 90 percent level of confidence as the NSCA 2.0 guidance suggests. The team used a randomized two-stage sampling process to select health centers. The sample size was initially calculated for the number of districts and later calculated for the number of health facilities needed, based on the above parameters and assuming a design effect of 1.6. The design effect used is based on a post-assessment analysis of NSCA 2.0 pilots. Districts were selected with the probability of inclusion in the assessment proportional to the number of health facilities in each district. Within each selected district, the proportionate number of CSBs required to make up the sample were selected at random in addition to the district hospital, and PhaGDis. Also, all regional referral hospitals (CHRR) and 6 CHUs were selected based on the sampling calculation and location of these facilities. SALAMA was censused for inclusion because of its overall importance to the supply chain.

The final sample is detailed below along with the full sample frame (see Exhibit 3). We planned to assess a total of 161 sites. The full list of selected sites is provided in the annex.

Exhibit 3. NSCA Sampling Frame and Selected Sample		
Facility Type	Sampling frame	Sample
Health centers (CSB)	2126	87
Regional Referral hospitals (CHRR)	15	15
University hospitals (CHU)	22	6
District hospitals (CHRD)	72	22
District pharmacies (PhaGDis)	67	30
SALAMA	1*	1
Total	2,303	161

*Denotes that this facility type was censused

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

Team Composition and Training

Central-level and field teams were formed and trained to conduct this assessment. Central-level interviews with the DPLMT, SALAMA, DPEV, and the vertical programs led by a local consultant and a team of three data collectors.

At the subcentral sites, two-person teams (34 members total) traveled to 158 sites over 21 days to collect data from July 24 to August 11, 2022. The USAID IMPACT team recruited 36 data collectors based on the criteria in the toolkit for this national assessment. Selection was based on a set of outlined skills and credentials, including deep understanding of key healthcare commodities, comfort with diverse supply chain functional areas, experience with large assessments, high levels of professionalism, and significant autonomy. All data collectors participated in intensive five-day training from July 11 to 15, 2022 on the assessment tools, SurveyCTO, tracer commodities, and best practices in survey methods. On the fourth day of training, participants conducted a pretest of the tools in 4 health facilities and the district pharmacy in Antananarivo. The pretest served as a practice exercise for data collectors, a low-stakes chance to troubleshoot technology, and a final opportunity to provide targeted feedback to the assessment team to further refine the survey to the Madagascar context.

Procedures

The DPLMT and the USAID IMPACT held several discussions prior to the implementation of this assessment. The central supply chain coordination committee ("committee GAS') was co-opted to be the in-country steering committee for the NSCA. A first workshop with the steering committee was held from June 14-15, 2022, to discuss the methodology of the NSCA, identify entities for assessment, adopt the sampling approach, determine tracer commodities list and review all the assessment processes and procedures. Under the leadership of DPLMT, this NSCA was implemented by the USAID IMPACT project in Madagascar with technical support from the USAID GHSC-PSM monitoring and evaluation technical team and leveraging funding with UNICEF and UNFPA. The scope of GHSC-PSM's technical support included assessment management, training, analysis, and presentation of findings and recommendations. In-country coordination and implementation were led by the DPLMT with support from the USAID IMPACT team. The USAID IMPACT project provides supply chain TA for Madagascar, so GHSC-PSM 's role in this activity was limited to providing technical guidance and advice in relation to the administration of the NSCA toolkit. It is important to recognize strong collaboration amongst in-country stakeholders for implementation of the NSCA such as leveraging funding with UNICEF and UNFPA. This strong collaboration created an enabling environment for the implementation and prioritization of the assessment.

Prior to the start of data collection, the Office Secretary General of the MINSANP and the DPLMT endorsed letters that were sent to regional health directorate (DRSP)to inform them that facilities in their respective province have been randomly selected to participate in a national assessment of the health supply chain system. DRSPs were responsible for communicating the exercise to the main points of contact at each facility under their oversight. Data collectors also carried with them a copy of the notification letter signed by the MINSANP, in case of communication failure, and were trained to explain or further reinforce the purpose and value of the assessment upon arrival.

Subnational data were collected from CSBs, district hospitals, referral hospitals, university hospitals and district warehouses. On average, teams spent one full day assessing the CSB and CHRD, one and a half days at the district pharmacies and referral hospitals; with travel days in between. One team member would lead the CMM survey interviews, while the other collected KPI data. If one team member completed their respective interview early (usually the CMM lead), data collectors would support the team member. The DPLMT included a supervisor in each team to provide the data collectors with the requisite administrative cover for facility entry.

The central-level team collected data from multiple department officials within the MINSANP, SALAMA, and vertical programs leads and senior finance, human resource, warehousing, procurement, customs, and regulatory officials. Access was facilitated by the supervisors, and the USAID IMPACT staff, and reflected relationships developed throughout the planning process with key stakeholders. Central-level interviews were conducted in August and September 2022 and were sometimes delayed due to the non-availability of respondents.

The Capability Maturity Model (CMM) questionnaire measures the level of capability and functionality present in the supply chain across 11 functional areas, including storage and warehousing, distribution, financial sustainability, waste management, and human resources. Only relevant modules were assessed at specific sites, depending on their facility level. For example, health facilities were not assessed on their capabilities in forecasting and supply planning. Relevance was determined by the DPLMT and the in-country NSCA steering committee based on their understanding of the supply chain functions at the various levels of the supply chain. The survey primarily consists of an extensive set of binary yes/no-type questions that establish the presence—or lack thereof—of a set of supply chain capabilities, processes, and best practices. The structure facilitates the collection of data in a standardized way, reduces the impact of subjectivity in the assessment (compared to NSCA 1.0), and improves the comparability of the results across countries and time.

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

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

Exhibit 4. CMM Functional Area by Level in the Madagascar Supply Chain System—Noncentral Levels

#	FUNCTIONAL MODULES ASSESSED	CSB	District Hospitals (CHRD)	Referral and University Hospitals	District Pharmacies (Phagdis)
1	Strategic Planning and Management			✓	
2	Human Resources	✓	✓	✓	✓
3	Financial Sustainability	✓	✓	✓	✓
4	Policy and Governance				
5	Quality and Pharmacovigilance	✓	✓	✓	✓
6	Forecasting and Supply Planning (FASP)			✓	
7	Procurement and Customs Clearance				✓
8	Warehousing and Storage	✓	✓	✓	✓
9	Distribution				
10	Logistics Management Information Systems	✓	✓	✓	✓
11	Waste Management	✓	✓	✓	✓

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

FUNCTIONAL MODULES ASSESSED	MINSANP (DPLMT)	SALAMA	Vertical Program
Strategic Planning and Management	✓	✓	
Human Resources	✓	✓	✓
Financial Sustainability	✓	✓	
Policy and Governance	✓	✓	
Quality and Pharmacovigilance	✓	✓	
Forecasting and Supply Planning	✓	✓	✓
Procurement and Customs Clearance	✓	✓	
Warehousing and Storage		✓	
Distribution		✓	
Logistics Management Information Systems	✓	✓	✓
Waste Management	✓	✓	

Key Performance Indicators

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

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

#	Key performance indicators	SALAMA	DPEV	Vertical Programs	CSB	District Hospitals (CHRD 1 & CHRD 2)	Referral & University Hospitals	District Pharmacies (Phagdis)
1	Stock data		✓		✓	✓	✓	✓
2	Delivery data	✓	✓		✓	✓	✓	✓
3	Human resource data (eg.staff turnover)	✓	✓	✓	✓	✓	✓	✓
4	Facility reporting rates	✓		✓	✓	✓	✓	✓
5	Temperature excursions	✓	✓		✓	✓	✓	✓
6	Forecast accuracy	✓		✓				
7	Supply plan accuracy	✓		✓				
8	Source of funds data	✓		✓				✓
9	Prices paid	✓	✓		✓			

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

Tracer Products

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

Exhibit 7. Tracer Commodities			
#	PRODUCT NAME	STRENGTH	PRODUCT CATEGORY
1	Amoxicillin powder for suspension	250mg/5ml	FANOME
2	Paracetamol	500mg	FANOME
3	DPMA-IM (Depo Provera)	150 mg/ml	Family Planning
4	1 rod implant (Implanon)	Unite	Family Planning
5	Combined oral contraceptives (Microgynon)	50/30 mcg + placebo	Family Planning
6	Plumpy'Nut	Unit	Nutrition
7	Oxytocin	10 UI	Maternal and Child Health
8	ORS, 20,5 g/1 L	20,5 g/1 L	Maternal and Child Health
9	ASAQ	100/270 mg	Malaria
10	Sulfadoxine-Pyrimethamine (SP)	500/25 mg	Malaria
11	Malaria RDT	N/A	Malaria
12	BCG	Un Dose	Vaccine
13	Vaccine - VAR	Un Dose	Vaccine
14	RHZE	150 + 75 + 400 + 275 mg	TB
15	Douletgravir + Lamivudine + Tenofovir	50mg/300mg/300mg	HIV

Data Management

Each data collector was provided with an individual smartphone programmed with SurveyCTO to electronically collect, enter, and upload data. All completed CMM and KPI questionnaires were uploaded daily to the SurveyCTO secure data server. After uploading, a team consisting of the M&E Specialist from GHSC-PSM, 2 monitoring and evaluation (M&E) specialists from IMPACT, and 3 data specialists recruited by IMPACT, reviewed submitted data daily for quality assurance. In cases of data oddities or discrepancies, the specialists followed up directly with the data collection teams (through a quality assurance Facebook messenger page, supplemented by direct calls from the logistics lead) to confirm data points, resolve issues, and provide future guidance. This structured process served to verify that all answers were correctly coded and nonresponse data points removed, facilitating more efficient analysis. Further, the frequency of this data review (sometimes referred to as "cleaning") enabled us to quickly identify unexpected issues, which were systematically addressed. After this daily review and response process, validated data were accepted by the M&E team for inclusion in the final datasets.

SurveyCTO exports data using a comma-separated values format. Data analysis workbooks that are part of the standard NSCA 2.0 toolkits were coordinately designed in Microsoft Excel to leverage this format. This minimized the data transformation process, streamlined data cleaning, and significantly increased automation of KPI calculation during data analysis. By using coding values that created clear "signal spikes," nonresponse values were easily identified by the values populating a summary metrics

page. The data analysis workbooks also produced charts, graphs, and data dashboards to enable top-line analysis that contributed to field-based debriefs for local stakeholders. Results will be discussed by examining all three components of the data collection: the supply chain map, CMM interviews, and KPI data collected.

Limitations

– Comparing CMM and KPI Scores

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

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

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

- Communication of Questions

Both Malagasy and French are official languages in Madagascar. The NSCA 2.0 tool was available in only French hence it is practical to assume that data collectors would ask some questions in Malagasy because it is the language spoken in both the official and non-official spaces in the country. Even when translations are professionally reviewed there may be some loss of information or introductions that could impair the original intention. We tried to minimize this incidence by recruiting data collectors that were comfortable communicating in French and training them to maintain the use of French in administering the survey.

Summary of Results

Overall, data were collected from 159 out of 161 targeted sites across all levels of the Madagascar public health supply chain system: District Pharmacies (n=29), Service delivery points, including CSBs (n=87), district hospitals (n=21), regional referral hospitals (n=15) and University Hospitals (n=6) and SALAMA. Data was also collected from the DPLMT, DSFa and the vertical programs (DPEV, PNLIST, PNLP, PNLT). For the ease of the presentation visuals and results, regional referral and university hospitals are mostly grouped as referral hospitals. Also, district hospitals represent the results from CHRDI and CHRD2, and CSB represent the CSB1 and CSB2.

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

Supply Chain Maps: Commodity and Information Flows

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

On July 7, 2022, 37 participants convened for the one-day supply chain mapping workshop in Ibis Hotel, in Antananarivo, Madagascar. Participants included representatives from the NSCA Steering Committee, the vertical programs, supply chain partners, and invited professionals (see report annex for the workshop slides, agenda, and final participant list). Participants were organized by their expertise into five working groups based on salient vertical programs, and each team was asked to produce a comprehensive map of commodity and logistic information flows from procurement to service delivery points. After the workshop, the assessment team integrated these maps into an illustration of the Madagascar public health supply chain with the goal of illuminating bottlenecks, inefficiencies, and opportunities for improvement.

Exhibit 8 illustrates the organization and elements within the Madagascar supply chain as well as the flow of commodities and information through the system. The final versions presented here have been reviewed and endorsed by in-country stakeholders.

Exhibit 8. Map of Commodity and Information Flow

USAID GLOBAL HEALTH SUPPLY CHAIN PROGRAM
Procurement and Supply Management ·

Madagascar Public Health Supply Chain System
Flow of Products and Information
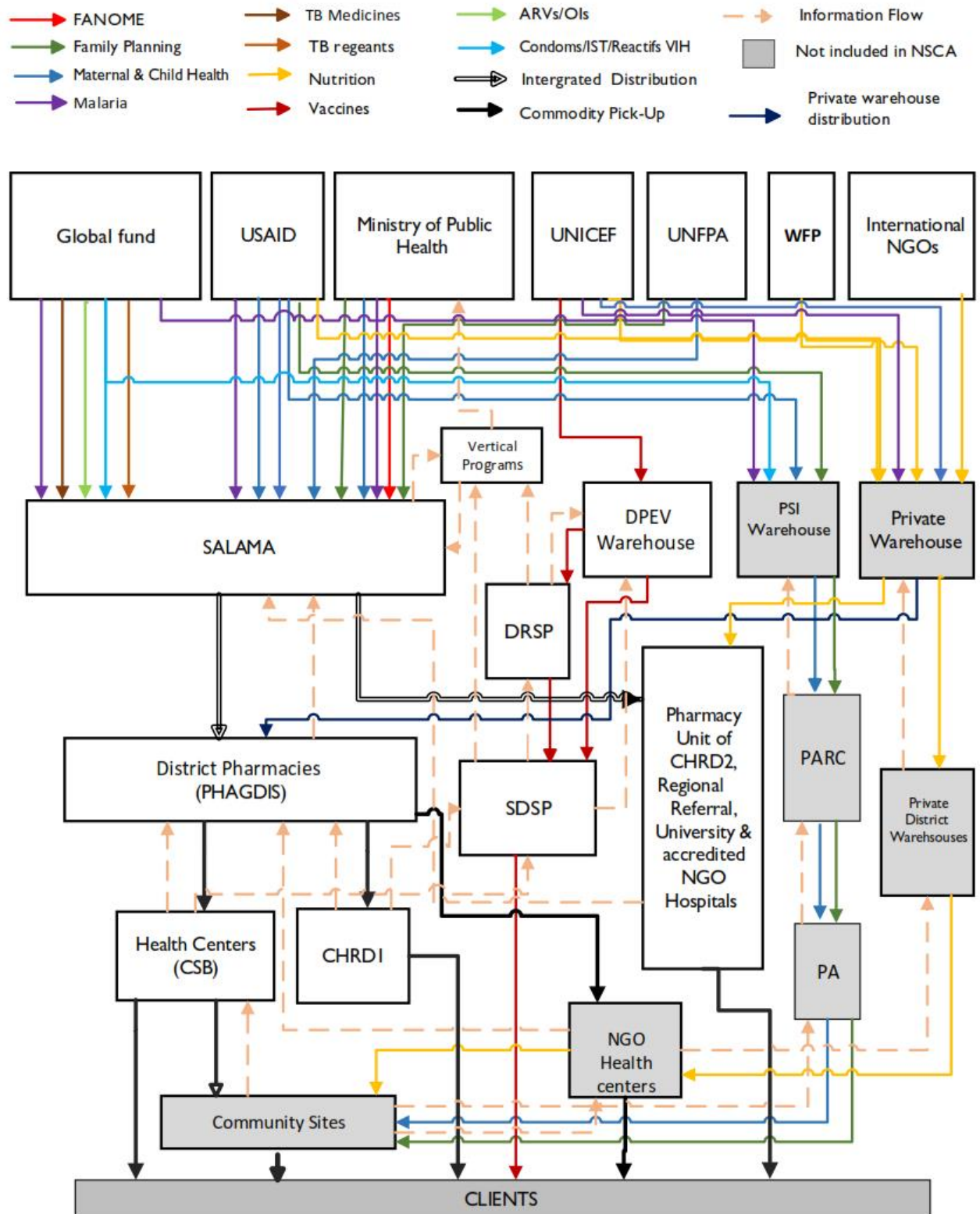
These illustrations of commodity and information flows through the Madagascar public health supply chain help to highlight several key facets and challenges of the current system:

- Limited Distribution of Commodities to peripheral levels : Integrated distribution of commodities is limited to the supply of commodities from the central level (SALAMA) to the PhaGDis and Referral and Specialized hospitals (CHRR, CHU, CHRD2). The PhaGDis, Referral, and Specialized hospitals are supplied by SALAMA based on their report and requisitions (Rapport-Bon de commande [RBC]). PhaGDis in turn supplies the CSBs and District Hospitals (CHRD1). However, PhaGDis do not have the logistics and resources to directly deliver commodities, so the facilities pick up commodities themselves from the PhaGDis using the most accessible means of transport available to them.

- Multiple Storage Locations: Several storage locations can be found at the central, regional, and district levels of the supply chain. Most commodities are stored and distributed from SALAMA at the central and the PhaGDis at the district level, however, private, and donor-funded facilities are also utilized. While this may provide an advantage in some instances the situation complicates integrated distribution and information flow.

- Many Procurers: Multiple entities—governmental and donor—are procuring health commodities for Madagascar's public health system, typically with multiple procurers per program area. While increasing the funds available for commodities, this also complicates coordination and supply planning, as entities procure products on separate timelines.

- Role of Regional and District level: The regional public health directorates (DRSP) and the District Public Health Services (SDSP) play significant roles in the supply chain including the management of commodities and the flow of information. The DRSP is usually the transit point for some specialized commodities such as vaccines, reagents, and test kits supply to the PhaGDis or SDSP. The DRSPs in some instances aggregate information for transmission to the central level. The SDSPs are usually co-located with the PhaGDis and technically management of vaccines, cold chain commodities, reagents, and some test kits. The SDSPs work with PhaGDis to aggregate and submit data from the CSBs and CHRDI to the LMIS.

- Information Landscape: Logistic information is expected to originate from the last4 mile to the district level for entry into the LMIS for access at the central levels. Data from CSBs are coupled with data from the community health volunteers and submitted to the PhaGDis for entry into the LMIS. The PhaGDis also receive data from the district hospitals (CHRD1) for entry into the LMIS. The referral and specialized hospital submit data into the eLMIS after which it becomes accessible at levels. However, not all facilities have the eLMIS installed and some are unable to enter data due to challenges with human resource capacity, equipment, and internet connectivity. There is also parallel information flow which does not necessarily conform to the designed pathway. For example, commodities procured and distributed by donors through local NGOs or via social marketing are captured and reported separately.

Understanding the CMM Results

A review of the CMM results presented below must consider how the scoring was completed. The capability and processes were assessed based on a maturity model, adapted from private-sector best practices to fit the public health context. For more information on how international benchmarks were considered in designing the CMM modules, review the NSCA 2.0 toolkit. Within each functional module, each question (or item) assessed has one of four maturity levels assigned to it, ranging from basic to state-of-the-art (SOA); the overall CMM score for this module is the sum of scores at each maturity level. Exhibit 9 provides an overview of each level of maturity, its definition, and its overall contribution to the functional area's overall CMM score.

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

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

Benchmarks in the NSCA

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

The logic behind this 80 percent benchmark is simple; to achieve such a score, most points must be in the basic and intermediate levels to mathematically reach 80 percent. If your supply chain has demonstrated capabilities across the basic and intermediate levels for a particular technical area, then most likely you do not need to prioritize this technical area for improvement in your next strategic planning process. Achieving 80 percent is certainly possible without completely filling basic and intermediate capabilities. This gap becomes a recommendation to focus on that technical area. Overall, this benchmark's main purpose is to help separate technical areas that are relatively more advanced than others and allow for pragmatic prioritization in improving the public health supply chain. Exhibits 10 to 16 present a summary of key data findings for capability maturity metrics across the 11 technical areas and seven facility sampling disaggregation types

Capability Maturity Model: Summary Tables

Exhibit 10. Noncentral-Level CMM Scores, Average, and Ranges Presented by Level of Facility for Each Functional Module				
	CSBs	**District Hospitals**	**Referral & University Hospitals**	**PhaGDis**
	n = 87	n = 21	n = 21	n = 29
Strategic Planning and Management	--	--	11% (0–57%)	--
Policy and Governance	--	--	16% (0–100%)	46% (0–88%)
Human Resources	33% (6–81%)	32% (12–50%)	30% (8–55%)	34% (8–61%)
Financial Sustainability	53% (27–76%)	60% (31–76%)	64% (16–85%)	56% (30–74%)
Forecasting and Supply Planning	--	--	30% (0–50%)	--
Procurement and Customs Clearance	--	--	30% (14–70%)	--
Warehousing and Storage	30% (15–46%)	33% (20–45%)	39% (30–57%)	37% (24–48%)
Distribution	--	--	--	--
Logistics Management Information System	52% (34–74%)	49% (4–75%)	62% (0–85%)	38% (0–63%)
Quality and Pharmacovigilance	13% (0–38%)	14% (0–38%)	15% (0–55%)	2% (0–17%)
Waste Management	23% (0–72%)	24% (4–53%)	35% (8–84%)	32% (3–48%)

--: means technical area was not applicable for this level of the supply chain.

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

	SALAMA	MINSANP (DPLMT)	Vertical Programs
	n = 1	n = 1	n = 1
Strategic Planning and Management	39%	17%	
Policy and Governance	100%	57%	
Human Resources	45%	42%	36%
Financial Sustainability	79%	59%	
Forecasting and Supply Planning	62%	66%	43%
Procurement and Customs Clearance	62%	26%	
Warehousing and Storage	66%		
Distribution	83%		
Logistics Management Information System	61%	42%	33%
Quality and Pharmacovigilance	56%		
Waste Management	78%		

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

Module	Level of the supply chain			
	CSBS	District Hospitals	Referral Hospitals	PhaGDis
	n = 87	n = 21	n = 21	n = 29
Forecasting and supply planning				
Procurement and customs clearance				
Warehousing and storage				
Distribution				
Waste management				
Strategic planning and management				
Human resources				
Financial sustainability				
Policy and governance				
Quality and pharmacovigilance				
Logistics management information system				
White cells indicate that data not applicable or not available				

Low score   50%   High Score

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

Module	Level of the supply chain		
	SALAMA	DPLMT	Vertical Programs
	n = 1	n = 1	n = 5
Forecasting and supply planning			
Procurement and customs clearance			
Warehousing and storage			
Distribution			
Waste management			
Strategic planning and management			
Human resources			
Financial sustainability			
Policy and governance			
Quality and pharmacovigilance			
Logistics management information system			

Low score — 50% — High Score

Select KPIs: Summary Tables

Exhibit 14. Select Key Performance Indicators, Average, and Ranges Presented by Level of Facility					
	CSB	District Hospitals	Referral & University hospitals	PhaGDis	SALAMA
	n =87	n = 21	n = 21	n = 29	n = 1
Stocked according to plan (tracer commodities)	28% (14%– 28%)	27% (15%-36%)	27% (15-40%)	26% (14%-43%)	13% (0%-50%)
Stockout on day of the assessment	31%	16%	23%	17%	33%
Average number of stockout days for 181-day period*	--	8.2 days (7%)	7.7 days (10%)	6.8 days (4%)	--
Average number of days per month with stockouts, given that there was a stockout	--	6.9 days	4.7 days	3.4 days	--
Stock card accuracy: percentage of facilities at 100 percent accuracy	43%	39%	60%	70%	36%
Stock card accuracy: average deviation from 100 percent accuracy across facilities (no deviance = 0)**	19%–1744%	33%– 307863%%	10%–132%	36% -752%	84%-100%
eLMIS record accuracy: percentage of facilities at 100 percent accuracy	75%	13%	10%	50%	25%
eLMIS record accuracy: average deviation from 100 percent accuracy across facilities (no deviance = 0)	0%–2000%	89%–4000%	66%–241%	26%–1844%	99%–100%
Waste from damage, theft, and expiry: damaged, lost, and expired stock as a percentage of the total stock available	0%	1%	1%	0%	1%
Staff turnover ratio	1%	1%	6%	14%	2%

*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 January 2022 through June 2022. This period included 180 days. The number in parentheses is the percentage of days the commodity was out of stock, on average. Thus, 46.3/180 = 27 percent.

