USAID GLOBAL HEALTH SUPPLY CHAIN PROGRAM
Procurement and Supply Management

ZAMBIA NATIONAL SUPPLY CHAIN ASSESSMENT REPORT

Capability, Maturity, and Performance Assessment

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Acronyms

3PL	third-party logistics
ADR	adverse drug reaction
AL	artemether-lumefantrine
BCG	Bacille Calmette-Guéri
CHAI	Clinton Health Access Initiative
CHAZ	Churches Health Association of Zambia
CMM	Capability Maturity Model
CoCs	combined oral contraceptives
COVID-19	coronavirus 2019
CP	cooperating partner
DHO	district health office
DTG	dolutegravir
DQA	data quality assessment
EDTA K2	ethylenediaminetetraacetic acid
eLMIS	electronic logistics management information system
EPI	Expanded Programme on Immunization
FASP	forecasting and supply planning
GHSC-PSM	Global Health Supply Chain Program-Procurement and Supply Management
GPS	Global Positioning System
GRZ	Government of the Republic of Zambia
HDI	Human Development Index
HFS	Health Financing Strategy
HR	human resources
HSSCS	Health Sector Supply Chain Strategy
ISO	International Organization for Standardization
IU	international unit
KPI	key performance indicator
LMIS	logistics management information system
M&E	monitoring and evaluation
MMSF	Medicine and Medical Supplies Fund
MNCH	maternal, newborn, and child health
MOH	Ministry of Health
MP	Member of Parliament
N/A	Not applicable
NDQCL	National Drug Quality Control Laboratory
NEML	National Essential Medicines List
NHRHSP	National Human Resource for Health Strategic Plan
NHSP	National Health Strategic Plan
NPVU	National Pharmacovigilance Unit
NSCA	National Supply Chain Assessment
PASCO	Program for Advancing Supply Chain Outcomes

PHO	provincial health office
POD	proof of delivery
PPP	public-private partnership
PV	pharmacovigilance
QA	quality assurance
RDT	rapid diagnostic test
RHZE	rifampicin–isoniazid–pyrazinamide–ethambutol
RPR	rapid plasma reagent
RTK	rapid test kit
SATP	stocked according to plan
SOA	state of the art
SOP	standard operating procedure
SOW	scope of work
STGs	Standard Treatment Guidelines
SWOT	Strength, Weakness, Opportunities, and Threats
TB	tuberculosis
TLD	tenofovir/lamivudine/dolutegravir
UHC	Universal Health Coverage
UNFPA	United Nations Population Fund
USAID	United States Agency for International Development
WHO	World Health Organization
WMS	warehouse management system
ZAMMSA	Zambia Medicines and Medicines Medical Supplies Agency
ZAMRA	Zambia Medicines Regulatory Authority

Executive Summary

The Ministry of Health (MOH), National Supply Chain Assessment (NSCA) Technical Committee, United States Agency for International Development (USAID), and USAID Global Health Supply Chain Program-Procurement and Supply Management (GHSC-PSM) project conducted fieldwork in Zambia for the NSCA 2.0 from January 22 to February 24, 2024. The NSCA measures supply chain functions' capability, functionality, and performance at all desired levels of a national health supply chain system. The assessment toolkit collects information through three primary methods: 1) a supply chain system mapping exercise, 2) the Capability Maturity Model (CMM) questionnaire, and 3) 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
Financial Management and Sustainability
Forecasting and Supply Planning
Procurement and Customs Clearance
Warehousing and Storage
Distribution
Logistics Management Information System
Quality and Pharmacovigilance
Waste Management

The primary purpose of this supply chain maturity assessment in Zambia is to provide comprehensive evidence and information about the state of the public health supply chain. Based on the findings, the Government of the Republic of Zambia (GRZ) can revisit and refine strategic priorities and operational plans in collaboration with key supply chain stakeholders. It can also 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. Specifically, the NSCA is expected to:

- Analyze and measure the performance and operational capacity of Zambia's public-sector pharmaceuticals product supply chain in coordination with all stakeholders.
- Identify the gaps in supply chain performance that enable development of hypothesis on root causes for the observed performance gaps and opportunities for future coordination for system strengthening efforts by stakeholders.
- Provide an updated map of the product and information flow within the public health supply chain and assess GRZ's progress to date in implementing the country's supply chain strategic plans.

The NSCA focused on those parts of the Zambian health supply chain directly financed or managed by the GRZ and those that are funded or managed by the Churches Health Association of Zambia (CHAZ). The assessment team collected capability and performance at the MOH and central-level supply chain entities, such as Zambia Medicines and Medical Supplies Agency (ZAMMSA) central warehouse, the CHAZ central warehouse, the Expanded Program on Immunization (EPI) warehouse for the storage of vaccine in Lusaka, and the Zambia Medicines Regulatory Authority (ZAMRA) for aspects of the assessment related to pharmaceutical quality assurance, pharmacovigilance, and waste

management. At the sub-national level, the regional hubs and service delivery entities (health posts, health centers, level 1 hospitals, and level 2 and 3 hospitals) were assessed. 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; however, for health posts, the sampling was conducted at a margin of error of +/–15 percent, and confidence level of 85 percent to make optimal use of available resources. In summary, the team assessed 205 sites consisting of 62 health posts, 93 health centers, 28 level 1 hospitals, 10 level 2 and 3 hospitals, seven regional hubs, and the five central-level entities cited above.

Before presenting the findings and recommendations of the NSCA, it is important to clarify its methodology. The NSCA focuses on assessing system capabilities, procedures, and functions within the supply chain and measures specific performance indicators to determine the current state of the supply chain. This approach provides a cross-sectional analysis of the system's maturity and performance rather than a trend analysis or impact evaluation of specific interventions. It is not a measure of return on investment or a predictor of organizational behavior, which can still be negative even though the required systems and processes may be in place. Additionally, the NSCA is not an audit, fraud detection exercise, or a predictor of corruption. Its primary purpose is to establish the state of the supply chain, identify performance gaps, and recommend targeted actions for prioritizing future investments and improvements.

At the time the NSCA was implemented in February 2024, the Health Sector Supply Chain Strategic Plan (HSSCS) 2019–2021 lapsed, and the GRZ and MOH were in the process of finalizing the development of a new strategy for 2023–2026. However, since the HSSCS 2023–2026 was pending approval, the assessment relied on the 2019–2021 strategy while referring to the draft strategy as and when required. Consequently, the assessment team strongly recommends immediate approval of the 2023–2026 strategy to resolve the strategic planning vacuum created, establish priorities for the supply chain, and provide a framework to guide required investments. The team also recommends extending the tenure of the future supply chain strategy to five years instead of the current three years to provide enough time for other actors in the supply chain to align with MOH priorities within the implementation period of the HSSCS.

While resolving current gaps in the strategic direction of the supply chain, strengthening the governance structure for the supply chain at the MOH is crucial. The MOH must pursue the full establishment of the supply chain control tower to strengthen technical and operational leadership for the supply chain system. It should also consider establishing a supply chain directorate at the MOH to provide oversight for the supply chain independent of other directorates. Given the potential impact of technological advancements and emerging dynamics such as artificial intelligence and machine learning on supply chains, the need is urgent to build strong supply chain capacity and operational competencies within the MOH to respond to future needs. Supply chain functions should not be treated as auxiliary functions, particularly at the central level and in large health institutions; they must receive special attention and investment as a critical component of the health delivery system. At the peripheral levels, where supply chain functions are likely performed by other health professionals, such roles need to be clearly stated in job descriptions so that specific individuals can be held responsible.

While the GRZ has been making significant investments in the supply chain by providing funding for the purchase and distribution of medicine to Zambians through ZAMMSA, donors have also played a significant role in funding and supporting key areas in the supply chain. Donors fund the purchase of health commodities and support distributions, development of the electronic logistics management information system (eLMIS), and many infrastructure investments. With the potential decline in donor funds, conversations are needed on how the country prepares for the necessary incremental investments in the supply chain. In this light, the success in implementing the National Health Insurance Scheme presents an opportunity for the GRZ to consider implementing cost recovery in the health sector, even if this will be initially restricted to referral health facilities.