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

Analysis, by Functional Module: Capability Maturity and KPI Results

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

Strategic Planning and Management

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

Exhibit 15. Examples of Scored Strategic Planning and Management Capabilities	
Basic	Presence of an approved supply chain strategic plan (or awareness of it for lower-level entities) Monitoring of supply chain implementation plan and presence of specific subsections Formal biannual assessment of supply chain risks
Intermediate	Strategic planning process that includes stakeholder mapping exercise Presence of a supply chain implementation plan Biannual updates to the supply chain strategic plan or implementation plan Actions to reform the supply chain system included in the strategic plan or implementation plan Coordination or engagement with the private sector to improve the supply chain within the last year
Advanced	Monthly meetings of stakeholder groups to review supply chain performance Presence of a risk management and mitigation/prevention plan Formal strategy for using public-private partnerships to improve supply chain performance
SOA	Formal and continuous assessment of supply chain risks

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

Strategic planning is currently nascent at all levels of the supply chain in Madagascar except for SALAMA. SALAMA, the central purchasing agency has a strategic plan covering the period 2020-2024 to guide its operations, optimize methods for the procurement of drugs and medical consumables, and harmonize the registration process for health commodities. The 202-204 strategy aims to position SALAMA as an efficient pillar of the health system that guarantees better access to health commodities for the population. The strategy seeks to:

- Develop the capacity of SALAMA to stock adequate quantities of health commodities
- Optimize delivery timelines
- Guarantee the quality of health commodities procured, stocked, and distributed by SALAMA
- Assure financial equilibrium
- Develop partnerships for complementary funding
- Adapt operational modalities to country development context and decentralization
- Ensure adequate human resource capacity

- Improve the quality management system
- Adapt and Implement the Global HSE policies
- Align actions and activities to the organizational mission

The National Health Sector Strategic Plan (PDSS) 2020 – 2024 outlines the roles and functions of the key actors at each level of the supply chain, highlights the difficulties confronting the sector and, makes recommendations to ensure the interrupted availability of medical supplies to support service delivery. However, there is no history of supply chain-specific strategic planning led by the DPLMT for itself or for the sub-national levels. Supply chain operations are mostly guided by the standard operating procedure manual (Manuel GIS) which only defines the roles and responsibilities and provides directions on how specific tasks should be completed and reported. However, this is inadequate as there is a need for a country supply chain strategy that has a clear definition of the vision and mission for the supply chain, sets out its objectives, and defines actions and timelines to achieve expected outcomes. This document should define the roles and responsibilities of sector stakeholders in achieving high-level outcomes and highlight the implementation and monitoring approach that will be used by the GOM. Hence, a comprehensive stakeholder consultation must be initiated for the development of a supply chain-specific strategy plan for the country.

Exhibit 16. Strategic Planning and Management Capability
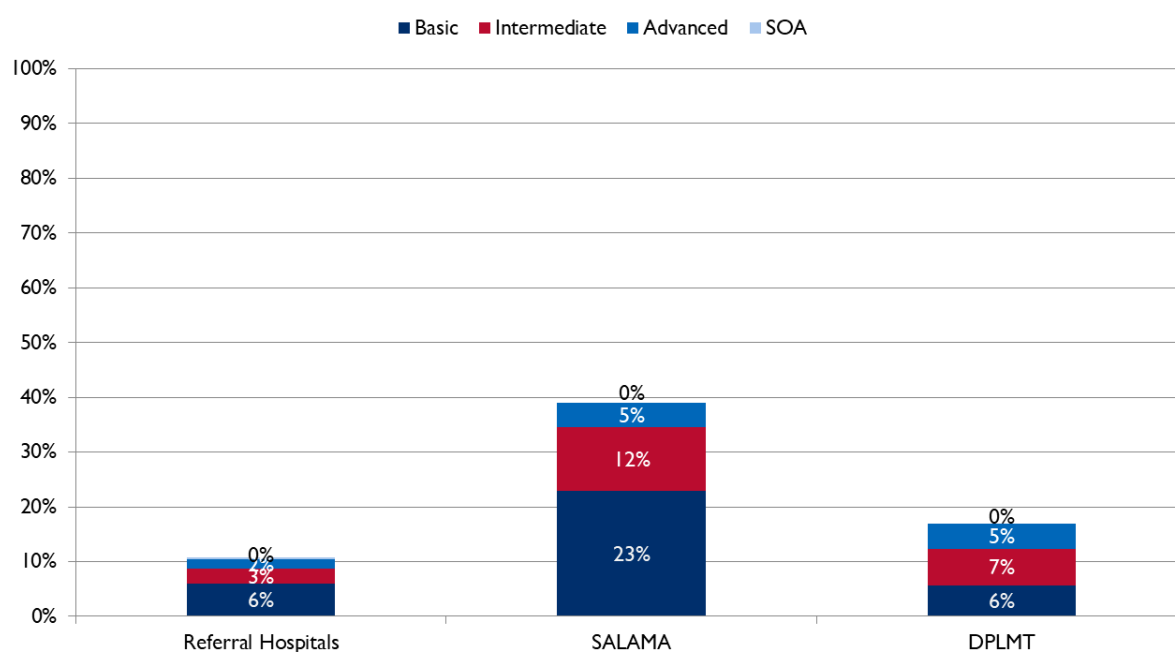
Note on interpreting results: Recall that CMM scores are a composite of assessed basic (max 50 percent), intermediate (30 percent), advanced (15 percent), and SOA (5 percent) capabilities. Reported percentages are the scored results averaged across all assessed sites, for each capability level and facility type. For more information, please refer to the Understanding the CMM Results section above.

Strategic planning and management capabilities were assessed at 21 referral and university hospitals, the central purchasing agency SALAMA, and the DPMLT which is responsible for providing strategic oversight and guidance for the entire supply chain. The district pharmacies (PhaGDis) and district hospitals were excluded because they are expected to rely on the strategic plans developed at the national level. The capability maturity scores and illustrative responses on select capability questions

are presented in Exhibits 16 and 17. Neither the central purchasing agency (SALAMA) nor the national supply chain oversight body, the DPLMT had adequate strategic planning capabilities in place, however, SALAMA demonstrated stronger capabilities in comparison to the DPLMT. In terms of the expected basic elements for strategic planning, the DPLMT scored 6 out of 50 percent while SALAMA scored 23 out of 50 percent. Overall capability for strategic planning at the central level was 40 percent for SALAMA and 18 percent for the DPLMT.

The strategic planning and management capabilities at the referral and university hospitals were expectedly low reflective of the limited practice of strategic planning within the entire supply chain. The overall maturity score for the referral and university hospitals was 11 percent and only 6 percent of the expected basic elements were in place. The capability scores for the referral and university hospitals ranged from 0 to 57 percent.

For strategic planning and management, responses from referral and university hospitals should be interpreted as their awareness of the existence of these strategic plans, how they fit into those plans, and their relevant responsibilities.

Exhibit 17. Strategic Planning and Management Capabilities Maturity Scores and Select Question Responses			
	Referral & University Hospitals	SALAMA	DPLMT
n =	21	1	1
Overall maturity score (range)	11% (0–57%)	39%	17%
Presence of an approved supply chain strategic plan	10%	✓	X
Is the supply chain strategic plan updated yearly or more often?	15%	✓ (Every 4 years)	X
Stakeholder mapping exercise	0%	X	X
Presence of a supply chain implementation plan	10%	✓ (1 year or less)	X
The supply chain implementation plan is monitored (timeframe)	10%	✓ (Bi-annually)	X
Supply chain reforms are being implemented	0%	X	X
Formal structure exists to monitor supply chain performance at this level	33%	✓	✓
Existence of performance monitoring plan tracking supply chain performance	37%	✓	X
Existence of a risk management and mitigation/prevention plan	5%	X	X
Coordination or engagement with private- sector companies	0%	Informal	Formal

Strategic planning capabilities. Strategic planning capabilities are low at all levels of the supply chain even though the central purchasing agency, SALAMA had an approved strategic plan covering 202-2024. SALAMA updates its strategic plan regularly (at least every 4 years) to align with its performance objectives and client expectations. However, there are no strategic plans for the supply chain at the national or sub-national levels even though the health sector strategic plan recognizes the role of the supply chain in achieving national health priorities. Stakeholders are expected to build on the findings and results of this NSCA and other assessments such as the UNICEF maturity model conducted in January 2022 to begin the process of developing the country's supply chain strategic plan.

Only 11% of the referral and university hospitals had an appreciation of supply chain strategic planning relevant to their level of service, as to be expected since national-level guidance and priority setting are absent.

Supply chain plans. A subsection of this technical area focuses on the presence, implementation, and monitoring of supply chain plans. Only SALAMA had a one-year supply chain implementation plan that is monitored bi-annually, however, there was no evidence of reforms as documented by performance monitoring. The DPLMT does not have an implementation plan to provide a clear understanding of its priorities for the supply chain sector. The absence of planning at the central level is replicated at the referral and university hospitals. Only 10% of the referral and university hospitals had supply chain implementation plans out of which 15% considered their plans updated regularly. Although the presence of a strategic plan was assessed in referral and university hospitals the NSCA considers this to be more the responsibility of central-level entities.

Public-private partnership. Public-private partnerships (PPPs) are considered a key feature in strategically managing public health supply chain systems. The role of private actors within Madagascar's public supply chain system continues to evolve. Referral and university hospitals supplement their commodity requirements with procurements from private vendors. SALAMA procures commodities from the private sector and contracts private vendors for transportation services but there is little evidence of a structured engagement between the DPLMT and the private sector. It would be beneficial for the country to take a holistic view of how the private sector interfaces with the public sector supply chain to derive mutual benefits for both sectors.

Supply Chain Risks. Risk planning is non-existent at all levels of the supply chain including SALAMA. SALAMA recognizes the risk inherent in its operations and exchange rate fluctuations. Also, the DPLMT considers human resources and technological constraints as its primary risks but has specific plans for dealing with such risks. Specific risks affecting the supply chain at the referral and university hospitals are indicated in Exhibit 18

Exhibit 18. Top Risks Experienced in the Supply Chain			
	Referral & Specialist hospitals	SALAMA	DPLMT
n =	1	1	1
Human resources	14%	X	✓
Technology	38%	X	✓
Operational	19%	✓	X
Economic (e.g., exchange rate)	5%	✓	X

Recommendations

The NSCA 2022 highlights the deficits in strategic planning at all the supply chains even though SALAMA has in place an approved strategic plan for 2020-2024 to guide its business operations. The current gaps provide the opportunity for the MINSANP, DPLMT, and country stakeholders to begin the process of building on existing capabilities in-country, results of NSCA, and other assessments to;

- Develop a comprehensive national strategic plan for the country that set outs the mission, vision, objectives, and priority areas for supply chain investments
- Provide guidance for the development of strategic plans or operational plans for sub-national levels of the supply chain (PhaGDis, Referral and University Hospitals, and Other Hospitals)
- Leverage the opportunity to develop a national supply chain strategic plan to provide guidance for private-sector partnerships in the supply chain.
- Develop guidance that will enable the various entities in the supply chain to identify and develop risk mitigation plans

Supplemental Exhibit

Exhibit 19. SPM: Distribution of Questions and Assignment of Weight Across Capability and Facility Levels								
	BASIC (50%)		INTERMEDIATE (30%)		ADVANCED (15%)		SOA (5%)	
MODULE	# of Qs	WEIGHT	# of Qs	WEIGHT	# of Qs	WEIGHT	# of Qs	WEIGHT
Referral hospitals	30	1.7%	18	1.7%	9	1.7%	2	2.5%
SALAMA	36	1.4%	13	1.2%	6	2.5%	1	5.0%
DPLMT	36	1.4%	13	1.2%	6	2.5%	1	5.0%

Note that interpretations of the scoring, and discussions of "differences" in the scores, need to be recognize that the number of assessed capabilities differs by facility type and module. Thus, positive responses to individual questions (i.e., reports of present capabilities) carry different weights, depending upon the technical area and facility type.
Note also that the number of questions and the question weighting for these modules vary because some conditionally scored questions are included. Figures presented here assume all conditions are met and all questions are included.

Policy and Governance

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

Exhibit 20. Examples of Scored Policy and Governance Capabilities	
Basic	Existence of a national medicines policy that includes objectives for supply chain management Five-year updates of national policies related to supply chain management Existence of national STGs and a National Essential Medicines List Existence of a process for registering medicines, products, and technologies Publicly available list of registered drugs and products
Intermediate	Quarterly meetings by a supply chain oversight and governance body to discuss supply chain issues Adaptation of national STGs from universal clinical guidelines
Advanced	Existence of a formal, high-level body that provides oversight and governance for the supply chain
SOA	Civil society is a part of the formal supply chain oversight and governance body

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

The Madagascar National Pharmaceutical Policy (NNP) seeks to sustain the physical and financial access to essential medicines for the entire population. The NPP provides the framework for harmonizing the different activities related to the development of the pharmaceutical sector to guarantee a level of health that enables everyone to lead a socially and economically productive life. There is also a National List of Essential Medicines List (NEML) which specifies the minimum requirements for health facilities to deliver optimum care. These are the drugs that have the best efficacy, safety, and cost-effectiveness for priority diseases by the level of care classifications. However, there is no evidence of the existence of a consolidated standard treatment guideline for all disease conditions and ailments even though the different health programs have their own treatment protocols.

2022 NSCA Findings and Analysis

Exhibits 21 and 22 show the NSCA results assessing the policy and governance capabilities present in Madagascar's public health supply chain. The presence of policy and governance capabilities at the central level is strongest within SALAMA but weaker within the DPLMT, PhaGDis, and SDPs. SALAMA obtained a perfect score for this technical area which confirms the presence of strong structures for governance within this autonomous agency. It is important to note that the NSCA in respect of this entity focused on the presence of policies for its internal governance and not the entire supply chain. Nevertheless, SALAMA's score demonstrates the existence of best practices in-country that can be leveraged for other areas of the supply chain. The DPLMT obtained an overall maturity capability score of 60 percent and had 79 percent of the expected basic elements in place. Even though the NPP accounts for the objectives of the supply chain there are no specific policies or guidelines that cover

supply chain technical areas including quality assurance, waste management, forecasting and supply planning, and others. The development of a national supply chain strategic plan can account for how the country intends to develop and strengthen these areas of the supply chain.

The PhaGDis and referral and university hospitals received capability maturity scores of 46 and 16 percent, respectively. The PhaGDis have district committees that provide oversight for the supply chain but 49 percent of them were unable to provide copies of formal policies that guide their operations. For referral and university hospitals the performance was poor due to the absence of standard treatment guidelines. The scarcity of standard treatment guidelines is equally prevalent in district hospitals and CSBs.

Exhibit 21. Policy and Governance Capability
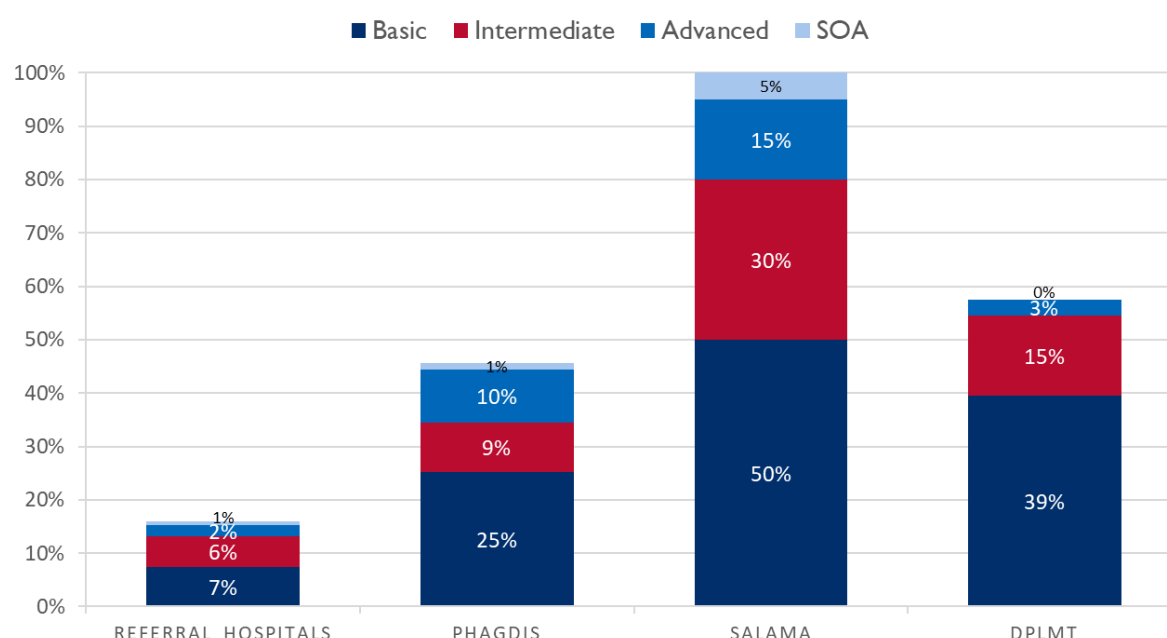
Note on interpreting results: Recall that CMM scores are a composite of assessed basic (max 50 percent), intermediate (30 percent), advanced (15 percent), and SOA (5 percent) capabilities. Reported percentages are the scored results averaged across all assessed sites, for each capability level and facility type. For more information, please refer to the Understanding the CMM Results section above.

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

	Referral hospitals	PhaGDis	SALAMA	DPLMT
n =	21	21	1	1
Overall maturity score (range)	16% (0–100%)	46% (0–88%)	100%	60%
Percent of basic items in place (range)	15% (0–100%)	50% (0–100%)	100%	79%

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

MOH establishment of a National Pharmaceutical Policy   X

A formal body that provides oversite and governance for the supply chain		✓
Frequency of governance body meetings		Quarterly
Existence of national STGs		X
Adaptation of STGs from the universal clinical guidelines		X
Frequency of revision of national STGs		X
Process for registering new drugs, products, and technologies		✓
The time it takes to register a new drug on average		3–6 months
Public list of registered products		MINSANP: ✓ MMA: ✓

Existence of policies and guidelines. There is high variability and weakness in the availability and uptake of policies and guidelines amongst actors in the supply chain. It is obvious that where policies exist, they are either not disseminated for assimilation within the supply chain; their identity or use is dependent on the personnel available at the entity assessed. It is important to clearly census the policies and guidelines available, identify their purpose, specify where they are required and develop a comprehensive plan for dissemination and use. For those that are not available there should be a coordinated process to develop such for the country.

Exhibit 24. Supply Chain System Guidelines and SOPs Available						
	CSBs	District Hospitals	Referral & University Hospitals	PhaGDis	SALAMA	DPLMT
n =	n = 87	n = 21	n = 21	n = 29	1	1
Guidelines or SOPs for the supply chain system exist, covering:						
Storage	25%	32%	38%	53%	✓	--
Inventory management	--	--	19%	62%	✓	No
LMIS	18%	26%	10%	62%	✓	No
Quality assurance	1%	6%	10%	36%	✓	✓
Forecasting	--	--	14%	--	X	X
Supply planning	--	--	5%	--	X	X
Waste management	28%	25%	38%	27%	✓	--
Procurement	X	X	19%	58%	✓	No
Financing	--	--	14%	34%	✓	✓
Human resources	50%	29%	14%	28%	✓	✓
None of the above			5%	No	No	No

Dissemination of policies. Dissemination of policies, if at all they exist, is poor in the public health system as shown in Exhibit 25. During the NSCA data collectors were presented with multiple documents in lieu of a national standard treatment guideline, however, a secondary examination of these documents showed that none of them meets the requirements of an STG.

Exhibit 25. Availability of National STGs						
	CSB	District Hospitals	Referral & University Hospitals	PhaGDis	SALAMA	DPLMT
n =	n = 87	n = 21	n = 21	n = 29	1	1
STGs available at site (physically verified)	0%	0%	0%	--	--	--

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

Recommendations

Policy and governance, maturity scores were perfect for SALAMA and 60 percent for the DPLMT. At sub-national levels of the supply chain, we see an expected weak performance referral, and university hospitals and the PhaGDis with scores ranging from 16 to 45 percent. Indicative of the high-level performance variability at this level. The following recommendation should be considered.

- Ensure that the protocols and procedures in place are censused and disseminated to every entity with consideration for their level and user requirements. This may also require that staff are trained to identify policies relevant to them
- Complement the national medicines policy and essential medicines list with a standard treatment guideline that is updated regularly to reflect modern therapeutic needs.
- Leverage the capacity within SALAMA to improve the performance of the PhaGDis in this area. This recommendation brings to light the need for the government to consider the role and relevance of maintaining all the district pharmacies in a future system design.
- As the country plans for supply chain reforms, it is important to consider decoupling supply chain functions and pharmaceutical practice regulations of the DPLMT. This could mean a separate entity for the management of the health sector supply chain sector whiles the DPLMT focuses on regulating the pharmaceutical sector.

Supplemental Exhibit

Exhibit 26. Policy and Governance, Distribution of Questions, and Assignation of Weight Across Capability and Facility Levels								
	BASIC (50%)		**INTERMEDIATE (30%)**		**ADVANCED (15%)**		**SOA (5%)**	
MODULE	# of Qs	WEIGHT	# of Qs	WEIGHT	# of Qs	WEIGHT	# of Qs	WEIGHT
District Hospitals	9	5.6%	1	30.0%	1	15.0%	1	5.0%
Referral &University hospitals (21)	9	5.6%	1	30.0%	1	15.0%	1	5.0%
PhaGDis (29)	12	4.2%	4	7.5%	2	7.5%	1	5.0%
SALAMA (1)	12	4.2%	4	7.5%	2	7.5%	1	5.0%
DPLMT (1)	12	4.2%	4	7.5%	2	7.5%	1	5.0%

Note that interpretations of the scoring, and discussions of "differences" in the scores, need to recognize that the number of assessed capabilities differs by facility type and module. Thus, positive responses to individual questions (i.e., reports of present capabilities) carry different weights, depending on the technical area and facility type.
Note also that the number of questions and the question weighting for these modules vary because some conditionally scored questions are included. Figures presented here assume all conditions are met and all questions are included.

Human Resources

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

| Exhibit 27. Examples of Scored Human Resource Capabilities	
Basic	At least two capacity-building sessions (e.g., LMIS, waste management, reporting) within the last year SOPs or training guides/materials
Intermediate	Human resource workforce plan that projects future needs for supply chain personnel Unified supply capacity-building plan Supportive supervision of supply chain functions within the last year Presence of appropriate supply chain functions in job descriptions
Advanced	Quarterly staff performance reviews Most (51–99 percent) staff have participated in capacity training in the last two years Database tracking of staff's attendance at capacity-building sessions in supply chain management Advanced supply chain–specific capacity-building programs available in country (e.g., e-learning, certificate, diploma programs)
SOA	Participation by all staff in supply chain capacity training within the last two years Bachelor's degree or master's program in supply chain available in country

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

The SOPs manual for logistics management, 2022 identifies the key actors at the various levels of the supply chain. Although it identifies roles, responsibilities, and functions for key actors, it does not prescribe the staffing norms. The current national health sector strategic plan identifies human resources gaps as a key challenge affecting the quality of health service delivery and makes recommendations to improve the skills, quality, and quantity of human resources for service delivery. However, these recommendations are skewed towards augmenting the quality and numbers of clinical staff and paramedics without significant attention to supply chain staff.

2022 NSCA Findings and Analysis

In Madagascar, human resource capabilities are sub-optimal at the various levels of the supply chain. Although SALAMA and the DPLMT have the strongest capacities, their capability scores in the NSCA were low at 45 percent and 42 percent respectively. Capabilities scores are also low for the sub-national levels ranging from 30 percent for referral hospitals to 34 percent for the PhaGDis, indicative of a limited range of human resources capabilities to support supply chain operations. SOA capabilities are virtually non-existent because of inadequate numbers of high-level professionals within the supply chain sector. Also, basic capabilities scores range from 15% to 21% for all levels confirming the limited human resource capacity-building efforts for supply chain staff. Exhibits 28 and 29 detail HR capability scores as well as select KPIs.

Exhibit 28. Human Resources Capability Maturity Model Scores
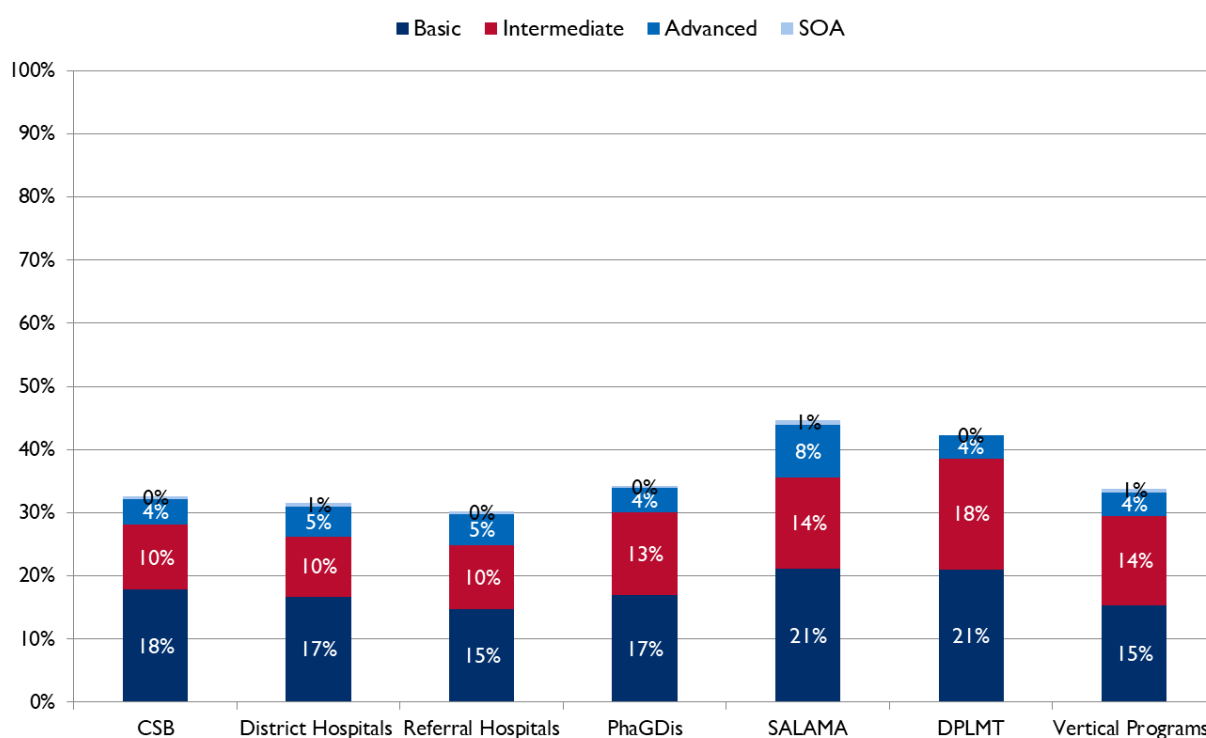
Note on interpreting results: Recall that CMM scores are a composite of assessed basic (max 50 percent), intermediate (30 percent), advanced (15 percent), and SOA (5 percent) capabilities. Reported percentages are the scored results averaged across all assessed sites, for each capability level and facility type. For more information, please refer to the Understanding the CMM Results section above.

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

	CSB	District Hospitals	Referral & University hospitals	PhaGDis	SALAMA	DPLMT	Vertical Programs
	n = 87	n = 21	n = 21	n = 29	1	1	5
Overall maturity score (range)	33% (6–81%)	33% (12–50%)	30% (8–55%)	34% (8–61%)	45%	42%	36%
Percent of basic items in place (range)	36% (11–72%)	33% (0–75%)	42% (8–58%)	34% (58–75%)	42%	42%	31%
Staff turnover ratio	1%	5%	5%	8%	2%	0%	--
Percentage of supply chain vacant	4%	5%	5%	8%	5%	0%	--

HR capabilities. It is typical to witness supply chain HR capabilities much stronger at the central level as compared to the lower levels of the supply chain. Although this is the case in Madagascar, the difference in capacity across the levels is minimal as the range of capability scores starts from 33 to 45 percent for all levels. A closer examination of the scores shows little differences between the basic, intermediate, and advanced capability scores for all the levels of the supply chain. Exhibit 30 highlights key strengths and gaps found in HR capabilities assessed at the central level. It is evident that supply staff at the DPLMT and within the set-up of the individual programs do not benefit from the same level of capacity building that occurs at SALAMA. In SALAMA we see better structures that can be shared as best practices for adoption by the other entities.

Exhibit 30. Select Supply Chain Human Resource Capabilities at Central level Institutions			
	SALAMA	DPLMT	VERTICAL PROGRAMS
Existence of HR workforce plan that project future needs for supply chain personnel	✓	X	X
Existence of general staff recruitment policies that are applied to supply chain personnel	X	X	X
Existence of unified supply chain capacity-building plan or staff development plan for current employees	✓	X	X
Most (51–99%) of staff have participated in a capacity-building session within the last year	✓	X	X

Dedicated Supply Chain Staff. Results from the 2022 NSCA reveal the misalignment between the definition of roles and responsibilities in the SOPs for logistics management vis-a-vis its manifestation at the service delivery points. Most staff at the CSBs, district hospitals, and referral hospitals do not have job descriptions for the supply chain roles they perform. There are inconsistencies in the job descriptions for personnel performing similar functions at different sites and some functions are missing in available job descriptions. It is important to update the job descriptions for the personnel at SALAMA, DPLMT, PhaGDis, and the SDPs to reflect current requirements. Staff cannot be held accountable for work that is officially not part of their job description. Ensuring that staff understands the supply chain functions for which they are responsible and allocating sufficient staff to complete those tasks are essential steps if supply chain operational capacity is to be strengthened at last-mile health facilities. The SOPs for logistics management has specified roles and responsibilities for key personnel at the various levels of the supply chain, however, individuals need to be handed specific job description beyond the generic roles stated in the operations manual.

Exhibit 31. Supply Chain Functions and Job Descriptions						
Supply chain functions are included in the job descriptions for at least one site personnel, including:			Percent of facilities reporting:			
	CSB	District hospitals	Referral & Specialist Hospitals	PhaGDis	SALAMA	DPLMT
Job description available*	37%	27%	48%	65%	✓	✓
Forecasting and quantification	--	--	33%	--	✓	✓
Procurement	--	--	24%	--	✓	X
Storage and inventory management	35%	24%	43%	83%	✓	X
Ordering & Reporting	36%	24%	43%	83%	✓	✓
Distribution	--	--	--	76%	✓	X
LMIS	36%	24%	43%	61%	✓	✓
Waste management	19%	17%	24%	39%	X	X
Quality and/or pharmacovigilance	0%	0%	5%	100%	✓	✓

* Is there a job description with appropriate qualifications for the head of logistics at the central level, pharmacy, or warehouse.

Supply chain capacity-building training. The NSCA 2022 highlights the absence of clear strategies and plans for supply chain capacity building for staff in most facilities. Capacity building is necessary to bolster the skills of current staff and retain them in the workforce. It is also necessary for onboarding new staff and maintaining service quality. Exhibit 32 details the capacity-building opportunities that staff have had within the past year across essential supply functions. The assessment highlights the low

levels of capacity-building opportunities for staff in key logistics management operations such as inventory management, ordering, and reporting, in the last year. Across all relevant supply chain functions, close to 70% of CSBs and district hospitals report receiving no capacity-building sessions of any kind in the last year. Coverage of capacity-building opportunities across the referral and university hospitals is not significantly better than at last-mile facilities, indicating the need for a total approach to institutionalizing capacity-building supply chain staff.

Exhibit 32. Areas Covered in Capacity-Building Sessions in the Last Year						
	Percent of facilities reporting:					
	CSB	District hospitals	Referral & University Hospitals	PhaGDis	SALAMA	DPLMT
Warehousing and inventory management	29%	25%	48%	48%	P	X
LMIS	27%	15%	38%	36%	X	P
Ordering and reporting	33%	12%	43%	33%	X	P
Waste management	27%	19%	42%	--	--	--
Medicine quality assurance	10%	8%	29%	10%	X	P
Treatment guidelines	11%	6%	5%	5%	X	X
Forecasting and Supply Planning	--	--	33%	27%	X	P
Procurement	--	--	33%	--	X	X
Distribution	--	--	--	39%	P	X
None of the above	46%	47%	43%	43%	X	X

Creating opportunities for capacity-building alone does not fully resolve the problem, rather, staff must be supported and permitted to defer work responsibilities to participate in these sessions. Exhibit 33 details the proportion of staff from each assessed facility type that participated in capacity-building sessions. At the CSBs 49 percent of staff could not participate in any capacity-building activities and only 6 percent of staff participated in most training activities. For district hospitals, 66 percent of staff had not benefitted from any capacity-building training analogous to 57 percent of staff at the referral and university hospitals. The situation seems to improve for staff at SALAMA and DPLMT, however, not all staff are able to benefit from available opportunities. So, capacity-building plans but be structured and timed to allow staff at last-mile facilities to participate more regularly in available opportunities.

The key barriers limiting participation capacity building training are detailed in Exhibit 34. Respondents identified many challenges as applied to their situation. The most common responses were finances and workloads, although lack of materials and access to skilled trainers were also commonly cited issues across facility types. Understanding these challenges and lack of opportunities is important in approaching the subject of training and capacity enhancement for staff.

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

	CSB	District hospitals	Referral & Specialist Hospitals	PhaGDis	SALAMA	DPLMT
			Percent of facilities reporting:			
None	49%	66%	57%	46%	0%	0%
Minimal (1–25%)	31%	12%	10%	25%	0%	0%
Some (26–50%)	8%	4%	10%	12%	0%	100%
Most (51–99%)	6%	10%	24%	7%	100%	0%
All (100%)	1%	3%	0%	8%	0%	0%

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

	CSB	District hospitals	Referral & University Hospitals	PhaGDis	SALAMA	DPLMT
			Percent of facilities reporting:			
Finances	40%	32%	43%	47%	✓	✓
Workload	18%	15%	38%	23%	✓	✓
Materials	1%	3%	5%	0%	X	X
Skilled trainers	13%	0%	10%	5%	X	X
Lack of interest	3%	3%	0%	0%	X	X

Supervision. Encouragement and support are crucial enabling factors to ensure the success of the supply chain workforce in carrying out their mission. Exhibit 35 details the relatively low prevalence of supportive supervision across the SDP facility types assessed. The range of respondents receiving supportive supervision in the past year is 36 to 58 percent and feedback post-supervision ranges from 28 to 47 percent. This result demonstrates the low levels of commitment by the central level for supervision to support and encourage staff at the peripheral levels. The MINSANP and DPLMT should consider the strengthening process for supportive supervision and allocate sufficient resources.

Exhibit 35. Supportive Supervision

	CSB	District hospitals	Referral & University Hospitals	PhaGDis	SALAMA	DPLMT
			Percent of facilities reporting:			
Supply chain staff received supportive supervision in the last year	37%	36%	33%	58%	✓	--
Staff received immediate feedback after supportive visits	28%	36%	33%	47%	✓	
Corrective actions are taken following supervision visits	28%	36%	33%	53%	✓	--

Recommendations

The NSCA identifies key gaps and weaknesses in human resource capacities that should inform strategies and approaches for supply chain systems strengthening. The health sector strategic plan 2020-2024 recognizes the significance of skilled and quality resources for health but does not specifically mention human resources for the supply chain. Also, the SOPs manual for logistics management 2022 details the roles and functions of the actors at all levels of the supply chain. However, these do not provide a focused strategy or plan to guide the supply chain human capacity development. The planned development of a national supply chain strategic plan for 2023 to 2025 should be a unique opportunity to begin putting in place the building blocks for supply chain human resource development in Madagascar.

The NSCA team makes the following recommendations.

- Leverage the development of the supply chain strategic plan for 2023-2027 to clearly outline the GOM's vision and strategies for supply chain human resource development.
- Develop and integrate supply chain-specific functions into the job descriptions for staff performing supply chain roles, particularly at the peripheral levels.
- Conduct a supply chain human resource assessment to form the basis for the definition of staff norms for supply chain staff in health facilities
- Implement innovative and potentially low-cost approaches to human resource capacity development such as e-learning, self-directed learning amongst others for continuous performance improvement.
- Develop a national supply chain human resource capacity development plan to guide capacity development planning for all levels of the supply chain.
-

Financial Sustainability

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

Exhibit 37. Examples of Scored Financial Sustainability Capabilities	
Basic	Supply chain costs (e.g., products, warehousing, distribution, personnel, overhead, service delivery) are recorded and records maintained Government *or* facility revenue/costs contribute minimally to total supply chain operations budget/health commodities (less than 25 percent) Budgets are prepared annually MOH financial unit regularly prepares and submits financial reports/profit and loss statements MOH financial unit regularly measures liabilities/cash cycle or cash flow/depreciation/conducts audits/inventories capital assets yearly Process exists for submitting unbudgeted requests
Intermediate	Facility's funding strategy explicitly includes supply chain costs Government/facility revenue is a source of funding for supply chain operations Government *or* facility revenue/costs contribute some to total supply chain operations budget/health commodities (between 25 percent and 50 percent) Donor support is routinely tracked by MOH Budget includes lines for miscellaneous funds
Advanced	Government *or* facility revenue/costs contribute most of supply chain operations budget/health commodities (51–99 percent) No commodity budget shortfall in the past year Funding can be reallocated at the management level
SOA	Government *or* facility revenue/costs contribute all of supply chain operations budget/health commodities (100 percent)

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

As is the case in most low and middle-income countries financing is a major constraint for the health sector in Madagascar. The country subscribes to the Abuja Declaration, which recommends that developing countries allocate 15 percent of revenue to the health sector, and the millennium development goal 3 (MDG3) which recommends that developing countries commit 10% of national budget to the health sector. Nevertheless, Madagascar currently commits 6.7 percent of its national budget to the health sector and relies on external funding to close gaps, particularly in the procurement of public health commodities. Drugs on the National Essential Drugs List are procured and distributed by SALAMA to the sub-national levels through a cost-recovery mechanism. SALAMA does not receive financial support from MINSANP or its partners, so its revenue comes from the sale or cost recovery products or its services such as the storage and distribution of pharmaceutical products. SALAMA procures generic essential medicines and makes them available to public referral and specialized hospitals, PhaGDis, and nonprofit NGOs. The PhaGDis supply district hospitals (CHRD1), health centers (CSB1 and CSB2), and local NGOs which are nonprofits. Generic essential medicines are sold to clients under the cost recovery mechanism called FANOME. Health facilities use the money generated from the sale of generic essential medicines to resupply their products. However, several health facilities are decapitalized, and it is making it difficult for them to be resupplied. The health centers were decapitalized and are unable to pay their debts to the PhaGDis, which are also having trouble reimbursing/paying SALAMA. Health facility financial reports are coupled with stock

movement reports, for submission to the person in charge of FANOME at the district level for submission to the DPLMT through the regional health offices, each month.

In 2022, MINSANP and USAID IMPACT conducted a total cost analysis (TCA) for the period 2017-2019 to improve cost efficiencies and financial viability. of the public sector supply chain. Although, the TCA results indicate overall solvency within the supply chain-wide variabilities were identified which have informed the development of a roadmap toward improving financial viability

2022 NSCA Findings and Analysis

Financial sustainability results for maturity model scores and the percentage of facilities reporting key capabilities are displayed in Exhibits 38 and 39. SALAMA has the highest system capacity with a capability maturity score of 80 percent in comparison to a lower score of 60 percent achieved by the DPMLT. SALAMA has perhaps built its capacity in financial management to assert its autonomy and manage its recovery funds, whereas the DPLMT largely relies on external funding and does not have similar capacities in place. Again, SALAMA's ability to run its business on the cost recovery model enabled it to achieve 4 out of the 5 percentage point marks for SOA maturity capabilities.

On average, the sub-national facilities had two-thirds (2/3) of the basic elements in place without significant variations in the overall capability maturity scores. The capability maturity scores for the subnational levels ranged from 53 to 64 percent. The referral and university hospitals recorded the highest capability maturity score of 64 percent because of stronger financial management capabilities Also, CSBs recorded the lowest capability maturity scores because of general weakness in institutional capacity for financial management at this level of the supply chain.

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

Exhibit 38. Financial Sustainability Capability Maturity Model Scores
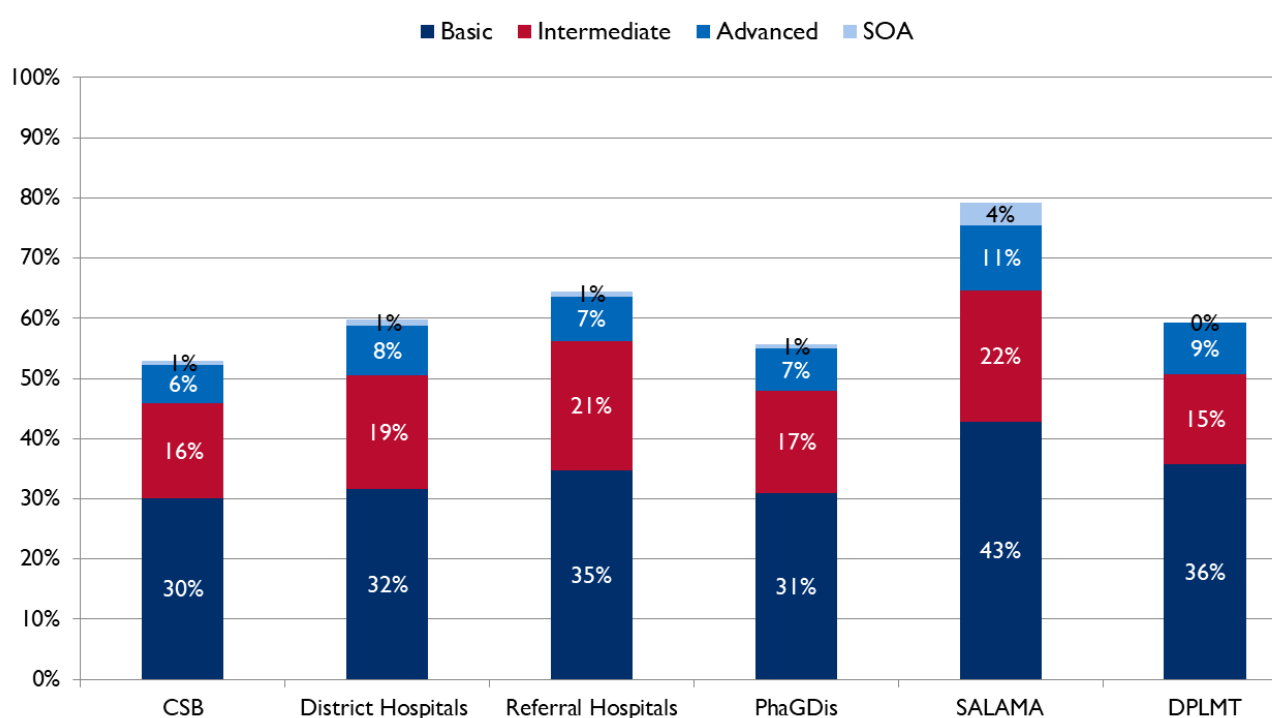
Exhibit 39. Central-Level Financial Sustainability KPIs, Maturity Score, and Percentage of Facilities with Key Capabilities Related to Supply Chain Management in Place						
	CSB	District hospitals	Referral & University Hospitals	PhaGDis	SALAMA	DPLMT
n =	87	21	21	29	I	I
Overall maturity score	53% (27–76%)	60% (31–76%)	64% (16–85%)	56% (30–74%)	79%	59%
Percent of basic items in place	60%	63%	69%	62%	86%	71 %
Budgets are prepared or updated annually	52%	63%	71%	66%	✓ (> than once a year)	✓
Budgets include miscellaneous funds for unexpected issues	21%	36%	57%	12%	X	X
Supply chain costs explicitly are recorded, and records maintained	53%	51%	67%	77%	✓	X
A funding strategy that explicitly includes supply chain costs exists	2%	2%	14%	2%	✓	X
In the past year, was there a health commodities budget shortfall? (Yes)	84%	95%	90%	75%	✓	✓

Exhibit 40. Details on the frequency of budget preparations						
	CSB	District hospitals	Referral & University Hospitals	PhaGDis	SALAMA	DPLMT
n =	87	21	21	29	I	I
Annually or more often	52%	63%	71%	66%	--	✓
Less often than a year	29%	30%	24%	22%	✓	--
Don't know	19%	8%	5%	11%	--	--

Presence of financial management best practices. Exhibits 39 and 40 show the financial sustainability capabilities including most basic items at the various levels of the supply chain. At the central level, SALAMA positions itself strongly with respect to financial management best practices as it regularly prepares and reviews its budgets. It documents supply chain-related costs and has in place a funding strategy that explicitly captures supply chain-related costs. However, there are budget shortfalls and miscellaneous costs are not regularly provisioned in its budgets. The DPLMT prepares its budget annually but has no funding strategy that explicitly captures supply chain costs, and it does not document supply chain costs. It has budget shortfalls and does not make room for miscellaneous expenditures in its budget.

Fifty-two (52) to 71 percent of sub-national facilities prepare budgets annually and 51 to 77 percent of the same regularly document and maintain records of supply chain costs. However, budget shortfalls were frequent amongst 85 to 95 percent of sub-national facilities in the past year and only 2 to 14

percent of these facilities have a funding strategy that explicitly captures supply chain-related costs. Amongst the sub-national facilities, only 12 to 57 percent of them make provision for miscellaneous expenditures in their budgets.

Exhibit 41 further demonstrates the core financial capabilities within SALAMA in relation to the preparation of income statements, assessing profits and losses, inventory of capital assets, and asset depreciation. However, these maturity capabilities are not fully replicated at the district pharmacies (PhaGDis) which also warehouse and supply commodities. At the service delivery level, the prevalence of insurance as a mode of payment is more pronounced within the referral & university hospitals (57%), followed by the district hospitals (28%), and extremely low at the CSBs (8%).

Exhibit 41. Percentage of Facilities with Key Financial Sustainability Capabilities in Place						
	CSB	District hospitals	Referral & University Hospitals	PhaGDis	SALAMA	DPLMT
n =	87	21	21	29	1	1
Cost-sharing policy/plan in place with donors	2 %	0 %	0 %	8%	✓	X
Regularly prepare and submit Financial Reports	21%	0 %	0 %	82%	✓	--
An Income or Profit and Loss statement	53%	51%	67%	82%	✓	--
Capital Assets are inventoried yearly	--	--	--	81%	✓	--
Measure depreciation	--	--	--	8%	✓	--
Accept health insurance	8%	28%	57%	--	--	--
Are insurance reimbursements timely?	4%	8%	29%	--	--	--

(--) these NSCA questions do not apply to this level of the supply chain.

Sources of funding and funding shortfalls. Exhibits 42 and 43 display information on the source of facility funds for supply chain operations and health commodities, respectively. High proportions of facilities across all levels reported that government and/or facility revenue and cost recovery contributed to their sources of funds in these two areas (the question allowed for the selection of multiple sources). The NSCA credits supply chains where the government or facility revenue contributes substantially to supply chain operations and health commodity costs (without differentiating relative contribution values). In Madagascar, facilities at each level of the supply reported that most or all of the budget in these areas were sourced from government contributions or facility revenue. That said, a substantial percentage of sites also reported a budget shortfall for health commodities in the previous year (refer to exhibit 39). Between 75 to 95 percent of sub-national structures reported a budget shortfall in the past year. Also, sub-national structures are not able to estimate donor or partner contribution to the supply chain since they don't directly receive these funds. SALAMA by the nature of its set-up depends on cost recovery funds but the DPLMT and

vertical programs acknowledge the contribution of partners to the supply chain and health commodities.

Exhibit 42. Sources of Funding for Supply Chain Operations						
	CSB	District hospitals	Referral & University Hospitals	PhaGDis	SALAMA	DPLMT
n =	87	21	21	29	1	1
Government budget (central or decentralized level)	61%	83%	86%	75%	X	✓
Donor/Implementing Partners	16%	15%	19%	34%	X	✓
Facility revenue/cost recovery	85%	72%	95%	90%	✓	X
Percentage of sites reporting government and/or facility revenue contributing most or all of supply chain budget last year	50%	29%	81%	79%	✓	X

Exhibit 43. Sources of Funding for Health Commodities						
	CSB	District hospitals	Referral & University Hospitals	PhaGDis	SALAMA	DPLMT
n =	87	21	21	29	1	1
Government budget (central or decentralized level)	56%	91%	90%	81%	X	✓
Facility revenue/cost recovery	93%	77%	100%	93%	✓	X
Donor/implementing partners	17%	33%	49%	25%	✓	X
Percentage of sites reporting government and/or facility revenue contributing most or all of health commodities last year	59%	71%	76%	993%	✓	X
Percentage of sites reporting a budget shortfall for health commodities last year	84%	95%	90%	75%	✓	X

Recommendations

This assessment suggests that many best practices in the financial management of public health supply chains are currently in place, including widespread budgeting and record keeping and primary reliance on government budgets and facility revenue to fund costs. However, a lack of financial solvency throughout the system is undermining trust in the financial institutions with corrosive effects on supply chain functions and ultimately the availability of health commodities. The NSCA also points to some the in performance at the non–central level, particularly at the lower levels in comparison to the central level. Financial sustainability for the supply chain can be enhanced as follows:

- Leverage the results of the 2022 TCA and its roadmap as critical levers for improving financial sustainability as the country plans the development of a comprehensive strategy for the health sector supply chain. The NSCA team endorses the options proposed in the TCA roadmap as necessary requirements for achieving financial sustainability and would like to encourage the MINSANP and DPLMT to prioritize the implementation of the options proposed.
- Audit the financial viability of the PhaGDis and health facilities to determine their impact on health commodity cost-recovery funds.
- Address funding shortages that affect adequate supply in the system.
- Ensuring that facilities across the supply chain and in all geographical locations receive guidance and support including documented guidelines and SOPs to implement basic financial management best practices universally.
- Explicitly including supply chain costs in all budgets to ensure adequate consideration and funding and facilitate financial tracking and monitoring of these activities.

Supplemental Exhibit

Exhibit 44. Financial Sustainability: Distribution of Questions and Assignation of Weight Across Capability and Facility Levels								
	BASIC (50%)		INTERMED. (30%)		ADVANCED (15%)		SOA (5%)	
MODULE	# of Qs	WEIGHT	# of Qs	WEIGHT	# of Qs	WEIGHT	# of Qs	WEIGHT
CSB (n=87)	7	7.1%	11	2.7%	6	2.5%	4	1.3%
District hospitals (n=21)	7	7.1%	11	2.7%	6	2.5%	4	1.3%
Referral hospitals (n=21)	7	7.1%	11	2.7%	7	2.1%	4	1.3%
PhaGDis (n=29)	14	3.6%	11	2.7%	7	2.1%	4	1.3%
SALAMA (1)	14	3.6%	11	2.7%	7	2.1%	4	1.3%
MOH/DPLMT (1)	14	3.6%	11	2.7%	7	2.1%	4	1.3%

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

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

Forecasting and Supply Planning

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

Exhibit 45. Examples of Scored Forecasting and Supply Planning Capabilities	
Basic	A dedicated unit within the MOH responsible for forecasting and supply planning of health commodities Forecasts are used to mobilize funding from government and donor sources
Intermediate	Data assumptions documented as part of the supply plan Data quality assessed for consumption data before use in forecasting
Advanced	Performance standards or benchmarks against which forecast accuracy is assessed Forecasting SOPs updated annually or more often
SOA	Use of specialized forecasting software that uses machine learning or advanced algorithms to determine future need Continuous or daily monitoring and updating of the supply plan

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

The current health sector strategic plan (2020-2024) states that forecasting and supply planning is conducted by the logistics management technical committees of the individual vertical health programs. and validated by the central logistics management committee. The key deficit is the inability of the country to mobilize sufficient resources to procure the forecasted needs, leading to shortages and stock-outs at service delivery points. Often, the programs are compelled to rely on health service statistics and demographic data for the quantification of health commodities, because of the low quality and unreliability of consumption data.

2022 NSCA Findings and Analysis

The NSCA typically considers FASP as a strategic level activity that should usually be conducted at the central level of the supply chain. Sub-national structures are usually not required to conduct independent forecasts or supply plans but rather feed off the national plan. If sub-national structures are envisioned to have such capabilities their role should be part of the subject defined in a national quantification guideline.

None of the supply chain levels assessed during the assessment was able to achieve the desirable NSCA capability maturity score of 80 percent. The DPLMT given its central role in coordinating supply chain functions posted the strongest capability maturity score of 66 percent mainly attributable to the presence of 86 percent expected basic capabilities. The DPLMT collaborates with the central logistics management committee to review and validate quantifications conducted by the vertical health programs. SALAMA which is responsible for essential medicines has 62 percent of overall maturity capabilities in place and 75 percent of basic elements available but considering its central role in the procurement of health supplies for the country the capacity within SALAMA ought to be optimum. The least capability maturity score of 29 percent was recorded at the referral and university but these are not expected by the NSCA to have strong capabilities in FASP activities and their role and that of other sub-national structures such as the PhaGDis and district hospitals should find definition within the context of a national quantification guideline.

The logistics management technical units within each of the vertical health programs are responsible for the quantification of health commodities they manage. The range of capability scores for each of the vertical programs assessed ranged from 56 percent to 44 percent. This thin spread of capabilities means is means none of the individual health programs possess the desirable maturity capabilities and makes a valid case for the centralization of FASP for synergy of effort and capabilities.

Exhibit 46. Forecasting Capability Maturity Scores
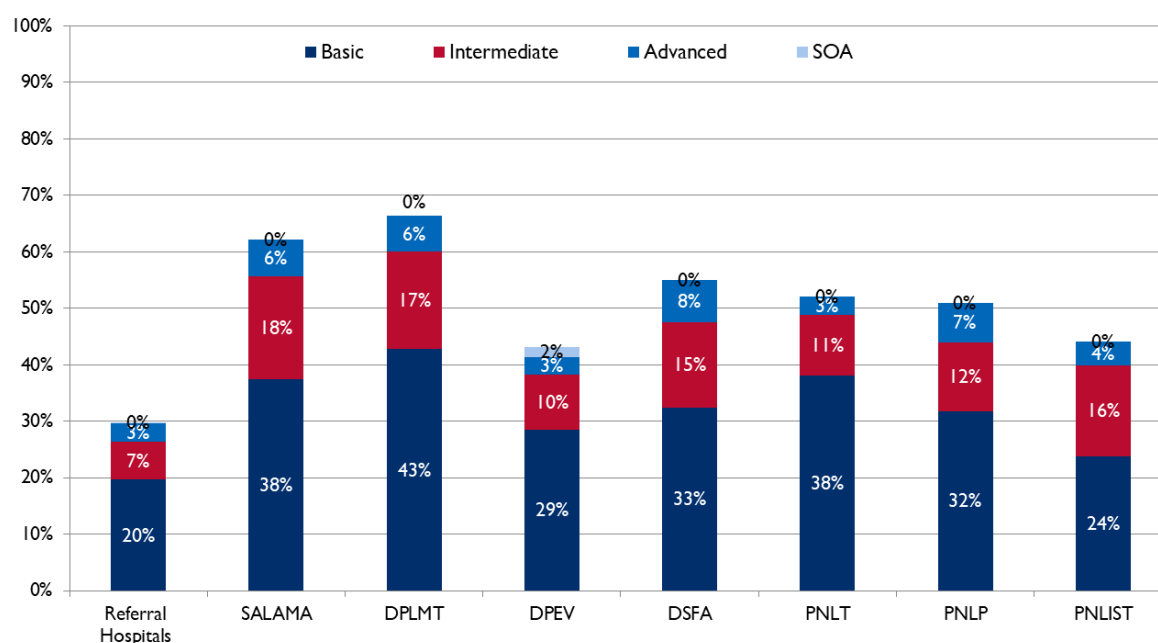
Note on interpreting results: Recall that CMM scores are a composite of assessed basic (max 50 percent), intermediate (30 percent), advanced (15 percent) and SOA (5 percent) capabilities. Reported percentages are the scored results averaged across all assessed sites, for each capability level and facility type. For more information, please refer to the Understanding the CMM Results section above

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

	Referral & University hospitals	SALAMA	DPLMT
n =	21	1	1
Overall maturity score (range)	30% (0–50%)	62%	66%
Percent of basic items in place (range)	41% (0–75%)	75%	86%

Exhibit 47b. Forecasting and Supply Planning Maturity Score, and Basic Capabilities in Place for Vertical Programs

	DPEV	PNLT	PNLP	DSFA	PNLIST
n =	1	1	1	1	1
Overall maturity score (range)	43%	52%	51%	55%	44%
Percent of basic items in place (range)	57%	76%	64%	65%	48%

Exhibit 48a. Forecasting Methodology Employed as Identified by Entities Assessed			
Methodology	Referral & University hospitals	SALAMA	DPLMT
Morbidity based	10%	X	✓
Consumption-based	71%	✓	✓
Demographic projections	10%	✓	✓
Service Statistic-based	5%	✓	✓

Exhibit 48b. Forecasting Methodology Employed as Identified by Vertical Programs					
Methodology	DPEV	PNLT	PNLP	DSFA	PNLIST
Morbidity based	X	✓	✓	X	X
Consumption-based	X	X	X	✓	✓
Demographic projections	x	X	✓	✓	X
Service Statistic-based	✓	✓	✓	✓	X

Forecast Methods: Exhibit 48 demonstrate the complexity of the methodologies employed in the quantification process in Madagascar. Generally, the approach to quantification varies or changes based on the disease area and program priorities. The use of consumption data is preferred as it is mostly reflective of the real demand. Reliance on other methodologies is often indicative of gaps in data availability and quality. In Madagascar, the process is dispersed amongst the various vertical programs, so the propensity to adopt different methods without synergies across each entity is high. So, deepening centralization and the development of national quantification guidelines will be beneficial for the standardization of the process.

Financing FASP Activities: Per the evidence in exhibit 49, there are multiple sources of funding for FASP including government, development partners, and facility cost recovery funds. However, it is common knowledge that government funding is limited and reliance on donor funding is unavoidable for the process. Increasing the government's contribution to the funding landscape is critical to achieving stability and sustainability. The results of quantification are used to source funding for the procurement of required commodities, hence, making funds available to sustain the process is a prerequisite for commodity security.

Exhibit 49. Government Contribution to Recurring Forecasting Costs				
	Referral & University hospitals	SALAMA	DPLMT	Vertical Programs
Government budget			✓	✓
Donor/Implementing Partners			✓	✓
Facility revenue/cost recovery		✓		
All (100%)	5%			

Exhibit 50. Government Contribution to Recurring Supply Planning Costs

	Referral & University hospitals	SALAMA	DPLMT	Vertical Programs
Most (51–99%)	29%			
Some (25–50%)	5%			
Minimal (less than 25%)	38%		✓	
I don't know	5%			✓

FASP Activities Performance Monitoring: Performance monitoring is critical for the success of FASP activities. Amongst the entities assessed during the NSCA, only SALAMA provided evidence of regularly monitoring FASP performance by forecast accuracy and supply plan accuracy. The rest of the entities including the DPLMT, and the vertical programs were unable to provide evidence to support their claim of performance monitoring. The NSCA calculated forecast accuracy for the underlisted tracer commodities in Exhibit 51 using available data for the period 2021. In interpreting these scores, it is important to understand that a score of 100% for forecast accuracy is the optimum whiles a deviation from the same is less desirable. In reviewing these scores, the assessment team concluded that enhancing data transparency and regular calculation of these indicators would be beneficial to supply chain performance management.

Exhibit 51. FASP Accuracy for All Tracer Products

Product	Forecast accuracy	Forecast Error (with Bais)	Supply plan accuracy
Amoxicillin Powder for Suspension 250mg/ml	87%	-13%	91%
Paracetamol 500mg	61%	39%	64%
DMPA-IM 150mg/ml	87%	-13%	100%
I rod Implant (Implanon)	87%	-13%	100%
Combined Oral Contraceptives (Microgynon)	100%	0%	--
Plumpy Nut	53%	47%	--
Oxytocin inj. 10 i.u	-3640%	-3740%	100%
ORS 20,5 g/1 L	98%	-2%	100%
ASAQ 100/270 mg	95%	-5%	100%
SP 500/25 mg	97%	3%	100%
Malaria RDT	52%	-48%	100%
BCG Vaccine	30%	-70%	100%
Varicella Vaccine	69%	-31%	100%
RHZE 150 + 75 + 400 + 275 mg	96%	-4%	100%
Dolutegravir 50mg + Lamivudine 150mg + Tenofovir 300mg	-345%	-445%	100%

Recommendations

The NSCA found a dispersion of sub-optimal FASP capabilities across multiple entities at the central level and a weak appreciation of the process amongst the referral and university hospitals. The dispersion of capabilities amongst multiple entities, and the inability of each of these entities to reach the desirable capability maturity level makes a strong case for centralization and standardization for FASP activities. NSCA prescribes the following recommendations

- Develop national quantification guidelines to standardize FASP activities and clarify roles and responsibilities.
- Consider the creation of a strong national quantification technical unit within the DPLMT to lead the process of quantification so the role of the vertical program is more towards defining program priorities.
- Institutionalize the monitoring and reporting of forecast accuracy and properly define the data sources for measuring FASP KPIs.
- Developed a structured approach to strengthening in-country capacity for FASP activities within the framework of supply chain HR capacity development.

Supplemental Exhibit

Exhibit 52. FASP, Distribution of Questions, and Assignation of Weight Across Capability and Facility Levels								
	BASIC (50%)		INTERMEDIATE (30%)		ADVANCED (15%)		SOA (5%)	
MODULE	# of Qs	WEIGHT	# of Qs	WEIGHT	# of Qs	WEIGHT	# of Qs	WEIGHT
Referral & University hospitals (21)	22	2.3%	26	1.2%	12	1.3%	3	1.7%
SALAMA	20	2.5%	7	4.3%	14	1.1%	3	1.7%
Vertical Programs	20	2.5%	7	4.3%	14	1.1%	3	1.7%
DPLMT (1)	21	2.4%	27	1.1%	14	1.1%	3	1.7%

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

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

Procurement and Customs Clearance

The procurement and customs clearance section seeks to determine that procurements are done transparently and in accordance with best practices. Major areas factored into the scoring for this CMM module are transparent, auditable procurement systems governed by policies and procedures; active management of vendor performance; and well-functioning customs clearance processes. This module was designed with public-sector procurement systems in mind. Exhibit 53 provides various examples of procurement capabilities at different levels.

| Exhibit 53. Examples of Scored Procurement and Customs Clearance Capabilities	
Basic	Existence of an approved vendor list All tenders include terms and conditions A documented process is in place for identifying and qualifying vendors A contract management or an order and delivery management system is in place
Intermediate	Procurements are approved by authorized personnel/stakeholders Vendor performance results are communicated to vendors Entity benchmarks or compares its purchase prices against market indices
Advanced	A procurement ethics or anticorruption program is in place External audits of the procurement system are conducted annual Procurement appeal decisions are made publicly available
SOA	Data in the contract management system are updated in real time or daily An electronic procurement (e-procurement) process is used

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

Madagascar has different mechanisms for the procurement and supply of health commodities. SALAMA procures generic essential medicines and makes them available to public referral and specialized hospitals, district pharmacies (PhaGDis), and nonprofit NGOs. District pharmacies supply district hospitals (CHRD1), health centers' pharmacies (CSB1 and CSB2), and local NGO nonprofits. Generic essential medicines are sold to clients under the cost recovery mechanism called FANOME. Health facilities use the money generated from the sale of generic essential medicines to resupply their products. The referral and university hospitals also have technical committees to supervise local procurements to fill gaps that are not met through the central procurement mechanism. For public health programs, the mechanism for procurement depends on the donor or partner providing funding for procurement.

2022 NSCA Findings and Analysis

Exhibits 54 and 55 display capability maturity scores for procurement and customs clearance. Procurement practices are currently distributed throughout the system. Normally, the NSCA does not assess procurement practices below the sub-national level, but it was important to get an understanding of procurement practices across the public health landscape, so procurement capabilities were assessed at referral and university hospitals. The district pharmacies do not conduct procurement on their own so were excluded. Overall, procurement maturity scores for Madagascar's public health supply chain were 60 percent at SALAMA, 26 percent at the DPLMT and, 29 percent at the referral and university hospitals.

Exhibit 54. Procurement and Customs Capability Maturity Scores
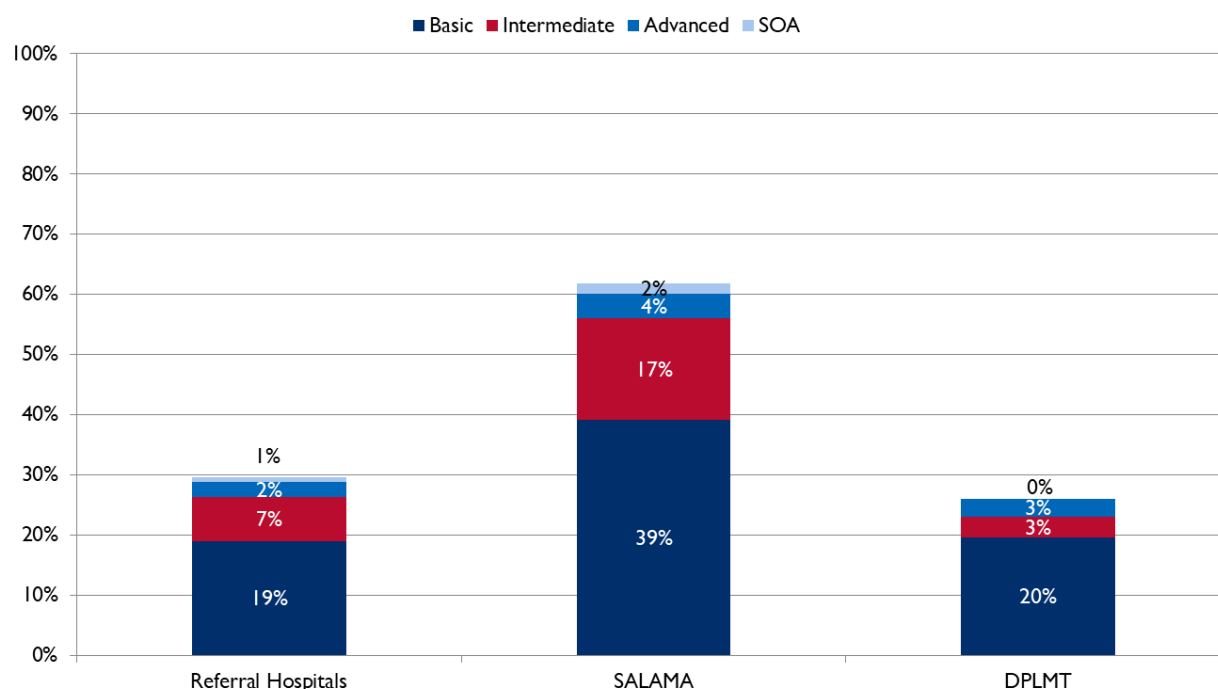
Note on interpreting results: Recall that CMM scores are a composite of assessed basic (max 50 percent), intermediate (30 percent), advanced (15 percent), and SOA (5 percent) capabilities. Reported percentages are the scored results averaged across all assessed sites, for each capability level and facility type. For more information, please refer to the Understanding the CMM Results section above.

Exhibit 55. Procurement and Customs Clearance Maturity Score, and Basic Capabilities in Place			
	Referral & University Hospitals	SALAMA	DPLMT
n =	21	1	1
Proportion of assessed facilities reporting that site procures some pharmaceuticals directly	57%	✓	✓
Overall maturity score (range)	30% (14–70%)	62%	26%
Percent of basic items in place (range)	38% (20–80%)	78%	39%

Procurement Processes. For SALAMA, the central purchasing agency, the procurement maturity score was 60 percent and 78 percent of basic elements were in place. External audits are carried out regularly, and an approved vendor list and vendor information is maintained in a database. SALAMA has SOPs to guide the procurements and documents process for identifying and qualifying vendors. However, there was no evidence of an anti-corruption program, and processes were more manual than electronic.

For the DPLMT the capability maturity score was 26 percent which is far lower than the score of 62 percent posted by SALAMA pointing to key weaknesses within the procurement and customs clearance functions within the entity. Some gaps identified by the NSCA include an absence of clear

approval procedures and internal control systems for the procurements. There was no evidence of procurement ethics committees in place or regular external audits and there is no evidence of procurement performance monitoring by the DPLMT.

For the referral and university hospitals assessed 57 percent confirmed that they conduct procurements. Out of these 42 percent of them have procurement oversight committees in place and 91 percent reported that they are audited externally at least every 2 years. Most of these facilities (82 percent) rely on the NEML for procurement and 58 percent of them have an approved vendor list. In contrast, only 17 percent confirmed the availability of SOPs for procurement and just 33 percent of them maintain vendor information in an accessible database. In most public health supply chain systems, the preference is to centralize procurement because of the benefits that accrue on the scale of quantities, and the ability to enforce quality control measures. However, because sub-national levels such as referral and university may conduct procurements it is important that SOPs and guidelines are developed and disseminated to achieve standardization and minimize variability.

Exhibit 56. Key Procurement Capabilities (Resources, Practices, and Items) and Percentage of Facilities Reporting			
	Referral & University Hospitals	SALAMA	DPLMT
n =	21	1	1
Procurements approved by authorized personnel or stakeholders	42%	✓	X
Internal control systems**	Value thresholds; protocols; tender committee; contract mgt; procurement and adjudication committee; approval protocols	Value thresholds; tender and contract committees; approval protocols	None
Annual external audits of procurement systems	33%	✓	None
Procurement ethics or anti-corruption programs in place	67%	X	X
Procurement guidelines, manuals, or SOPs available (and onsite)	17%	✓	X
Documented process for identifying and qualifying vendors	25%	✓	X
Approved vendor list exists	58%%	✓	X
Vendor information is maintained in a database	33%	✓	X
Most common system for maintaining procurements information	Electronic file (83%); software (8%); manual (75%)	electronic (100%)	X

Exhibit 57. Procurement KPIs for Central-Level Facilities	
	SALAMA
Vendor on time and in full rate	N/A
Vendor fill rate	N/A
Percentage of procurements placed as an emergency order	0%
Average number of days for customs clearance	11
Stock turn per annum	N/A
Percent of incoming batches tested for quality	28%
Percent of product batches tested that meet quality standards	100%

NB: Some standard NSCA procurement KPI were omitted due to absence of required data

Prices Paid. The assessment was unable to access data on the prices paid for items at the central level for benchmarking against international reference prices. This is because the central purchasing agency (SALAMA) considered this to be confidential information, but price transparency is critical to improving efficiency in the procurement process.

Source of Funds for Procurement. Another important component of Madagascar's procurement environment is the sources of funding for those procurements. Exhibit 58 details the source of funds for procurements for public health programs. It is encouraging to see how donors or implementing partners do not seem to be the main source of funding at any level, with most entities relying either on GOM budgets and Facility Revenue & Cost Recovery.

Exhibit 58. Source of Funds for Procurement			
Funding source	Referral &University hospital	SALAMA	DPLMT
Government	42%	0%	100%
Donor/ implementing partners	33%	0%	0%
Facility revenue/cost recovery	50%	100%	0%

Customs Clearance. The DPLMT is responsible for securing customs clearance at central level, but this role is yet to be fully asserted. The NSCA identified key elements in place to support the clearance of commodities such as procedure manuals that guide customs clearance and tax exemption for the importation of health commodities at SALAMA. However, there are no standard matrices to monitor performance in custom clearance procedures. SALAMA also plays a role in the clearance process and has structures in place to enable it to perform assigned tasks in the customs clearance process.

Exhibit 59. Customs clearance capabilities			
	Referral &University hospital	SALAMA	DPLMT
Entity plays a role in customs clearance	_	✓	✓
Existences of procedures that guide customs clearance		✓	--
Presence of an entity responsible for coordinating the customs clearance		✓	--
Customs clearance process monitored using standardized metrics		✓	--

NB: DPLMT provided limited information on its role in customs clearance at the time of data collection.

Recommendations

The overall maturity score for SALAMA which is the central purchasing agency for the supply chain is 60 percent, whiles the DPLMT which has more of an oversight role scored 29 percent. Procurement capabilities at the referral and university hospitals that sometimes conduct localized procurements to fill gaps in supply for the central level scored 30 percent. These scores are all below the desirable NSCA capability score of at least 80 percent and reveal deficits within this technical area that must be addressed.

- Deploy procurement and contract management systems to increase process transparency and access to data.
- The role of the DPLMT in the procurement process should be revised and updated so that it is an active participant in the procurement process and its oversight function should include active performance monitoring.
- Develop and disseminate standard procedures to guide procurement activities at the referral and specialized health facilities that may need to occasionally conduct localized procurement.

Supplemental Annex

Exhibit 60. Procurement and Customs Clearance: Distribution of Questions and Assignation of Weight Across Capability and Facility Levels								
	BASIC (50%)		INTERMED. (30%)		ADVANCED (15%)		SOA (5%)	
MODULE	# of Qs	WEIGHT	# of Qs	WEIGHT	# of Qs	WEIGHT	# of Qs	WEIGHT
Referral & University Hospitals	20	2.5%	33	1.1%	16	1.0%	4	1.2%
SALAMA (1)	20	2.5%	33	1.1%	16	1.0%	4	1.2%
DPLMT (1)	20	2.5%	33	1.1%	16	1.0%	4	1.2%

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

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

Warehousing and Storage

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

Exhibit 61. Examples of Warehousing and Storage Capabilities	
Basic	Inbound shipments are checked for quantity, carton/pallet count, and documentation Stock cards are used to track and manage inventory A repair and maintenance plan is in place for all equipment and utilities
Intermediate	Facilities receive distribution schedule in advance from the issuing warehouse or supplier Different batches of quarantined product are segregated in the quarantine area
Advanced	Temperature is electronically monitored and linked to audible alarms when the temperature is outside the established range Warehousing and storage data and information are backed up off-site
SOA	Proof of deliveries are maintained through an automated system (such as barcodes scanned) Advanced warehouse management system is used to track and manage inventory

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

The SOP manual for logistics management in Madagascar details the process and procedures for inventory management, storage of health commodities, requisition, and resupply of health commodities, managing damages and expiries, and other logistics management tasks. However, it does not recognize historical challenges with warehousing and storage in the health supply chain and does not proffer solutions tackling storage and distribution capacity challenges throughout the supply chain.

2022 NSCA Findings and Analysis

Overall, as is expected, warehousing and storage capabilities improve further up in the supply chain from the last mile. With a score of 66 percent, SALAMA scored higher than any other entity within the supply chain. The DPLMT scored 47 percent and scores for the sub-national levels ranged from 30 to 37 percent. Evidently, maturity scores at SALAMA and the sub-national levels are all well below the NSCA's recommended benchmark of 80 percent. Exhibits 62 and 63 display the capability maturity scores for warehousing and storage, by facility type. Results will be examined in several sections, including storage practices, stock card use, storage conditions, and stock availability.

Exhibit 62. Warehousing and Storage Capability Maturity Scores
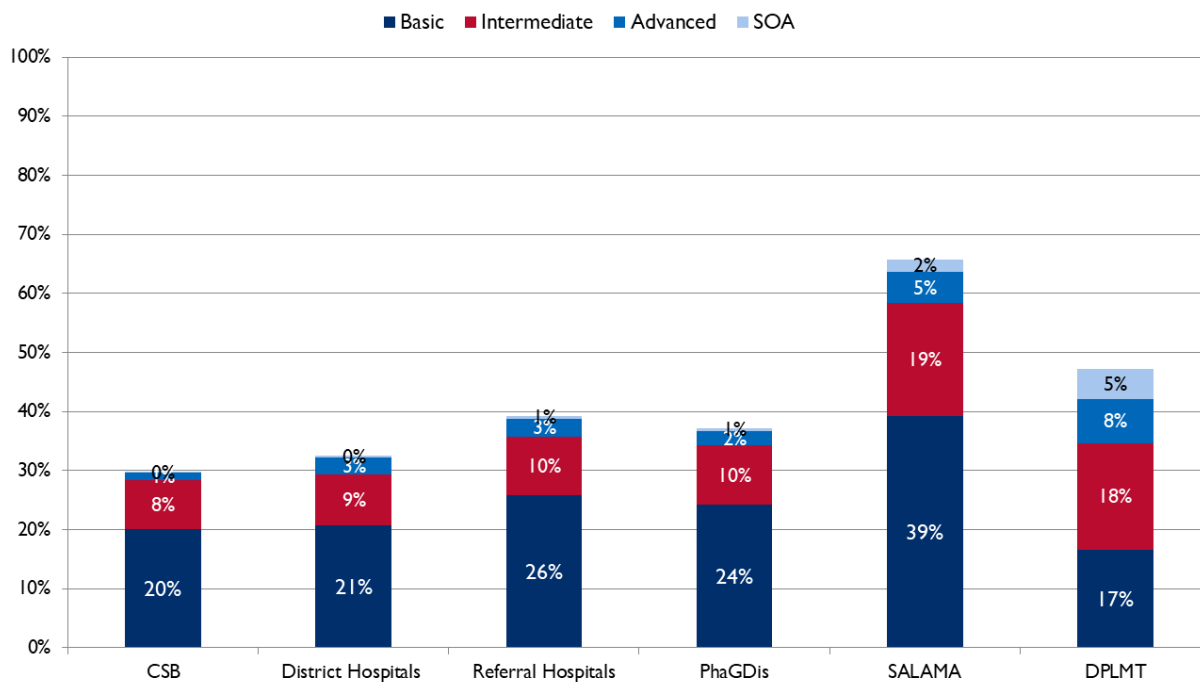
Note on interpreting results: Recall that CMM scores are a composite of assessed basic (max 50 percent), intermediate (30 percent), advanced (15 percent), and SOA (5 percent) capabilities. Reported percentages are the scored results averaged across all assessed sites, for each capability level and facility type. For more information, please refer to the Understanding the CMM Results section above.

Exhibit 63. Warehousing and Storage Maturity Score, and Basic Capabilities in Place

	CSB	District hospitals	Referral & University Hospitals	PhaGDis	SALAMA	DPLMT
n =	87	21	21	29	1	1
Overall maturity score (range)	30% (15–46%)	33% (20–45%)	39% (30–57%)	37% (24 -48%)	66%	47%
Percent of basic items in place (range)	40% (14–59%)	41% (26–55%)	52% (37–74%)	48% (34–62%)	78%	33%
Availability of SOPs for warehousing & storage	25%	32%	38%	53%	✓	✓

Storage and Inventory Management Practices. The SOP manual for logistics management provides the tools and job aids to standardized inventory management practices within entities in the supply chain. The SOPs have sections on warehousing and storage to enable the various entities to keep within the expected standards, but their availability at the various entities within the supply chain is limited. The availability of the SOPs manual for logistics ranges from 25 to 53 percent amongst the

CSBs, district hospitals, and referral and university hospitals. Hence, it is difficult to anticipate that there is uptake and use of the manual and its job aids in the operations of SDPs.

On a positive note, the reliance on maximum and minimum stock levels to guide the re-ordering of commodities was high; between 87 to 100 percent of orders are based on the use of max-min levels (refer to exhibit 64). On the contrary, the proportion of facilities keeping stock within the set max-min level ranged from 14 to 43 percent. A possible explanation could be that even though the SDPs and PhaGDis rely on max-min levels for re-ordering of commodities but their ability to stock inventory to the level desired is dependent on availability at the re-supply point.

Exhibit 64. Methodology Used for Ordering as Reported by Facilities					
	CSB	District Hospitals	Referral & University Hospitals	PhaGDis	SALAMA
Using min-max guidance	87%	92%	95%	100%	100%
Using previous consumption to inform ordering	10%	3%	0%	0%	0%
Using intuition to inform ordering	2%	5%	5%	0%	0%

Other evidence of good inventory management practices is found throughout the system. For example, most facilities checked inbound shipments for quantity and remaining shelf life (91 to 100 percent). Similarly, almost all CSBs, district hospitals, referral, and district hospitals and PhaGDis conduct (82 to100 percent) physical inspections and notify the issuing warehouse or the supplier of any discrepancy in commodities received, even if the protocol of checking inbound systems is not in place. On the other hand, 20 percent of the PhaGDis and between 18 to 24 percent of SDPs, reported altogether rejecting an entire shipment in case of a discrepancy. Equally commonplace was maintaining proof of delivery (POD) records for all products received. Maintenance of PODs ranged from 92 percent to 82 percent for all service delivery points and most PODs (85-95 percent) are kept for periods exceeding 12 months.

Stock Card Use and Inventory Tracking

Exhibit 64 displays the percentage of facilities, by tracer commodity, that were found to have perfectly accurate stock cards on the day of the visit. The performance is strongest at the PhaGDis and weakest amongst the SDPs. Stock card accuracy at the CSB, district hospitals, and referral & university hospitals averaged 43, 39, and 60 percent respectively.

Exhibit 65. Percentage of Facilities With 100 Percent Accurate Stock Card, by Tracer Commodity
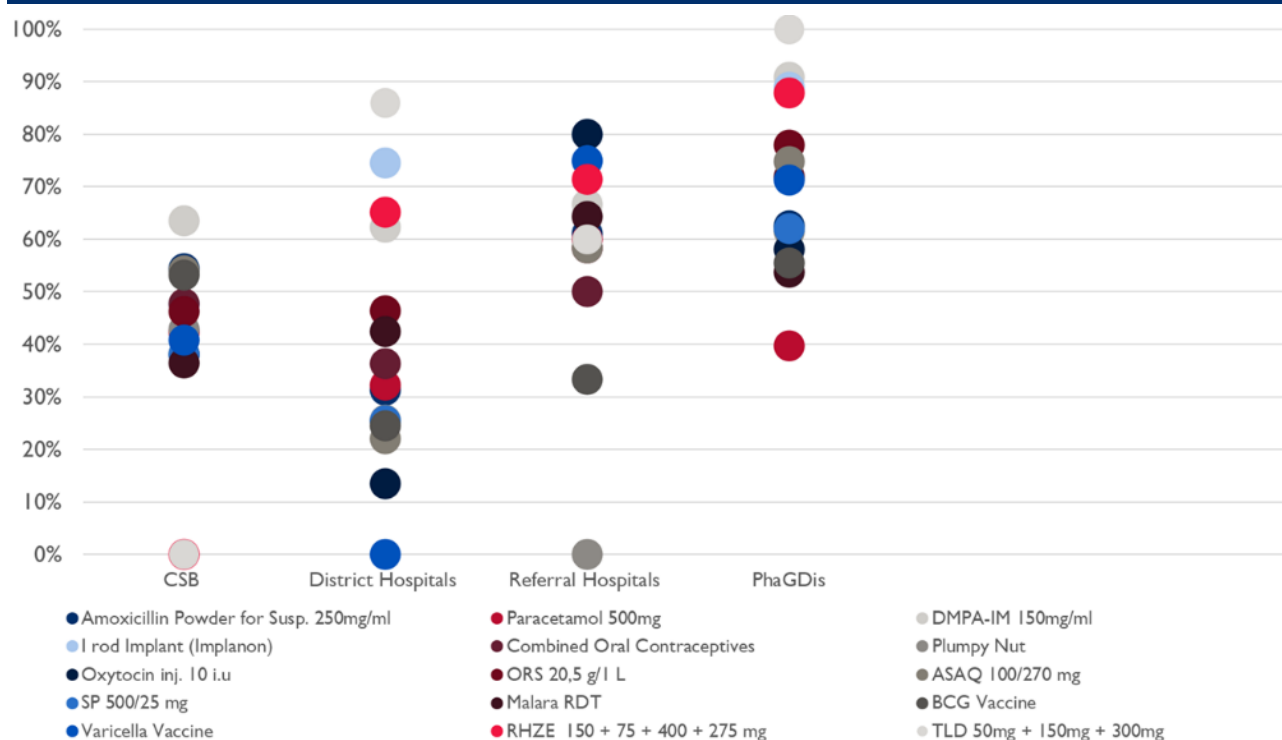
Legend:
- Amoxicillin Powder for Susp. 250mg/ml
- I rod Implant (Implanon)
- Oxytocin inj. 10 i.u
- SP 500/25 mg
- Varicella Vaccine
- Paracetamol 500mg
- Combined Oral Contraceptives
- ORS 20,5 g/l L
- Malara RDT
- RHZE 150 + 75 + 400 + 275 mg
- DMPA-IM 150mg/ml
- Plumpy Nut
- ASAQ 100/270 mg
- BCG Vaccine
- TLD 50mg + 150mg + 300mg

Exhibit 66. Percentage of Facilities with 100 Percent Accurate Stock Card, by Tracer Commodity					
	CSB	District Hospitals	Referral & University Hospitals	PhaGDis	SALAMA
n =	87	21	21	29	1
Amoxicillin Powder for Susp. 250mg/ml	54%	31%	61%	63%	100%
Paracetamol 500mg	42%	32%	60%	40%	100%
DMPA-IM 150mg/ml	63%	62%	67%	91%	0%
I rod Implant (Implanon)	48%	75%	80%	89%	0%
Combined Oral Contraceptives	48%	36%	50%	72%	100%
Plumpy Nut	43%	26%	0%	62%	--
Oxytocin inj. 10 i.u	38%	13%	80%	58%	0%
ORS 20,5 g/l L	46%	46%	58%	78%	100%
ASAQ 100/270 mg	54%	22%	58%	75%	0%
SP 500/25 mg	38%	25%	75%	62%	0%
Malaria RDT	36%	42%	64%	54%	0%
BCG Vaccine	53%	24%	33%	56%	--
Varicella Vaccine	41%	0%	75%	71%	--
RHZE 150 + 75 + 400 + 275 mg	0%	65%	71%	88%	0%
Douletgravir 50mg + Lamivudine 150mg + Tenofovir 300mg	--	86%	60%	100%	--
AVERAGE	43%	39%	60%	70%	36%

--: Product not managed or data unavailable at the time of data collection.

Storage Conditions. For infrastructure, many of the basic components are in place across the system. Permanent, leak-free roofing in facilities is ubiquitous across the country for CSB, district hospitals, referral, and university hospitals, and the PhaGDis (between 78 – 90 percent of these

structures have permanent leak-free roofing). Also, smooth, and non-porous floors were observed in 76 to 95 percent of these sub-national structures. On the other hand, adequate ventilation was observed in 37 to 58 percent of these structures, and a designated area for the quarantine was only observed in 6 to 48 percent of them. Access to shelves, pallets, and cabinets was also confirmed in a large proportion of the facilities assessed, however, the NSCA did not confirm if this equipment was adequate for the storage areas. In terms. of electric lighting, the NSCA found that facilities depended more on generators and solar power for consistent power. This finding is reflective of limited access and unreliability of grid power in the country.

Availability of cold chain storage was found at 36 percent of CSBs, 34 percent of district hospitals, 67 percent of referral and university hospitals, and 53 percent of PhaGDis. Most of this cold storage equipment (61 to 100 percent) were free-standing refrigerators. Temperature logs were kept amongst 68 percent of CSB and 59 percent of PhaGDis, but only 10 percent and 12 percent of district hospitals and referral hospitals maintain temperature logs. Virtually, none of the sampled sites reported a temperature excursion exceeding one percent of the time in the last six months, but this could be due to poor recording and monitoring,

With respect to SALAMA's capacity for the storage of health commodities the entity has cold storage capacity including cold rooms, and digitalized temperature monitoring systems, It also has other storage equipment such as pallets, hand trucks, trollies, and forklifts, to enable deal with the large volume of commodities it manages. Safety equipment such as fire extinguishers, smoke detectors, heavy-duty gloves, lab coats, helmets, and safety boots amongst others were also available. Again, it is important to note that the NSCA confirmed the availability of this equipment but did not measure adequacy for the task at hand.

| Exhibit 67. Specialized Storage Capabilities at Service Delivery Points					
	CSB	District Hospitals	Referral & University Hospitals	PhaGDis	SALAMA
Percentage of facilities that have cold chain storage	36%	34%	64%	53%	✓
Percentage of facilities that have designated quarantine area	8%	6%	33%	48%	✓
Percentage of facilities that have designated storage for hazardous substances	2%	7%	24%	5%	✓
Percentage of facilities that have designated storage for controlled substances	4%	10%	38%	3%	✓

Stock Availability. The NSCA examined stock levels over the previous six months before the assessment by reviewing historical stock records. Exhibit 68 displays the stocked according-to-plan (SATP) rates, defined as the number of observations of stock levels that were within min/max levels, over the defined period. Although the max-min for all levels of the supply chain is stated within the SOPs for logistics management, adhering to these stock levels would require more concerted effort amongst system stakeholders. SALAMA is unable to keep inventory within the prescribed 9 to 13 months max-min level and appears to have adopted a system of maintaining a minimum inventory level of 5 months of stocks (MoS) due to limited financial capacity. If this is the case, then this decision has a cascade effect on the lower levels of the supply chain and has implications for them to obtain and stock inventory within the levels required.

Exhibit 68. SATP Rates for All Tracer Products, by Level in the Supply Chain					
	CSB	District Hospitals	Referral & University Hospitals	PhaGDis	SALAMA
n =	87	21	21	29	1
Amoxicillin Powder for Susp. 250mg/ml	27%	34%	45%	22%	33%
Paracetamol 500mg	26%	35%	34%	39%	0%
DMPA-IM 150mg/ml	25%	31%	22%	14%	0%
1 rod Implant (Implanon)	34%	36%	27%	16%	0%
Combined Oral Contraceptives	26%	27%	33%	29%	0%
Plumpy Nut	14%	23%	25%	20%	--
Oxytocin inj. 10 i.u	18%	15%	26%	22%	0%
ORS 20,5 g/1 L	25%	28%	18%	31%	--
ASAQ 100/270 mg	22%	20%	12%	21%	0%
SP 500/25 mg	35%	36%	17%	31%	50%
Malaria RDT	31%	25%	28%	43%	50%
BCG Vaccine	25%	25%	0%	25%	--
Varicella Vaccine	30%	25%	7%	32%	--
RHZE 150 + 75 + 400 + 275 mg	50%	18%	23%	21%	0%

-- : --: Product not managed or data unavailable at the time of data collection.

Exhibit 69. Stocked According to Plan Rates for All Tracer Products, by Level in the Supply Chain
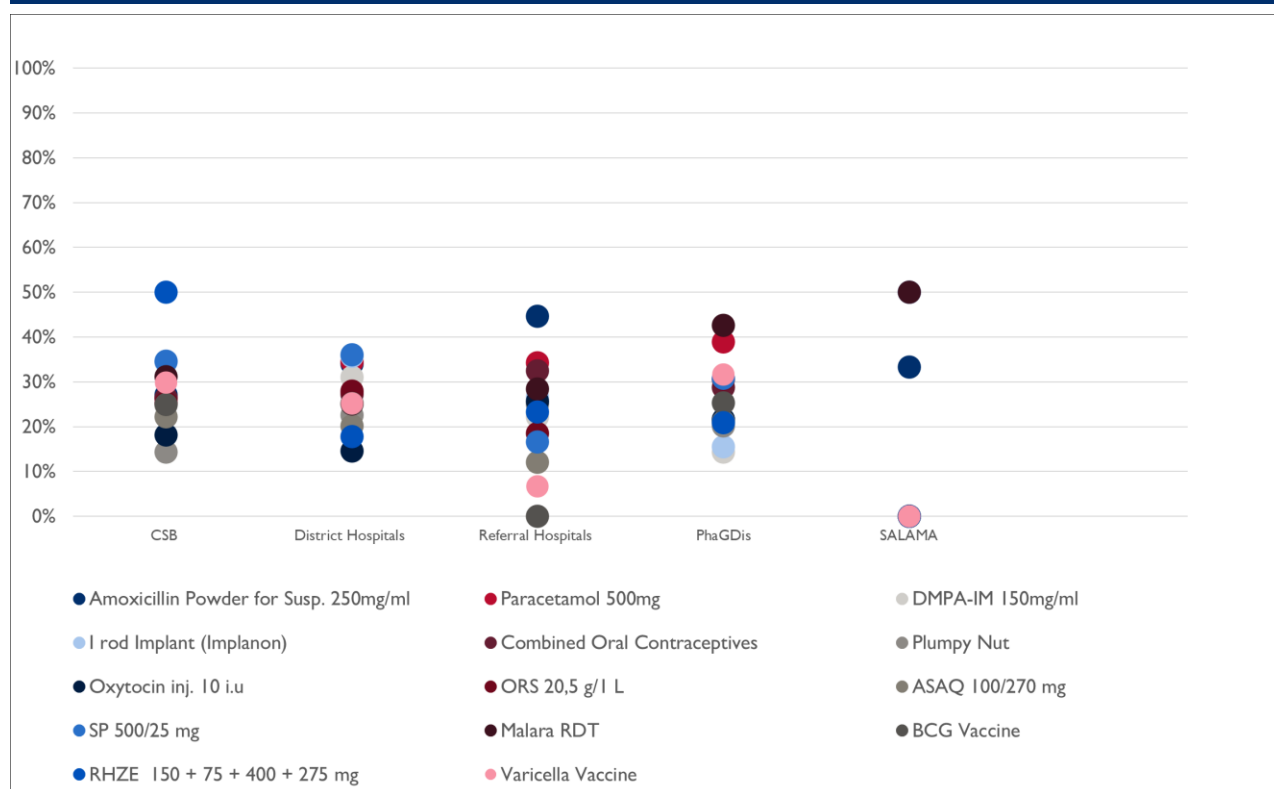
The availability of commodities at SDPs is the top priority of any well-functioning pharmaceutical supply chain. The NSCA found that stock-out rates were highly variable amongst the facility types

assessed and sometimes reached 50 percent stock-out rates for some of the tracer commodities. Of particular concern at the time of assessment is the stock-out of family planning products at SALAMA and its effect on availability at the PhaGDis and SDPs. These stock imbalances and others should be corrected over time to assure uninterrupted access to clients.

Exhibit 70: Percentage of Facility Stockout of a Tracer Commodity on the Day of the Assessment						
	CSB	District Hospitals	Referral & University Hospitals	PhaGDis	SALAMA	DPEV
n =	87	21	21	29	1	1
Amoxicillin Powder for Susp. 250mg/ml	31%	36%	17%	18%	0%	--
Paracetamol 500mg	14%	4%	5%	6%	0%	--
DMPA-IM 150mg/ml	43%	21%	40%	39%	100%	--
1 rod Implant (Implanon)	30%	39%	25%	39%	100%	--
Combined Oral Contraceptives	26%	34%	30%	20%	100%	--
Plumpy Nut	24%	0%	25%	9%	--	--
Oxytocin inj. 10 IU	25%	11%	20%	14%	0%	--
ORS 20,5 g/1 L	25%	24%	33%	4%	100%	--
ASAQ 100/270 mg	15%	13%	18%	6%	0%	--
SP 500/25 mg	17%	0%	50%	6%	0%	--
Malaria RDT	7%	15%	25%	2%	0%	--
BCG Vaccine	39%	24%	25%	29%	--	0%
Varicella Vaccine	16%	0%	20%	13%	--	0%
RHZE 150 + 75 + 400 + 275 mg	50%	12%	9%	32%	0%	--
TLD 50mg +150mg + 300mg	--	10%	6%	24%	0%	--
Average	31%	16%	23%	17%	33%	--

--: Product not managed or data unavailable at the time of data collection.

Exhibit 71. Percentage of Facility Stockout of a Tracer Commodity on the Day of the Assessment
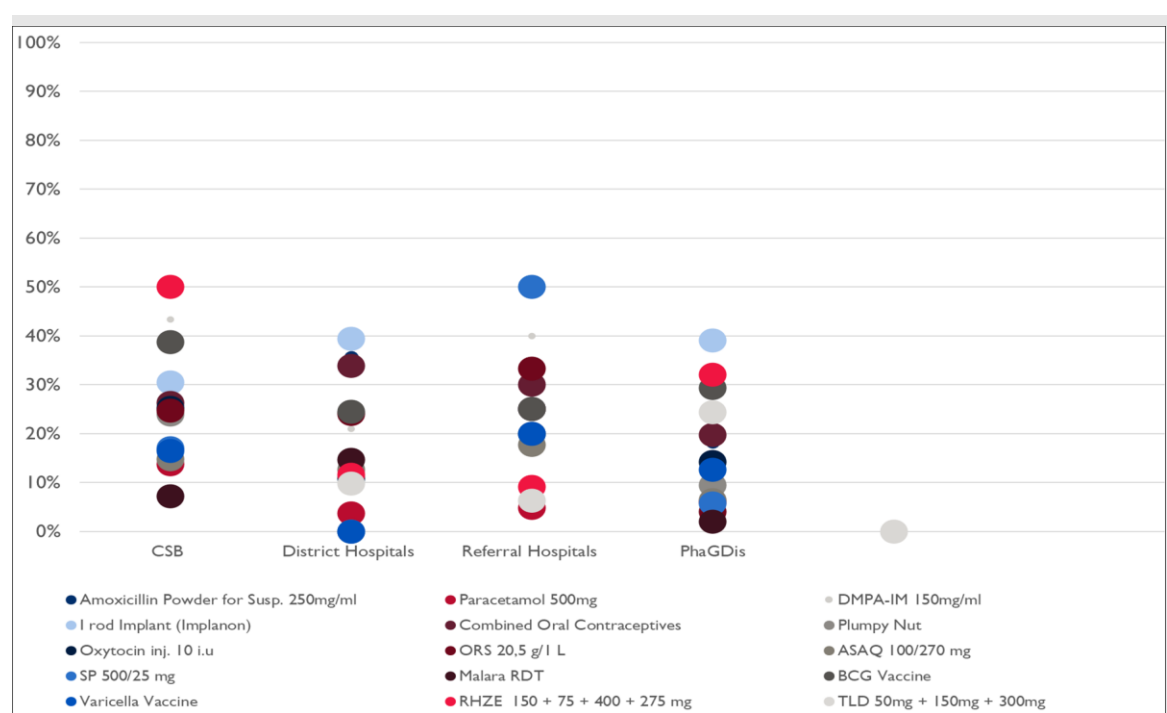
Recommendations

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

- Invest in strengthening the logistics management of capabilities at last-mile facilities, especially at the CSBs and district hospitals. It is not enough to have in place the SOPs manual for logistics management, there must be but a clear plan for dissemination, training, and use by supply chain actors at the last mile.
- In addition to the NSCA, it will be important to conduct a warehouse capacity and optimization study in Madagascar to understand the state of storage infrastructure and determine options for warehousing and storage of commodities.
- Put in place a plan to further integrate the storage capacity and capabilities available at the PhaGDis and district health offices. For example, cold storage equipment at the district should be considered as part of the equipment of the PhaGDis so that the district health office focus on service delivery more than inventory management
- Continue to provide capacity building around inventory management for last-mile facilities. Strong quality logistics data starts with the stock card and many facilities continue to have inaccurate records.

Supplemental Exhibit

Exhibit 72. Warehousing and Storage: Distribution of Questions and Assignation of Weight Across Capability and Facility Levels								
	BASIC (50%)		INTERMED. (30%)		ADVANCED (15%)		SOA (5%)	
MODULE	# of Qs	WEIGHT	# of Qs	WEIGHT	# of Qs	WEIGHT	# of Qs	WEIGHT
CSB (n=87)	48	1.0%	29	1.0%	13	1.1%	7	0.7%
District hospitals (21)	48	1.0%	29	1.0%	13	1.1%	7	0.7%
Referral & University hospitals (21)	53.3	0.9%	30	1.0%	13	1.2%	6	0.8%
PhaGDis (29)	74.7	0.7%	37	0.8%	14	1.1%	5	1.0%
SALAMA (1)	74.7	0.7%	37	0.8%	14	1.1%	5	1.0%
DPLMT (1)	74.7	0.7%	37	0.8%	14	1.1%	5	1.0%

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

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

Distribution

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

Exhibit 73. Examples of Scored Distribution Capabilities	
Basic	Existence of an approved distribution plan that defines when products will be delivered to clients Existence of a data management system that captures distribution plans and operations Existence of manual systems for capturing and maintaining transportation data Temperature monitoring devices used to track temperature excursions during transportation Security management measures: unannounced inspections/security guards Process for recording loss incidents Manual tracking of ownership of commodities throughout the system POD records maintained manually
Intermediate	Distribution routes are preplanned/included in the communication to health facilities/reviewed annually Existence of policies that cover the distribution and transportation of commodities/aspects of fleet management (list of policies areas/key aspects) Documented SOPs for managing transportation assets available at site Existence of electronic systems for capturing and maintaining transportation data Collection of distribution cost data/using Excel
Advanced	Products from different programs and partners distributed in an integrated manner wherever product characteristics allow (most products = an intermediate capability) Daily or real-time capture of transportation data Temperatures recorded in transit Security management measures: video surveillance/two-way radio/barcode scanning
SOA	Government budget or facility revenue covers 100 percent of recurring distribution costs Security management measures: radio frequency identification tags

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

The limited distribution network is one of the known challenges that affect the Madagascar supply chain. SALAMA conducts integrated distribution of health commodities from the central level to the district pharmacies. Referral and specialized hospitals and accredited non-profit NGOs, District hospitals (CHRD1), and the CSBs then collect their supplies from the district pharmacies (PhaGDis) using whatever means of transport available to them. SALAMA is not responsible for the distribution of commodities beyond the district level and a large number of district warehouses makes it difficult for them to be adequately equipped to assume this responsibility. A Supply Chain Network and Cost Analysis conducted in 2015 provided options including the creation of regional hubs to optimize commodity distribution within the network. In addition to SALAMA, some donors conduct a parallel distribution to the district levels for supply to the lower levels. There are also social marketing channels and NGOs that conduct parallel distribution of commodities.

2022 NSCA Findings and Analysis

The NSCA only assessed the distribution of health commodities through the public health supply chain system. Capability Maturity assessment was conducted at SALAMA and the DPEV warehouse which warehouses and distributes vaccines. The PhaGDis were excluded because they are currently not mandated to conduct distributions. SALAMA recorded an acceptable capability maturity score of 84 percent indicative of the system capabilities developed over the years. Almost all the required basics and intermediate elements were in place and the only areas requiring improvements were the advanced and state-of-the-art capabilities.

The DPEV distributes vaccines to the district health services for distribution to peripheral facilities, who then pick up their requirements via multiple transportation options. The DPEV attained an overall capability maturity score of 44 percent in comparison to the 83 percent achieved by SALAMA. Also, 50 percent of expected basic elements and 13 percent of intermediate capabilities were absent. Given the relatively strong capabilities within SALAMA, it would be prudent for other partners involved in the distribution of commodities to leverage on its systems to minimize the multiplicity of actors within the distribution network.

Exhibit 74. Distribution Maturity Scores
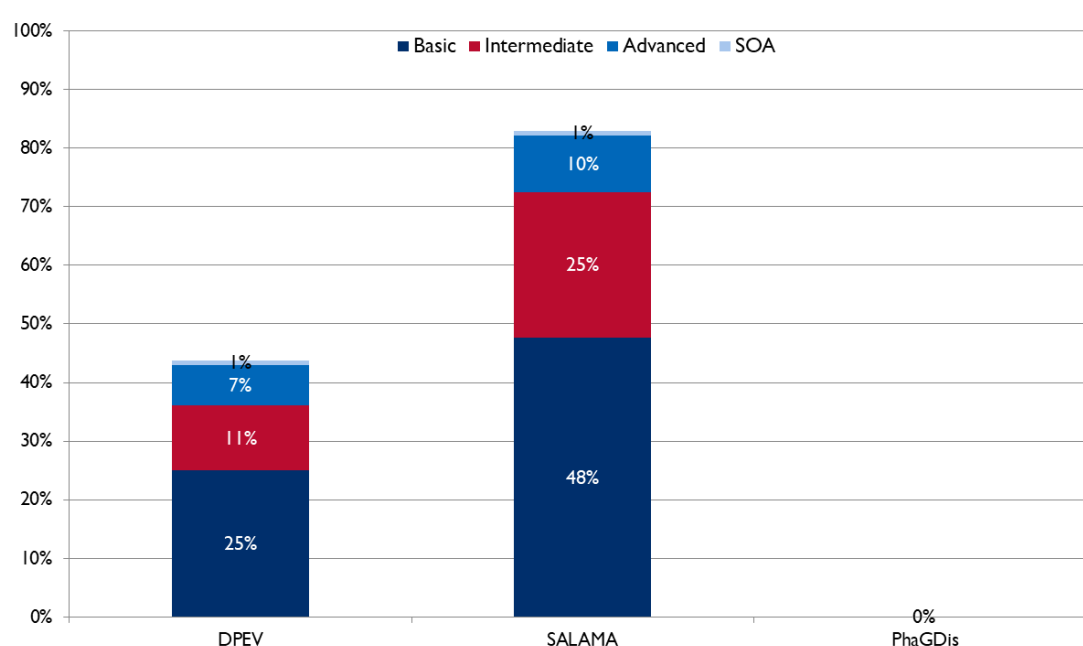
Note on interpreting results: Recall that CMM scores are a composite of assessed basic (max 50 percent), intermediate (30 percent), advanced (15 percent) and SOA (5 percent) capabilities. Reported percentages are the scored results averaged across all assessed sites, for each capability level and facility type. For more information, please refer to the Understanding the CMM Results section above.

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

	SALAMA	DPEV
n =	1	1
Overall maturity score (range)	83%	44%
Percent of basic items in place (range)	95%	50%

Exhibit 76 depicts some of the core features of the distribution systems in the 2 central-level entities assessed. SALAMA has an approved distribution plan that guides its operations while the DPEV did

not show proof of the existence of an approved distribution. The DPEV relies largely on donor funding for distribution while SALAMA blends donor funding with facility cost recovery funds. SALAMA can capture distribution data electronically whiles the DPEV relies on its manual systems, nonetheless, for both entities, the cost drivers for distribution and transportation are human resources, maintenance, outsourcing or rental cost, per-diems, and fuel.

Exhibit 76. Assessing features of Distribution Capabilities in Place at Central Level		
	SALAMA	DPEV
Mechanisms used for distribution	Own fleet, rented vehicles, Outsourced service	Own fleet, rented vehicles,
Existence of an approved distribution plan	✓	X
Responsibility for funding the distribution budget	Donor and Implementing Partners, Facility cost recovery	Government (minimal), Donor and Implementing Partners
Presence of policies that cover distribution and transportation of commodities	X	X
Do you maintain proof of delivery?	Yes (manually),	Yes (electronic with manual entry)
Components of distribution cost	Human resource, maintenance, outsourcing or rental cost per-diems and fuel	Human resource, maintenance, outsourcing or rental cost per-diems and fuel

Distribution KPIs

Access to distribution data for the calculation of KPIs to determine distribution performance was limited. This is because the data collection team did not have access to the full complement of distribution data from SALAMA during the period of assessment, which was further complicated by the absence of a structured distribution from the PhaGDis to the peripheral sites. Deductions from the available data indicate the distribution system has some foundational capabilities at the central level that will serve it well for years to come. However, to bring the system to the highest levels of effectiveness and efficiency, a concerted focus on collecting, interpreting, and using data guide distribution planning and operations is needed.

Exhibit 77. Downstream Order Key Performance Indicators (Jan – June. 2022)			
	SALAMA	DPEV	PhaGDis
Total number of orders (randomly selected over a six-month period	20	20	34
Order turnaround time (days)	27.3	--	47.4
Percentage of orders adjusted	0%	0%	23%
Average deviance from 100 percent fill rate	--	--	13%
Percentage of orders delivered in-full	--	--	72%

Recommendations

- Revisit the recommendations of the 2015 study of the supply chain network and cost analysis of health products to select an optimum distribution model to the last mile.

- Consider the long-term viability of all the district Pharmacies in the context of last-mile delivery – as optimizing the capacities of all 115 for last-mile delivery will be a herculean task if the chosen option for distribution involves each of the district pharmacies.

- Leverage the demonstrated capacity of SALAMA to further harmonize distribution to minimize the use of parallel networks by partners.

Supplemental Exhibit

Exhibit 78. Distribution Module, Distribution of Questions and Assignation of Weight Across Capability and Facility Levels								
	BASIC (50%)		INTERMEDIATE (30%)		ADVANCED (15%)		SOA (5%)	
MODULE	# of Qs	WEIGHT	# of Qs	WEIGHT	# of Qs	WEIGHT	# of Qs	WEIGHT
SALAMA	21	2.4%	43	0.7%	17	0.9%	7	0.7%
DPEV	21	2.4%	43	0.7%	17	0.9%	7	0.7%

Note that interpretations of the scoring, and discussions of "difference" in the scores, need to recognize that the number of assessed capabilities differs by facility type and module. Thus, positive responses to individual questions (i.e., reports of present capabilities) carry different weights, depending on the technical area and facility type.
Note also that the number of questions and the question weighting for these modules vary because some conditionally scored questions are included. Figures presented here assume all conditions are met and all questions are included.

Logistics Management Information Systems

Accurate and timely data are critical for effective decision-making throughout the public health system. The logistics management information system is the system of records and reports—paper-based or electronic—that is used to aggregate, analyze, validate, and display data to inform logistics decisions and manage the supply chain. Major areas that were factored into the assessment of LMIS capabilities and performance in the NSCA included evidence that standardized LMIS tools and practices are used consistently throughout the system, harmonized reporting practices, regular reporting intervals, performance monitoring on quality of reporting, and ultimately, performance in data accuracy, completeness, and timeliness (see Exhibit 79).

Exhibit 79. Examples of Scored Logistic Management Information System Capabilities	
Basic	Paper-based LMIS tools Quarterly reporting frequency Internal DQAs
Intermediate	Standardized tools across the supply chain— geographic regions, health programs, and system levels Electronic LMIS tools Monthly reporting frequency Standard process to review LMIS data Reliable internet
Advanced	Weekly reporting frequency Virus protection for eLMIS computers
SOA	Real time/daily LMIS reporting frequency

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

The supply chain information flow landscape in Madagascar can be complex to understand. According to the SOPs manual for logistics management 2022, information is expected to flow from the CSBs and CHRD1 to the PhaGDis for onward transmission to the central purchasing agency (SALAMA) for requisition and re-supply of products. The referral and university hospitals submit their data directly to SALAMA for requisitions and resupply, using the system called Channel. There is also the use of the DHIS2 platform by social marketing which is entirely outside of the public supply chain.

The SOP for logistics management 2022, has procedures for data quality assurance and indicators to track supply chain system performance but these are hardly followed or utilized.

2022 NSCA Findings and Analysis

LMIS capability and performance results from this NSCA are presented in Exhibits 80 through 82. Overall, maturity capability scores for all entities ranged from 38 to 62 percent and the presence of basic elements ranged from 44 to 88 percent. The referral and university have the strongest capability score of 62 percent and are closely followed by SALAMA with a score of 62 percent. The CSB, district hospitals, and PhaGDis posted maturity capability of scores of 52, 49, and 38 percent respectively. The score at the DPLMT was 42 percent and the average score for all the vertical programs was 38 percent (refer to exhibits 80a and 80b).

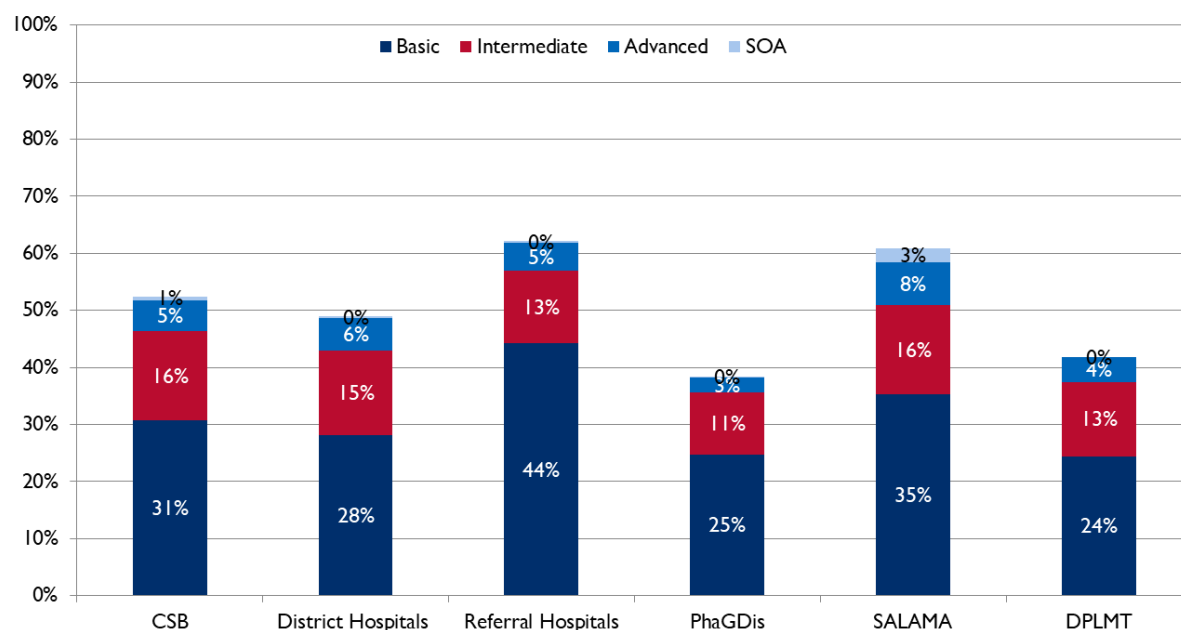Exhibit 80 LMIS Maturity Scores Across All Surveyed Facility Types

Exhibit 80 LMIS Maturity Scores Across All Surveyed Facility Types
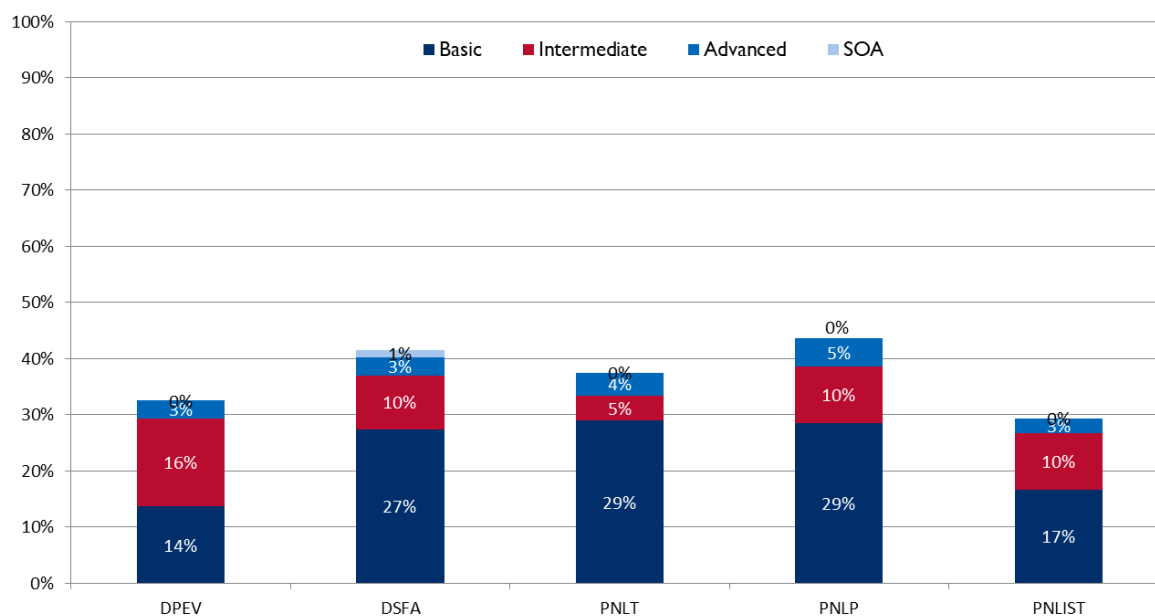

Exhibit 81 LMIS Maturity Scores Across Vertical Programs

	CSB	District Hospitals	Referral & University Hospitals	PhaGDis	SALAMA	DPLMT
n =	87	21	21	29	1	1
Overall maturity score (range)	52% (34–74%)	49% (4–75%)	62% (0–85%)	38% (0–63%)	61%	42%
Percent of basic items in place (range)	61% (33%–83%)	56% (8–83%)	88% (0-122%)	50% (0–81%)	71%	49%

Central level. Typically, the strongest capabilities in LMIS function are found at the central level, and those capabilities decrease progressively going through the health system to last-mile facilities. SALAMA scored 61 percent which is just a point behind the highest score for LMIS capabilities of 62 percent for the referral and university hospitals. SALAMA administers both electronic and paper-based LMIS and has policies in place to guide the use of both versions of the system. It conducts standard regular meetings to review LMIS data and reports and has a technical team and helpdesk to support the use of the system. It relies on LMIS data for the performance of key functions such as procurement, forecasting, and distribution but not for equally important supply chain tasks such as waste management, reverse logistics, or re-distributions. SALAMA tracks LMIS indicators such as completeness and accuracy of reports and conducts internal data quality audits (DQA). Internet connectively is reliable and funding for the LMIS activities is from facility cost recovery funds.

The DPLMT is expected to provide policy oversight for the use of the LMIS be it paper or electronic at all levels of the supply chain. It has harmonized the monthly reporting schedules amongst the different vertical programs and created a technical working group and helpdesk to address LMIS challenges. However, the DPLMT faces multiple challenges with the use of the LMIS including unreliable internet connectivity, lack of computers, data quality and entry errors, insufficient human resources, and time constraints amongst others. The DPLMT tracks the accuracy and timeliness of LMIS reports and relies on LMIS data for supply planning, forecasting, and procurements. However, there is no evidence that it conducts or leads DQAs, and its budgets are largely donor-driven.

The vertical programs in Madagascar, receive reports through their district and regional health administrations. LMIS reports for various health areas (malaria, family planning, TB, maternal and child health, and others) are submitted monthly to inform program planning and commodity re-supply. However, based on their combined maturity score of 38 percent, it is evident the vertical programs do not possess capacities beyond obtaining and using the LMIS data for decision-making.

PhaGDis. 77 percent of the PhaGDis use both electronic and paper-based LMIS and 20 percent use paper-based LMIS for their monthly reporting cycle. The SOPs for logistics management were available in 24 to 38 percent of the PhaGDis. 58 percent of them conduct regular meetings to review and validate LMIS data but internal DQAs occur in only 17 percent of the PhaGDis. The major challenges with using electronic LMIS are related to internet connectivity, inadequate human resources, availability of computers, and time due to competing priorities. The timeliness of reporting is tracked in 46 percent of the PhaGDis, completeness in 19 percent, and accuracy in 35 percent. Funding for the LMIS at this level occurs through a mix of funds including donors, cost recovery, and government.

Service Delivery Points: Amongst the CSBs, district hospitals, referral and university hospitals the LMIS maturity capability scores range from 49 to 62 percent. The referral and university hospitals scored 62 percent and had 88 percent of the basic elements in place. 43 percent of the referral and university hospitals use paper-based LMIS and 52 percent of them use a mix of electronic and paper-based LMIS. Amongst these referral facilities, 29 percent have SOPs manual for electronic LMIS but only 9 percent have manuals for paper-based LMIS.

97 percent of the CSBs use paper-based LMIS but only 18 percent of them provided copies of the SOPs of LMIS. Similarly, 62 percent of district hospitals have but only 26 percent of them provided copies of the SOPs for LMIS. However, it is important to note that Madagascar's SOPs manual for logistics management 2022, has a section on logistics management and so its availability at SDPs should be considered as concomitant to the availability of SOPs for LMIS.

Exhibit 83. Use of Paper Based or eLMIS at Central and Sub-national levels						
	CSB	District Hospitals	Referral & University Hospitals	PhaGDis	SALAMA	DPLMT
n =	87	21	21	29	1	1
Paper-based LMIS only	97%	62%	43%	20%	X	X
Electronic LMIS (eLMIS) only	0%	0%	0%	0%	X	X
Both Paper & eLMIS	2%	38%	52%	77%	✓	✓

Type of LMIS: In reference to Exhibit 83 generally there is a mix of electronic and paper LMIS at the various levels of the supply chain in Madagascar. The use of only paper-based LMIS declines as one moves from the lowest level to the highest level. As shown in Exhibit 83 percent of CSBs use paper-based LMIS as against 20 percent of the PhaGDis. Beyond the CSBs to the summit of the supply chain most entities use a mix of both paper and electronic LMIS. This situation is reflective of the state of the supply chain systems in most developing countries since relying on electronic LMIS only may not be feasible in most of these countries. It is important to remember that in exhibit 89 internet connectivity, downtime and, availability of computers are stated as some of the major challenges affecting the deployment of the eLMIS.

Exhibit 84. Key LMIS Capabilities in Place—all levels

	CSB	District Hosp.	Referral & University Hospitals	PhaGDis	SALAMA	DPLMT
n =	87	21	21	29	1	1
Percentage of facilities reporting there a standard process, such as scheduled, regular meetings, to review LMIS data and reports	48%	40%	33%	58%	✓	✓
Percentage of facilities reporting presence of manuals or SOPs on paper based LMIS	18%	26%	29%	24%	X	X
Percentage of facilities reporting presence of manuals or SOPs on eLMIS	0%	0%	9%	38%	✓	✓
Percentage of facilities reporting existence of reliable internet connectivity at facility ("always or almost always works")	0%	9%	9%	8%	✓	✓
Percentages of facilities reporting inclusion of eLMIS in the overall organizational budget	53%	48%	57%	14%	✓	✓
Percentage of facilities reporting conducting internal DQAs	10%	15%	14%	17%	✓	X
Percentage of facilities reporting tracking of timeliness, completeness, and accuracy of reporting by lower-level facilities	--	--	--	46%	✓	✓

Exhibit 85. Key LMIS Performance Capabilities in Place—all levels

	CSB	District Hosp.	Referral & University Hospitals	PhaGDis	SALAMA	DPLMT
n =	87	21	21	29	1	1
Percentage of facilities reporting a stock-out of stock cards	32%	31%	29%	55%	--	--
eLMIS record accuracy: Percentage of facilities with 100 percent accurate stock card, average across tracers	48%	40%	33%	58%		
eLMIS record accuracy: Percentage points deviation from 100 percent accuracy	0%–2000%	89%–4000%	66%–241%	26%–1844%		

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

Legend:
- TLE, 600/300/300 mg
- Malaria RDT
- Mag. Sulphate Inj. (50%)
- Amoxicillin, 250mg
- Lamivudine/Zidovudine ,30/60 mg
- Depot Medroxyprogesterone Acetate (IM)
- 2 RHZE + 4RH (Category 1*3) kits
- Paracetamol, 500 mg
- First Response HIV RTK
- Levonorgestrel 1-Rod Implant
- Pentavalent Vaccine
- Examination Gloves Medium,
- AL 6x4
- Oxytocin injectable, 10 IU/mL
- ORS sachet, 250mg

Exhibit 87. Percentage of Facilities With 100 Percent Accurate eLMIS Record, by Tracer Commodity

Legend:
- Amoxicillin Powder for Susp. 250mg/ml
- 1 rod Implant (Implanon)
- Oxytocin inj. 10 i.u
- SP 500/25 mg
- Varicella Vaccine
- Paracetamol 500mg
- Combined Oral Contraceptives
- ORS 20,5 g/1 L
- Malara RDT
- RHZE 150 + 75 + 400 + 275 mg
- DMPA-IM 150mg/ml
- Plumpy Nut
- ASAQ 100/270 mg
- BCG Vaccine
- TLD 50mg + 150mg + 300mg
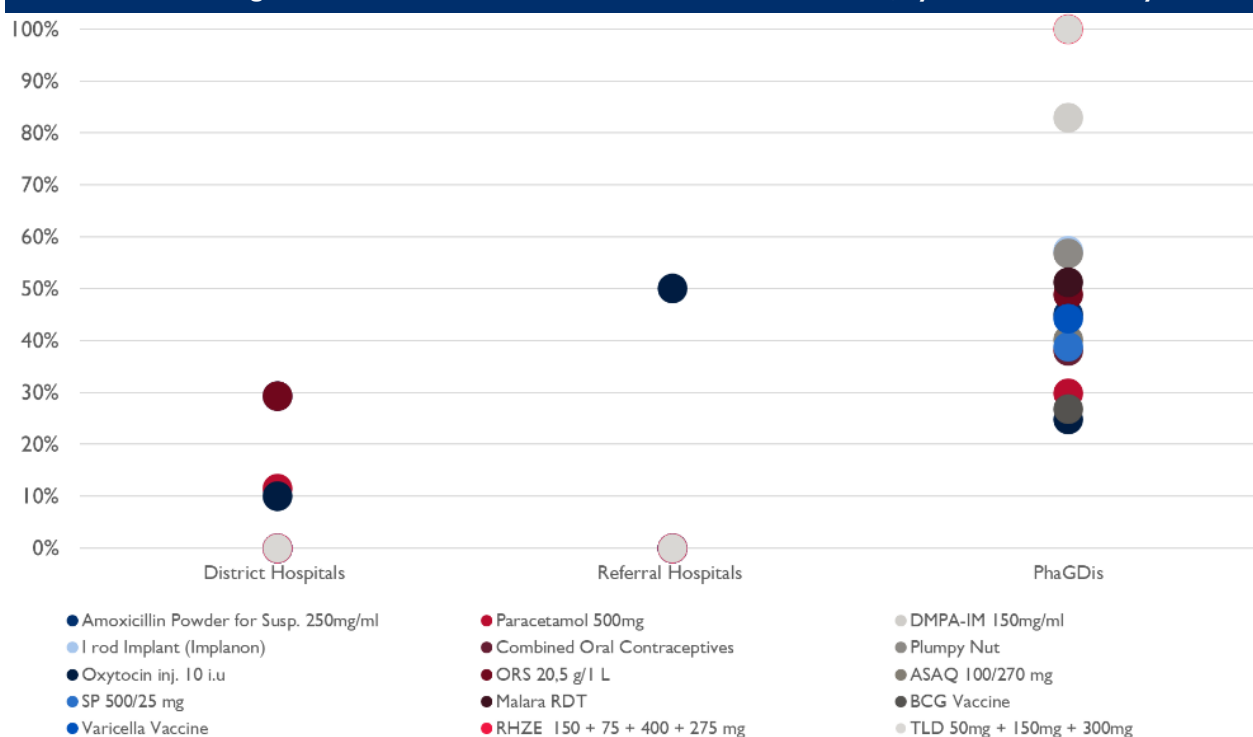
Exhibit 88. Most Frequently Cited Challenges with paper-based LMIS						
	CSB	District Hospitals	Referral & University Hospitals	PhaGDis	SALAMA	DPLMT
n =	87	21	21	29	1	1
Data loss	25%	14%	14%	7%	X	✓
Delayed feedback from higher levels	10%	0%	5%	10%	-	--
Difficulties in filing	36%	24%	14%	30%	X	✓
Data quality or data entry errors	0%	14%	18%	18%	✓	✓

Exhibit 89. Most Frequently Cited Challenges with eLMIS						
	CSB	District Hospitals	Referral & University Hospitals	PhaGDis	SALAMA	DPLMT
n =	87	21	21	29	1	1
Internet connectivity	0%	28%	55%	58%	X	✓
Downtime centrally (system failure)	0%	26%	64%	33%	X	✓
Availability of computers	100%	36%	27%	18%	X	✓
Delayed feedback from higher levels	33%	6%	18%	0%	X	✓
Insufficient human resources capability	0%	33%	18%	29%	X	✓
Insufficient number of staff	0%	26%	64%	33%	X	✓
Data quality or data entr errors	100%	36%	27%	18%	X	✓

HR for LMIS. While the Human Resource module has its own section of the report, it is important to highlight some of the HR dynamics related to LMIS, as the system's success or failure is largely driven by the people who input, analyze, and use the information from the system. Two of the most important considerations for supportive capabilities for the workforce are staff's understanding of their job responsibilities and the opportunities for those staff to grow and refresh their skills as it relates to their job duties. Exhibit 88 details the prevalence of LMIS as a formal component of job descriptions and the proportion of staff receiving capacity-building opportunities in LMIS across various service delivery points. It is encouraging to see that at the referral and district pharmacies LMIS include LMIS in their job descriptions and capacity-building opportunities. This indicates strong commitment by the government to ensure that staff are aware of their LMIS responsibilities and have the skills needed to complete the work. However, the prevalence of both items in the CSBs and district hospitals are lower. Less than one-third of CSB and district hospitals reported having LMIS as a formal component of at least one staff member's job description (see Exhibit 90). Capacity building at the CSB level on this topic was also scarce. It is further concerning that the degree of training observed in district hospitals is not yielding the anticipated gains in performance. Putting all of this into the context detailed in the eLMIS subsection, a clear picture emerges about the need to review and update the quality of the training and capacity building around eLMIS with health facilities.

Exhibit 90. LMIS Prevalence in Job Descriptions and Capacity Training Opportunities						
	Percentage of facilities reporting					
	CSB	District Hospitals	Referral & University Hospitals	PhaGDis	SALAMA	DPLMT
n =	87	21	21	29	1	1
LMIS in formal job descriptions of at least one staff member	32%	24%	43%	61%	✓	✓
Capacity training on LMIS in past year	27%	15 %	38%	36%	X	✓

Data Quality Assessments. Any well-functioning LMIS requires the regular use and review of DQAs to ensure validity of the information stored in the system. In Madagascar, DQAs are not a normal part of supply chain operations. Only 10 percent of CSBs, 15 percent of district hospitals, and 14 percent of referral hospitals report conducting them. Looking closer, the most common type of DQAs is internal, with facility staff being the most common implementers. Central-level representatives and district health officials were reported as the most common participants in DQAs. On a positive note, we see that 42 percent of CSBs and 45 percent of district hospitals report receiving feedback on their DQAs. However, when examining these capabilities considering eLMIS performance, some disconnect is apparent. Exhibits 85, 86 and 87 detail the degree of accuracy and deviance from accuracy across various tracer products. There is still plenty of room for improvement in having high-quality consumption data within the eLMIS.

Recommendations

The NSCA results provide a good opportunity to examine the state of the LMIS to leverage its robust, nationwide eLMIS system as the cornerstone of its supply chain. To do so a countrywide

commitment to systems and data quality is needed. Specifically, the GOM should consider the following steps:

- The Madagascar SOPs manual for logistics management 2022, has an elaborate section on LMIS (electronic and paper-based), however, the SDPs appear not to be aware of the presence of these tools and job aids. This means there must be a plan to train and promote the use of these job aids and tools to address gaps in the operations of the LMIS in the country.
- In the transition to the use of electronic LMIS, the country should consider adopting a phased approach where hospitals and the PhaGDis are fully transitioned before the CSBs. Currently, the CSBs rely on paper based LMIS and will require a greater effort to transition to eLMIS. Transitioning to eLMIS should also be costed in terms of equipment needs and internet access.

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

- Ensure that all facilities have at least one person on staff with LMIS duties as a formal part of their job responsibilities. Staff cannot be expected to work on tasks they are not assigned. Simultaneously, ensure that infrastructure and adequate staffing are present within facilities nationwide to allow for LMIS duties to be completed in a satisfactory manner.

- Reinvigorate the processes for internal and external data quality assessments. A renewed focus on LMIS accuracy is needed, as the absence of a fully functioning LMIS has placed minimal focus on data quality in the value chain.

- Ensure that best practices are shared across entities to ensure consistency of expectations, policy, and practice for LMIS data in the supply chain.

Supplemental exhibits

Exhibit 91. LMIS: Distribution of Questions and Assignation of Weight Across Capability and Facility Levels								
	BASIC (50%)		INTERMEDIATE (30%)		ADVANCED (15%)		SOA (5%)	
MODULE	# of Qs	WEIGHT	# of Qs	WEIGHT	# of Qs	WEIGHT	# of Qs	WEIGHT
CSB (87)	12	4.1%	11	2.7%	5	3%	2	2.5%
District hospitals (21)	12	4.1%	11	2.7%	5	3%	2	2.5%
Referral & University hospitals (7)	11	4.5%	14	2.1%	6	2.5%	2	2.5%
PhaGDis (31)	20	2.5%	21	1.4%	11	1.4%	2	2.5%
SALAMA (1)	20	2.5%	21	1.4%	11	1.4%	2	2.5%
DPLMT(1)	43	1.2%	22	1.4%	12	1.3%	3	1.7%

Quality Assurance and Pharmacovigilance

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

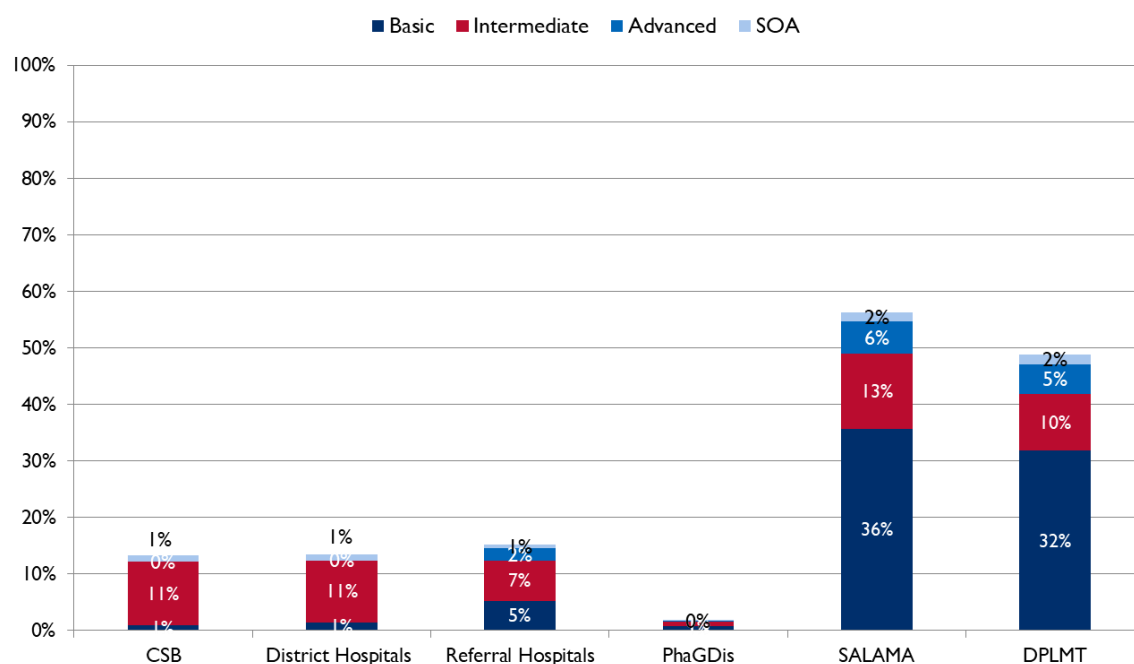| Exhibit 92. Examples of Scored Quality Assurance and Pharmacovigilance Capabilities	
Basic	Formally approved national-level product quality assurance strategy or policy Formally approved guidelines or manual/SOPs
Intermediate	Samples of received pharmaceutical products taken for quality control testing (intermediate capability at MOH, RMS, and RH levels, advanced for SDPs) Quarterly (or more frequent) quality control samples Data collection tools available for pharmacovigilance
Advanced	Dedicated department responsible for implementing pharmacovigilance strategy All laboratories conducting quality control testing accredited by a competent body (e.g., WHO) SOPs to quarantine and/or recall product determined to be compromised Certificates of analysis and conformance recorded for **all** medicines received from international sources
SOA	Action protocols, based on pharmacovigilance results

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

Until 2005, pharmacovigilance activities in Madagascar were limited to the collection and dissemination of information medicines from the WHO and other global laboratories. The National Pharmacovigilance Policy (NPP) was first developed in 2005 and revised in 2011 to focus on the fundamental elements to revitalize the pharmaceutical sector in Madagascar. The NPP highlights the directions and strategies required to ensure access to safe medicines for the entire population. In 2006, the Madagascar Medicines Agency (MMA) established the National Centre for Pharmacovigilance to coordinate pharmacovigilance for the pharmaceutical sector. The NSCA team also sighted a health systems quality assurance manual developed in 2007, but its availability was scarce in many of the facilities assessed.

2022 NSCA Findings and Analysis

Exhibits 93 and 94 display the capability scores, by facility type, for quality assurance and pharmacovigilance. The results show that the central levels of the supply chain possess the strongest pharmacovigilance capabilities while pharmacovigilance capabilities appear to be limited at the sub-national level levels of the supply chain. It is also important to note that the CMM measurement for the central level is representative of the capacity within entire the structure of the MINSANP rather than the DPLMT alone. '

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

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

	CSB	District hospitals	Referral & University Hospitals	PhaGDis	SALAMA	DPLMT
n =	87	21	21	29	1	1
Overall maturity score (range)	13% (0–38%)	14% (0–38%)	15% (0–55%)	2% (0–17%)	56%	49%
Percent of basic items in place	2%	3%	10%	2%	71%	64%
Availability of SOPs for pharmacovigilance	6%	5%	5%	--	--	P
Availability of reporting forms for pharmacovigilance	66%	67%	67%	--	--	
Availability of SOPs for product quality control/quality assurance	1%	6%	10%	0%	100%	100%

Central-level Entities. The central levels hold the strongest capabilities for pharmacovigilance and quality assurance despite the low maturity capabilities score of 56 percent and 46 percent for SALAMA and the MINSANP respectively. The MINSANP has in place the policies, guidelines, and procedures to promote pharmacovigilance and quality assurance within the supply chain. However, the uptake and use of these policies and procedures is not pervasive throughout the systems. At the central warehouse, quality testing is outsourced but laboratories conducting testing do not have formal accreditation and results of quality testing are not available in a timely manner for decision-making. Suffice it to say that the building blocks for strong pharmacovigilance and quality assurance system at the central level are in place but must be enforced to achieve maximum benefit. Another area for attention is to improve government funding for pharmacovigilance and quality assurance in the supply chain.

Role of PhaGDis: The PhaGDis produced the lowest capability maturity score of 2 percent in this technical area. They appear unincluded in the chain for the collection of samples for quality testing and not included in the pathway for information sharing. They don't have copies of the quality assurance manuals and are not prioritized for product quality assurance. The PhaGDis are holding points for products destined for service delivery points, so interact with products in a manner that can affect quality and reliability. Hence, their ability to assess and use pharmacovigilance information can improve overall safety for clients. If the PhaGDis are considered to have supervisory responsibility for the lower levels of the supply chain, then it is important they are equipped to assert their roles in the quality assurance process.

Exhibit 95. Key QA and Pharmacovigilance Capabilities in Place at Service Delivery Points			
	CSBs	District hospitals	Referral & University Hospitals
n =	87	21	21
Facilities reporting samples of products taken for testing	0%	0%	10%
Facilities reporting SOPs for quarantine/recall of suspected products	0%	0%	5%
Facilities reporting presence of action protocols based on PV results	23%	22%	33%
Facilities reporting sharing collected PV data with central-level authorities	46%	43%	52%

Service Delivery Points: Pharmacovigilance and quality assurance capabilities scores are low for all the service delivery points. The overall capability maturity score was 13 percent for CSBs and district hospitals and 15 percent for referral and university hospitals. This is because most of these entities do not have the SOPs for pharmacovigilance or quality assurance and adverse drug reporting forms fully available. The results in Exhibit 95 show that facilities play minimal roles in the quality assurance chain as they are not involved in post-market surveillance. Also, many of these facilities are not sharing data on PV events with the central level and are not likely to act on PV events. Given the NSCA findings on the availability of SOPS, protocols and tools at the central it is mandatory to improve the dissemination and uptake of these tools at the various SDPS.

Recommendations

- Ensure the widespread availability of SOPs, reporting tools, and staff prepared to complete these reports, without which the pharmacovigilance system cannot function. The MINSANP should print and distribute all necessary pharmacovigilance tools to facilities across the country, particularly to last-mile facilities.

- Pair the distribution of materials with a cascading training program to ensure that staff understands when and how to respond to ADRs and other PV-related events.

- Strengthen quality assurance and pharmacovigilance practices at the district pharmacies. This level of the supply chain can serve as a strong linkage between central-level leadership and the nascent PV system at the service delivery level.

Supplemental Exhibit

Exhibit 96. QPV: Distribution of Questions and Assignation of Weight Across Capability and Facility Levels								
	BASIC (50%)		**INTERMEDIATE (30%)**		**ADVANCED (15%)**		**SOA (5%)**	
MODULE	# of Qs	WEIGHT	# of Qs	WEIGHT	# of Qs	WEIGHT	# of Qs	WEIGHT
CSBs (n=87)	4	12.5%	3	10.0%	4	3.8%	1	5.0%
District hospitals (21)	4	12.5%	3	10.0%	4	3.8%	1	5.0%
Referral & University hospitals (21)	5	10.0%	8	3.8%	4	3.8%	1	5.0%
PhaGDis (29)	7	7.1%	9	3.3%	8	1.9%	3	1.7%
SALAMA (1)	7	7.1%	9	3.3%	8	1.9%	3	1.7%
MINSANP/ DAMM	7	7.1%	9	3.3%	8	1.9%	3	1.7%

Note that interpretations of the scoring, and discussions of "differences" in the scores, need to recognize that the number of assessed capabilities differs by facility type and module. Thus, positive responses to individual questions (i.e., reports of present capabilities) carry different weights, depending on the technical area and facility type.
Note also that the number of questions and the question weighting for these modules vary because some conditionally scored questions are included. Figures presented here assume all conditions are met and all questions are included.

Waste Management

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

| Exhibit 97. Examples of Scored Waste Management Capabilities	
Basic	SOPs for waste management and disposal National regulatory agency or department for enforcing regulations Unusable pharmaceutical products stored separately Minimal government or facility budget contribution toward waste management
Intermediate	Disposal methods: on-site incineration, inertization or solidification Waste disposal events authorized and documented Internal audits of waste management
Advanced	Disposal supervised and certified by a regulatory authority Unusable pharma waste products sorted by method of disposal
SOA	Waste management system integrated with LMIS

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

Madagascar developed a national policy for the management of medical waste and the security of injections in 2017, to reduce the health and environmental risks and impacts associated with medical waste and injectables. Specifically, this policy aims to strengthen the legislative and regulatory framework, standardize medical waste management practices and injection safety, and develop the skills of health personnel in waste management by mobilizing resources and strengthening partnerships. Also, the policy aims to have in place adequate technical skills and equipment for patient safety and the management of accidents and infections related to waste management, empower the community of users, and strengthen the monitoring and evaluation framework. There are also guidelines for the destruction of expired and damaged health products developed in 2011 but this was sparingly available in many facilities. Also, these guidelines need to be updated to align with the requirements of current national policy on waste management.

2022 NSCA Findings and Analysis

Exhibits 98 and 99 detail the findings for the waste management module during the NSCA. SALAMA had a total capability maturity score of 78 percent and had all the basic elements in place. However, there is a weak capability for waste management at the sub-national levels of the supply chain. The capability maturity score was 24 percent for CSBs and district hospitals, 36 percent for referral and university hospitals, and 31 percent for the PhaGDis. These entities lack most of the basic waste management capabilities required. Most of them do not have the required SOPs and demonstrated evidence that the required procedures are followed during waste disposal.

Exhibit 98. Waste Management Capability Maturity Model Scores
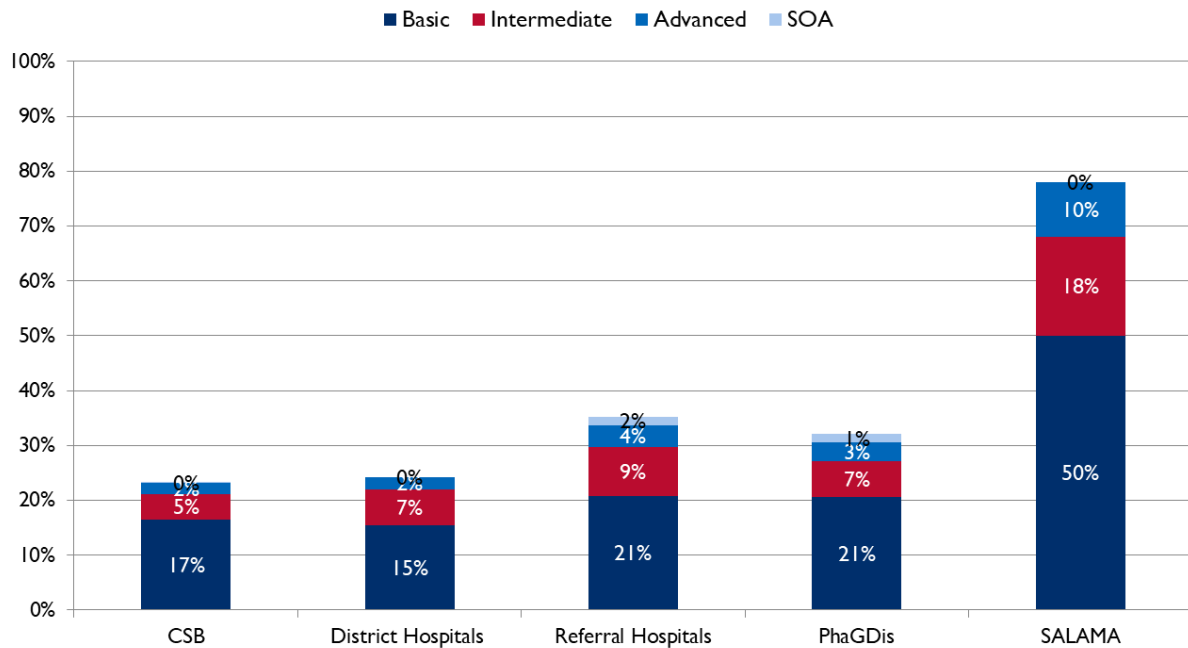
■ Basic ■ Intermediate ■ Advanced ■ SOA

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

Service delivery points. Waste management practices and capabilities at service delivery points are further highlighted in Exhibit 99 details the prevalence of SOPs and adherence to waste management practices at this level. Waste disposal events are rarely documented or authorized by a higher-level authority. These disposals are rarely reported to higher-level authorities as well. Facility staff at these facilities appear to lack an understanding of expectations and appropriate practices. Most facilities at this level reported using landfill and onsite incineration as their preferred method of disposal, however, different pharmaceuticals are not sorted during disposal. This means multiple commodities are bundled for incineration or dumped in the landfill. The DPLMT should consider providing guidance and training to these facilities to ensure they are aware of proper waste management procedures and expectations.

PhaGDis. As detailed in Exhibit 99, the district pharmacies had only 41 percent of the expected basic elements in place, though, 84 percent of them store unusable pharmaceuticals separately and 83 percent confirmed that waste disposal was supervised by a higher authority. The availability of waste disposal SOPs was confirmed in 27 percent of the PhaGDis and just 41 percent of them documented the disposal of commodities. Amongst the PhaGDis, the preferred disposal methods are incineration, landfill, and transport to higher-level facilities. Like the SDPs, only 8 percent of the PhaGDis segregated waste before disposal**.** Thus, the overall maturity capability score of 32 percent, is evidence of the need for capacity strengthening for proper waste disposal practices at this level.

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	Percent of facilities reporting:					
Exhibit 99. Waste Management Maturity Scores and Select Capabilities and Performance Indicators						
	CSBs	District hospitals	Referral & University Hospitals	PhaGDis	SALAMA	DPLMT
n =	**87**	**21**	**21**	**29**	**1**	**1**
Overall maturity score (range)	23% (0–72%)	24% (4–53%)	35% (8–84%)	32% (3–48%)	78%	-
Percent of basic items in place (range)	33% (0-100%)	31% (0–75%)	42% (0–100%)	41% (0–75%)	✓	--
Percentage of facilities demonstrating presence of SOPs for waste management and disposal at site	28%	25%	38%	27%	✓	--
Percentage of facilities reporting that waste disposal events are authorized and documented	31%	36%	48%	41%	✓	--
Percentage of facilities demonstrating that unusable pharmaceutical products are stored separately	44%	47%	62%	84%	✓	--
Percentage of facilities reporting disposal supervised or certified by a regulatory authority	47%	45%%	81%	83%	✓	--

Recommendations

The findings on the current state of pharmaceutical waste management in the Madagascar supply chain system point to opportunities to expand and deepen capabilities in this key technical area. The NSCA makes the following recommendations:

- Revise waste disposal standard operation procedure to provide guidelines to actualize the objectives of national policy for the management of medical waste and the security of injections.

- Ensure that policies and procedures for waste management, are fully disseminated to all facilities across the country.

– Reinforce the distribution of policies and sharing of best practices with training and oversight. Facility staff will need supportive supervision to ensure that they are conducting waste management activities correctly.

- Standardize the process for documenting and communicating waste disposal events to district and central-level authorities for all facilities and ensure facilities understand how to adhere to them.

Exhibit 100. Waste Management, Distribution of Questions, and Assignation of Weight Capability and Facility Levels								
	BASIC (50%)		**INTERMED. (30%)**		**ADVANCED (15%)**		**SOA (5%)**	
MODULE	# of Qs	WEIGHT	# of Qs	WEIGHT	# of Qs	WEIGHT	# of Qs	WEIGHT
CSBs (n=87)	4	12.5%	7	4.3%	5	3.0%	1	5.0%
District hospitals (21)	4	12.5%	7	4.3%	5	3.0%	1	5.0%
Referral & University hospitals (21)	4	12.5%	10	3.0%	6	2.5%	2	2.5%
PhaGDis (29)	4	12.5%	10	3.0%	6	2.5%	2	2.5%
SALAMA (1)	4	12.5%	10	3.0%	6	2.5%	2	2.5%

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

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

Cross-cutting Analysis

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

- SALAMA: This entity is creditable in most of the areas assessed in contrast to the other entities in the supply chain, although low scores were obtained in strategic planning, human resources, and quality and pharmacovigilance which must be improved. Also, it appears to be siloed and focused on the procurement, warehousing, and delivery of commodities downstream without direct responsibility for their functioning, operations, and performance.
- DPLMT: As the central statutory body supply chain, the DPLMT did not obtain strong capability maturity scores in the NSCA. The maturity scores for the DPLMT for all areas assessed ranged from a low zero score in waste management to a maximum of 66 percent in forecasting and supply planning. As the central level of the supply chain, the DPLMT or an alternate entity needs to be fully equipped and strengthened to perform its oversight responsibilities.
- PhaGDis: The NSCA results showed low capability maturity scores for the PhaGDis which were below the desired 80 percent score. The capability maturity scores for the PhaGDis ranged from 56 percent in financial sustainability to a low of 2 percent in quality and pharmacovigilance. These results signal the need to reexamine the mandate and role of the PhaGDis in the supply chain. If the PhaGDis are envisioned as intermediaries within the supply chain, then their capacity should be built to deliver on their expected role.
- Service delivery points: The NSCA did not show significant variations in the performance of SDPs in terms of the capability maturity scores obtained. Even though the referral and university hospitals show better performance than the district hospitals and CSB, all scores were below 80 percent with a range of 64 percent to 11 percent. These low scores imply that the capacity to perform supply chain functions are weak within the SDPs. Of particular concern is the low human resource capability score of between 30 percent and 33 percent, which implies the human resource capacity to drive supply chain functions in the SDPs is below optimum.

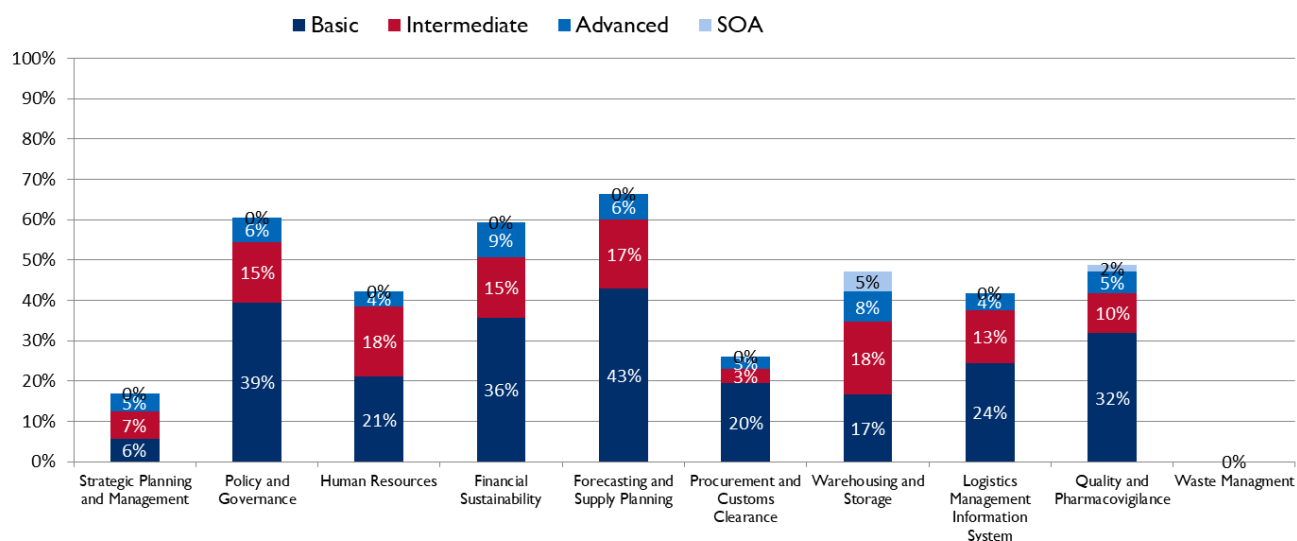## Exhibit 101. DPLMT/ MINSANP, CMM Scores for All Relevant Technical Areas

Legend: ■ Basic ■ Intermediate ■ Advanced ■ SOA

Technical Area	Basic	Intermediate	Advanced	SOA
Strategic Planning and Management	6%	7%	5%	0%
Policy and Governance	39%	15%	6%	0%
Human Resources	21%	18%	4%	0%
Financial Sustainability	36%	15%	9%	0%
Forecasting and Supply Planning	43%	17%	6%	0%
Procurement and Customs Clearance	20%	3%	3%	0%
Warehousing and Storage	17%	18%	8%	5%
Logistics Management Information System	24%	13%	4%	0%
Quality and Pharmacovigilance	32%	10%	5%	2%
Waste Managment				0%

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

Legend: ■ Basic ■ Intermediate ■ Advanced ■ SOA

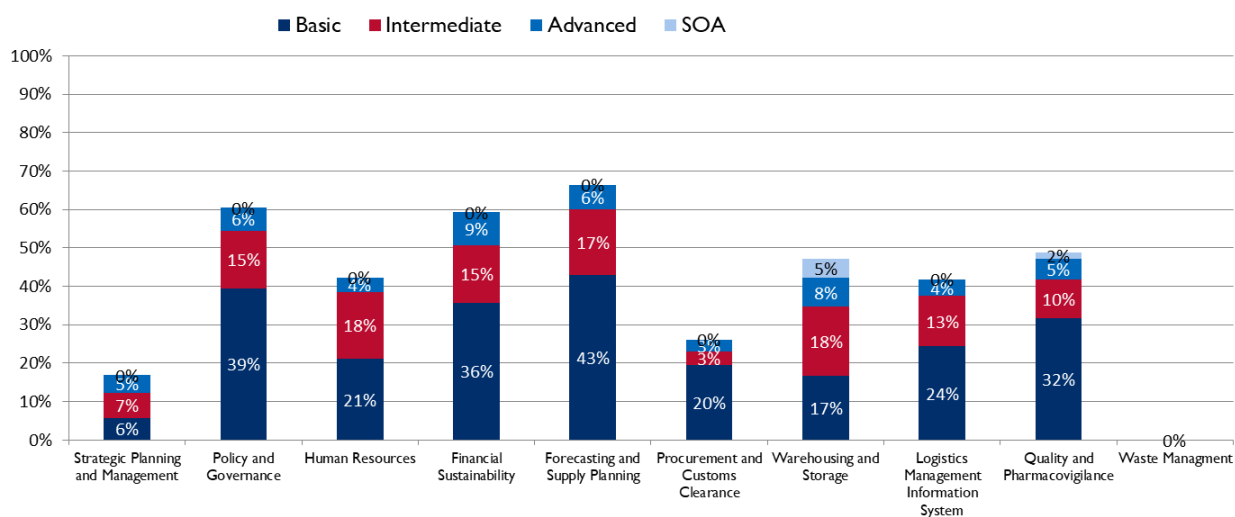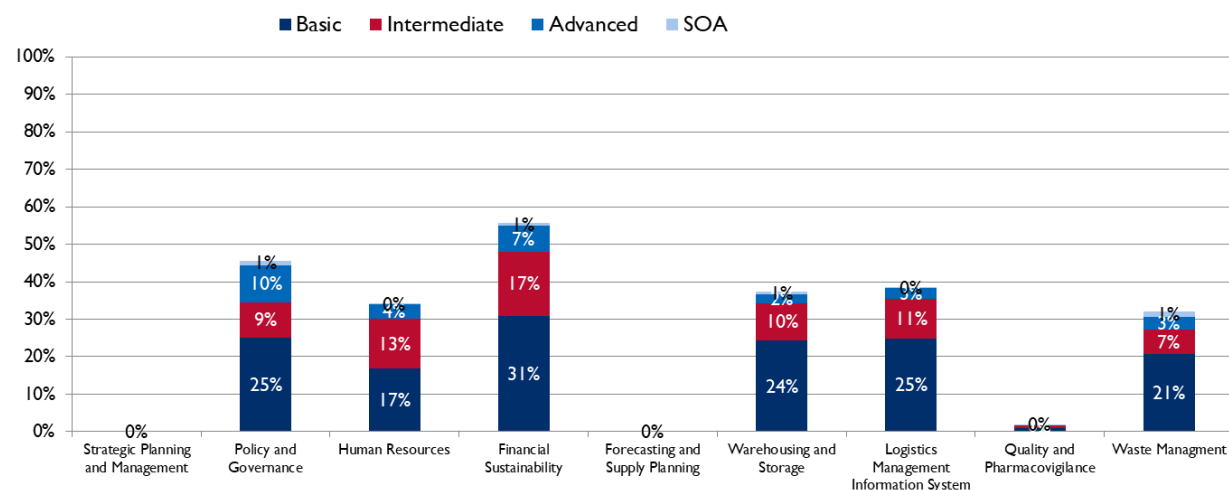| Technical Area	Basic	Intermediate	Advanced	SOA
Strategic Planning and Management	6%	7%	5%	0%
Policy and Governance	39%	15%	6%	0%
Human Resources	21%	18%	4%	0%
Financial Sustainability	36%	15%	9%	0%
Forecasting and Supply Planning	43%	17%	6%	0%
Procurement and Customs Clearance	20%	3%	3%	0%
Warehousing and Storage	17%	18%	8%	5%
Logistics Management Information System	24%	13%	4%	0%
Quality and Pharmacovigilance	32%	10%	5%	2%
Waste Managment				0%

Exhibit 103. PhaGDis, CMM Scores for All Relevant Technical Areas

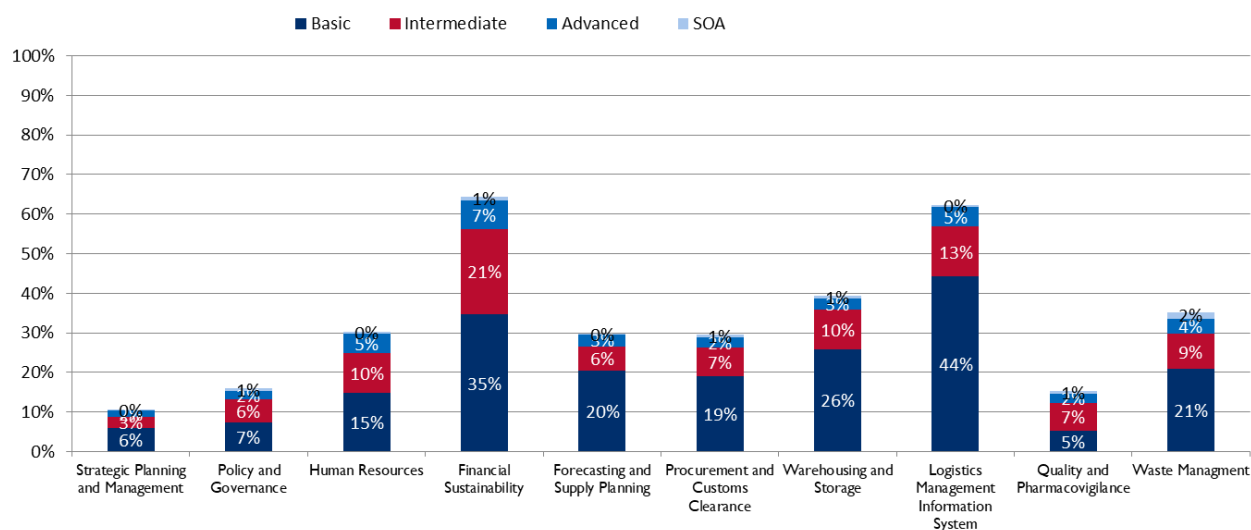**Exhibit 105. District hospitals (CHRD), CMM Scores for All Relevant Technical Areas**

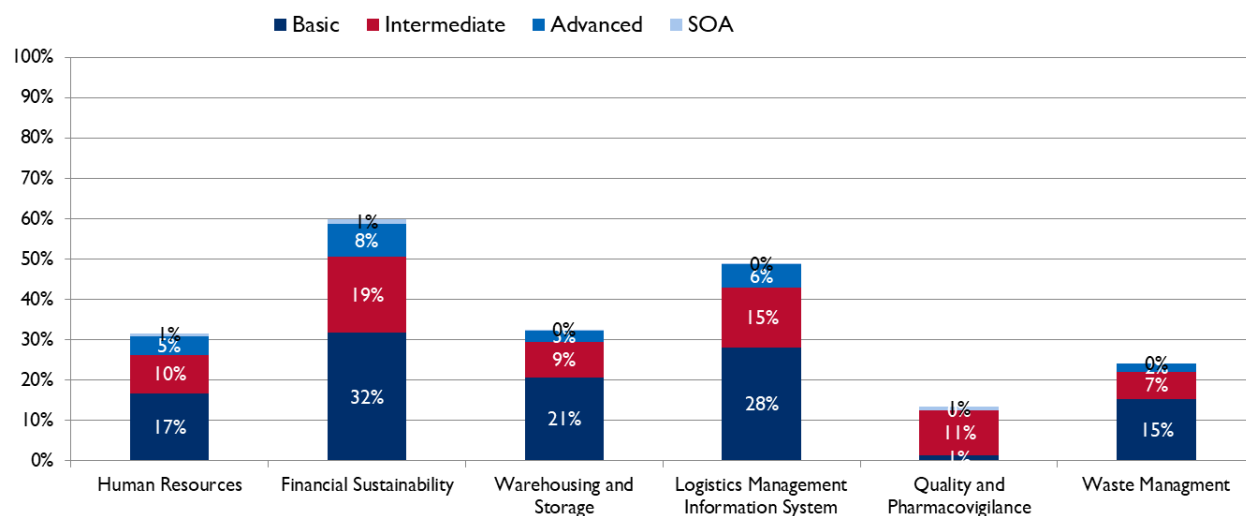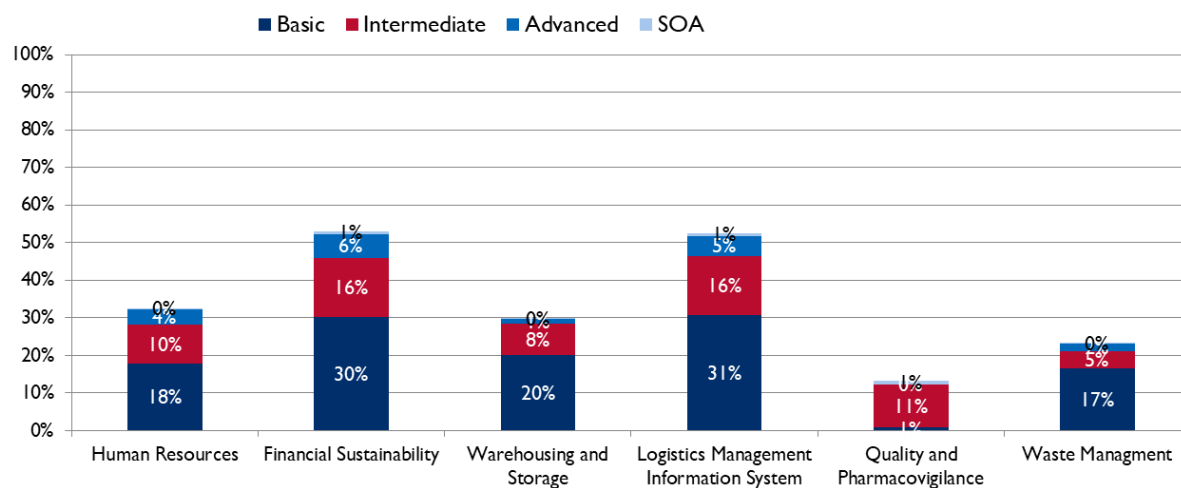Legend: ■ Basic ■ Intermediate ■ Advanced ■ SOA

Human Resources: Basic 17%, Intermediate 10%, Advanced 5%, SOA 1%
Financial Sustainability: Basic 32%, Intermediate 19%, Advanced 8%, SOA 1%
Warehousing and Storage: Basic 21%, Intermediate 9%, SOA 0%
Logistics Management Information System: Basic 28%, Intermediate 15%, Advanced 6%, SOA 0%
Quality and Pharmacovigilance: Basic 1%, Intermediate 11%, SOA 1%
Waste Managment: Basic 15%, Intermediate 7%, Advanced 2%, SOA 0%

Exhibit 106. CSBs, CMM Scores for All Relevant Technical Areas

Legend: ■ Basic ■ Intermediate ■ Advanced ■ SOA

Human Resources: Basic 18%, Intermediate 10%, Advanced 4%, SOA 0%
Financial Sustainability: Basic 30%, Intermediate 16%, Advanced 6%, SOA 1%
Warehousing and Storage: Basic 20%, Intermediate 8%, SOA 0%
Logistics Management Information System: Basic 31%, Intermediate 16%, Advanced 5%, SOA 1%
Quality and Pharmacovigilance: Basic 1%, Intermediate 11%, SOA 1%
Waste Managment: Basic 17%, Intermediate 5%, SOA 0%

Consolidated Recommendations

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

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

To model how Madagascar might consider prioritizing supply chain interventions and reforms, these recommendations per technical area are categorized using the criteria above to emphasize their prioritization for improving the country's supply chain. The reason for prioritizations is provided in brackets after the recommendation, according to the categorizations above. Rather than being a finalized list, these examples are meant to serve as a guide—and a stimulus for a critical and inclusive exercise in prioritization by the MINSANP and GOM. Additional targeted recommendations are found at the end of each technical section in this report.

Strategic Planning

- Develop a comprehensive national strategic plan for the country that set outs the mission, vision, objectives, and priority areas for long-term chain investments [Time-order priorities].
- The central level should provide guidance for the development of strategic plans or operational plans for sub-national levels of the supply chain (PhaGDis, Referral and University Hospitals, and Other Hospitals) [Time-order priorities].
- Leverage the opportunity to develop a national supply chain strategic plan to guide private-sector partnerships in the supply chain [Prevailing priority].
- Develop guidance that will enable the various entities in the supply chain to identify and develop risk mitigation plans [Prevailing priority].

Policy and Governance

- Ensure the protocols and procedures in place are censused and disseminated to every entity with consideration for their level and user requirements. This may also require that staff are trained to identify policies relevant to them. [Low-cost/high-yield]
- Complement the national medicines policy and essential medicines list with a standard treatment guideline that is updated regularly to reflect modern therapeutic needs. [Time-order priorities]
- Leverage the capacity within SALAMA to improve the performance of the PhaGDis in this area. This recommendation also brings to light the need for the government to consider the

role and relevance of maintaining all the district pharmacies in a future system design. [Prevailing priority]

- As the country plans for supply chain reforms, it is important to consider decoupling supply chain functions and pharmaceutical practice regulations of the DPLMT. This could mean a separate entity for the management of the health sector supply chain sector while the DPLMT focuses on regulating the pharmaceutical sector. [Time-order priorities]

Human Resources

- Leverage the development of the supply strategic plan for 2023-2027 to clearly outline the GOM's vision and strategies for supply chain human resource development. [Prevailing priority]
- Develop and integrate supply chain-specific functions into the job descriptions for staff performing supply chain roles, particularly at the peripheral levels. [Prevailing priority]
- Conduct a supply chain human resource assessment to form the basis for the definition of staff norms for supply chain staff in health facilities. [Prevailing priority]
- Develop a national supply chain human resource capacity development plan to guide capacity development planning for all levels of the supply chain. [Prevailing priority]

Financial sustainability

- Leverage the results of the 2022 TCA and its roadmap as critical levers for improving financial sustainability as the country plans the development of a comprehensive strategy for the health sector supply chain. The NSCA team endorses the options proposed in the TCA roadmap as necessary requirements for achieving financial sustainability and would like to encourage the MINSANP and DPLMT to prioritize the implementation of the options proposed [Time-order priorities]..
- Audit the financial viability of the PhaGDis and health facilities to determine their impact on health commodity cost-recovery funds. [Prevailing priority]
- Address funding shortages that affect adequate supply in the system. [Prevailing priority]
- Ensure that facilities across the supply chain and in all geographical locations receive guidance and support to implement basic financial management best practices universally. [Prevailing priority]
- Explicitly include supply chain costs in all budgets to ensure adequate consideration and funding and facilitate financial tracking and monitoring of these activities. [Prevailing priority]

Forecasting and Supply Planning

- Develop national quantification guidelines to standardize FASP and clarify roles and responsibilities. [Prevailing priority]
- Consider the creation of a strong national quantification technical unit within the DPLMT to lead the process of quantification so the role of the vertical program is more towards defining program priorities. [Prevailing priority]
- Institutionalize the monitoring and reporting of forecast accuracy and properly define the data sources for measuring FASP KPIs. [Prevailing priority]
- Developed a structured approach to strengthening in-country capacity for FASP activities within the framework of supply chain HR capacity development. [Prevailing priority]

Procurement

- Deploy procurement and contract management systems to increase process transparency. This is necessary for enhancing data access and overall process transparency. [Prevailing priority]
- The role of the DPLMT in the procurement process should be revised and updated so that it is an active participant in the procurement process and its oversight function should include active performance monitoring. [Prevailing priority]
- Develop and disseminate standard procedures to guide procurement activities at the referral and specialized health facilities that may need to occasionally conduct localized procurement. [Low-cost/high-yield]

Warehousing and Storage

- Invest in strengthening the logistics management of capabilities at last-mile facilities, especially at the CSBs and district hospitals. It is not enough to have in place the SOPs manual for logistics management, there must be a clear plan for dissemination, training, and use by supply chain actors at the last mile. [Low-cost/high-yield]

- In addition to the NSCA, it will be important to conduct a warehouse capacity and optimization study in Madagascar to understand the state of storage infrastructure and determine options for warehousing and storage of commodities. [Prevailing priority]

- Put in place a plan to further integrate the storage capacity and capabilities available at the PhaGDis and district health offices. For example, cold storage equipment at the district should be considered as part of the equipment of the PhaGDis so that the district health office focuses on service delivery more than inventory management. [Low-cost/high-yield]

- Continue to provide capacity building around inventory management for last-mile facilities. Strong quality logistics data starts with the stock card yet many facilities continue to have inaccurate records. [Low-cost/high-yield]

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Distribution

- Revisit the recommendations of the 2015 study of the supply chain network and cost analysis of health products to select an optimum distribution model to the last mile. [Low-cost/high-yield]

- Consider the long-term viability of all the district Pharmacies in the context of last-mile delivery – as optimizing the capacities of all 115 for last-mile delivery will be a herculean task if the chosen option involves each of the district pharmacies. [Prevailing priority]

- Leverage the demonstrated capacity of SALAMA to further harmonize distribution to minimize the use of parallel networks by partners. [Low-cost/high-yield]

LMIS

- The Madagascar SOPs manual for logistics management 2022, has an elaborate section on LMIS (electronic and paper-based), however, the SDPs appear not to be aware of the presence of these tools and job aids. This means there must be a plan to train and promote the use of these job aids and tools to address gaps in the operations of the LMIS in the country. [Low-cost/high-yield]

- In the transition to the use of electronic LMIS, it is apparent the country must adopt a phased approach where hospitals and the PhaGDis are fully transitioned before the CSBs. Currently, the CSBs rely on paper-based LMIS and will require a greater effort to transition to eLMIS. Transitioning to eLMIS should also be costed in terms of equipment needs and internet access. [Prevailing priority]

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

- Ensure that all facilities have at least one person on staff with LMIS duties as a formal part of their job responsibilities. Staff cannot be expected to work on tasks they are not responsible for. Simultaneously, ensure that infrastructure and adequate staffing are present within facilities nationwide to allow for LMIS duties to be completed in a satisfactory manner. [Prevailing priority]

- Reinvigorate the processes for internal and external data quality assessments. A renewed focus on LMIS accuracy is needed, as the absence of fully functioning LMIS has placed minimal focus on data quality in the value chain. [Prevailing priority]

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

Quality and Pharmacovigilance

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

Waste management

- Revise waste disposal standard operation procedure to provide guidelines to actualize the objectives of national policy for the management of medical waste and the security of injections. [Prevailing priority]

- Ensure that policies and procedures for waste management, are fully disseminated to all facilities across the country. [Low-cost/high-yield]

- Reinforce the distribution of policies and practices with training and oversight. Facility staff will need supportive supervision to ensure that they are conducting waste management activities correctly. [Low-cost/high-yield]

- Standardize the process for documenting and communicating waste disposal events to district and central-level authorities for all facilities and ensure facilities understand how to adhere to them. [Low-cost/high-yield]

Conclusions

The 2022 NSCA in Madagascar documented the presence of existing capabilities and levels of performance across technical areas applicable at each level of the supply chain. The mixture of strengths and weaknesses points to a set of priorities for the Ministry of Public Health and the Government of Madagascar to consider as inputs for the development of a 5-year country supply chain strategic plan for the period 2023-2028 plan. In the absence of a country supply chain strategy that outlines the challenges, priorities, and proposed interventions over a defined period, it is difficult to track progress and identify areas for improvement from a historical perspective.

The DPLMT is the oversight body for the country's public supply chain system. Its mandate covers pharmaceutical and traditional medicine practices, but it does not cover the autonomous central purchasing agency which is responsible for the procurement and supply of essential medicines for the health system. The results of NSCA depict the presence of stronger system capabilities in SALAMA in comparison to the DPLMT. However, the core strengths observed in SALAMA appear to be confined within the agency as there is an apparent absence of a direct supervisory relationship between SALAMA and the lower levels of the supply chain. This weakness in the supervisory relationship between the central and district levels is also observed between the district pharmacies and pharmacy units in the district hospitals and CSBs. Whereas this has been a lasting feature of the Madagascar supply chain, learnings from other developing countries favor the creation of a central supply chain agency that directs supply policy from the central to peripheral levels. This type of administrative body centralizes supply chain competencies and delineates lines of authority and responsibility within a common framework. In the Madagascar scenario, this option could imply the decoupling of the supply chain functions from the DPLMT, so it is managed by a separate entity.

The NSCA also examined the various supply chain functions performed within the confines of the vertical public health programs and concludes these activities should rather find expression in the roles and responsibilities of a central supply chain body. This is because the vertical programs perform these functions at sub-optimal levels, so centralization within a single entity will likely optimize their individual outputs. Beyond the restructuring required at the central level, is important to redefine the role of district pharmacies within the context of an optimized supply chain system. If the decision is taken to implement direct delivery of commodities to service points, then the role of the district pharmacies as a strong transit point for health commodities ought to be re-examined. Parallel to this issue, the storage of some commodities within the set-up of the regional and district health administration creates multiple nodes in the supply chain that must be the subject of a system re-organization. In terms of distribution, the NSCA team proposes that country stakeholders revisit the recommendation in previous network optimization studies to determine a favorable option for the country.

Another key observation of the NSCA is the discrepancies observed in the availability of SOPs, guidelines, tools, and other resources at the various levels of the supply chain. Whereas many more policies and guidelines may need to be developed or updated to reflect the exigencies of the times. It is important to intensify efforts at ensuring that those available are deployed and used at all levels of the supply chain. This also means a clear plan must be developed to equip the human resources within the supply chain to take advantage of these resources.

With respect to warehousing and storage , maturity capacity scores for all entities assessed in respect of warehousing storage were below the desirable NSCA score of 80 percent. Whereas the NSCA assesses the capability and maturity of warehouses and storage capacity, a comprehensive warehouse

assessment of the Madagascar supply chain will complement the findings of the NSCA. As a warehouse assessment will go beyond the findings of the NSCA to look at the state of infrastructure and its capacity to handle inventory.

In addition to the issues raised above, the analysis has highlighted findings below for consideration of the MINSANP and the DPLMT:

Strategic planning and direction: A major future of the Madagascar supply chain is the absence of a national-level supply chain-specific strategic plan which defines the vision, mission, and objective of the supply chain within the context of the national health system. SALAMA does have a strategic plan for its operations but even this should be derived from a country-level plan which gives direction and sets the agenda for other entities. A strategic plan is important because identifies priorities and proposes interventions for their achievement within a defined time

Refining Country Leadership for Supply Chain Activities. The understanding of the NSCA team is that the DPLMT has functions beyond the health supply chain including pharmaceuticals management and traditional medicine practice. So, it is important within the context of redefining the role of the role supply chain in health service to strongly consider the separation of supply chain functions from the DPLMT, so that it focuses on the practice of pharmaceutical and traditional medicine, for a separate entity to lead supply chain activities such as quantification, procurement, logistics information management, waste management, and other supply chain functions.

Strengthening Relationships: The results of the NSCA showed that SALAMA performed strongly in most of the technical areas in comparison to other entities in the supply chain. Although this is a phenomenon that is commonly observed in most public health supply chain systems, there is little evidence that capabilities within SALAMA are leveraged by other entities within the supply chain. SALAMA as an autonomous agency does not have direct supervisory responsibility for the entities in the public supply chain. So, it is important to initiate steps that will ensure the best practices within SALAMA benefit other entities in the supply chain.

Centralizing Forecasting and Supply Planning: The NSCA team recognized the dispersion of forecasting and supply planning functions amongst the individual vertical programs with none of them exhibiting optimal capability or maturity. It is therefore plausible that centralizing this activity and others with a single supply chain technical unit while the vertical programs focus on defining program priorities.

Procurement and Customs Clearance: This is one of the areas where maturity capability scores were quite low for both the DPLMT and SALAMA. Hence, it is important to review procurement procedures and systems for greater visibility and transparency. It is also important to ensure procurement committees are functional, contract management systems are in place and performance monitoring is institutionalized.

Performance Monitoring: The SoPs for logistics management 2022 selected some indicators to track supply chain performance, however, these do not cover all supply chain functions. Generally, the NSCA showed that most entities did not actively monitor the performance of supply operations and calculation of performance indicators was mostly absent. Hence, there is a need to re-position performance monitoring as a key component of supply chain and logistics management function, so that performance indicators are actively monitored, and the results used for decision-making.

Downstream Distribution: There is an integrated distribution for most commodities from SALAMA to the district levels and referral hospitals. However, there is no direct delivery to the over 2300 health centers and hospitals that receive commodities from the district pharmacies. This situation should give way to a more organized and structured distribution system beyond the district levels to relieve facilities from the burden and risk of transporting health commodities and their facilities. In selecting an option for a structured distribution from the district pharmacies to lower levels, the role played by all 115 district pharmacies must be assessed, so that efficient and optimal options are selected

Develop, Update and Disseminate Resources: There is a need to develop new policies and procedures for supply chain activities, update existing ones and ensure proper dissemination to required levels of the supply chain. For instance, there is a need to develop guidelines for national quantification and procurement of health commodities and update manuals for supply chain quality assurance and the destruction and disposal of expired and damaged commodities. However, whether new manuals are developed, or old ones revised it is important that these documents are disseminated to required users so that they have an impact on the performance of supply chain tasks.

The authors of this report are confident that with empowered leadership, strategic targeting of supply chain weaknesses, and a commitment to equity within the health system, Madagascar can implement appropriate reforms to further strengthen the supply chain to help realize the vision of a Malagasy population in perfect health contributing to the development of a modern and prosperous nation.