The electronic LMIS (eLMIS) is an asset to the Zambian public health supply chain system, with almost 100 percent coverage for all health facilities through the facility and central editions of the system. The eLMIS presents a great opportunity for active tracking and use of data to drive supply chain performance. Issues related to stockouts, stocking according to plan, data accuracy, and order processing can be resolved if data from the eLMIS drive decision making. Therefore, the MOH needs to lead the development of a monitoring and evaluation framework for the supply chain. The framework should determine key performance indicators to be tracked at each level of the supply chain, with some accessible to facilities after each reporting cycle. Personnel in charge of supply chain functions at each system level must understand their performance parameters and be able to make decisions at their operational level to resolve identified challenges. At the central level, there is a need to accelerate the ongoing process to integrate the warehouse management system (WMS) and the eLMIS to enable the system to fully benefit from automating supply chain data management systems.

ZAMMSA and its regional hubs represent a strong nexus in the supply chain and should be leveraged to optimize outcomes such as improved product availability and increased access to quality affordable medicine at all public health facilities. Deploying an end-to-end WMS and using modern technology and logistics tools to drive operations demonstrates the high level of investment the government and cooperating partners have made in recent years. However, operations at ZAMMSA are on a large scale and involve multiple levels of complex activities that cannot be encompassed within a single assessment or any other ad hoc monitoring events. Therefore, benchmarking the operations of ZAMMSA with international standards such as International Organization for Standardization (ISO) 9002 is necessary for continuous improvement and maintenance of standards. The regional hubs are important nodes in the supply chain, and their operations should be expanded as a deliberate strategy to minimize centralization at ZAMMSA and decrease the risk of holding most of the country's stock at ZAMMSA. For a large country like Zambia, it is appropriate to replicate the operations of ZAMMSA at two or more locations. A deliberate push is needed to prioritize decentralization of supply chain operations, including the phased transformation of ZAMMSA from fine-picking to bulk supply-only so that the hubs assume this responsibility.

At the peripheral levels, supply chain capacity and maturity decline from level 2 and 3 hospitals to health posts. Level 1 hospitals perform better than health centers, and health centers outperform health posts. Supply chain duties at health centers and health posts are performed mostly by co-opted staff burdened with other roles. So, leveraging existing opportunities within the supply chain, such as supportive supervision, on-the-job training, and pre-service training, is key to continuously improving capacity and providing the skills required to perform these functions.

To assist the country in prioritizing supply chain interventions and reforms, the recommendations below have been selected for focus, as they are critical for improving the country's supply chain. Rather than being a finalized list, they should serve as a guide—and a stimulus for a critical and inclusive exercise of prioritization by the GRZ, MOH, and partners. To ensure that workstreams stay on track for implementing supply chain priorities, the NSCA team recommends prioritizing the following steps in addition to the areas highlighted above:

- For the MOH and GRZ, work to strengthen supply chain governance at the central level by making the MOH supply chain control tower functional to enhance coordination, data visibility, analytics, and accountability.

- For the MOH and ZAMMSA, intensify efforts to standardize operations of the central-level warehouse, particularly at ZAMMSA, by achieving ISO certification. Similarly, the MOH and partners should prioritize support for ZAMRA to accelerate processes toward its attainment of World Health Organization prequalification.

- For the MOH and GRZ, prioritize implementation of the Heath Financing Strategy (HSF) 2017–2027 with emphasis on providing incremental funding for procuring health commodities through the Medicine and Medical Supplies Fund to reduce reliance on donors.

- For the MOH and ZAMMSA, work to improve procurement transparency through enhanced process documentation, centralization, and application of key performance indicators to track performance. This should

include process digitalization to reduce manual processes and facilitate access to documents and data for performance tracking.

- For the MOH and ZAMRA, prioritize implementing a product security and serialization strategy as a comprehensive approach for product quality assurance.
- For the MoH, ensure the dissemination of policies, guidelines, and tools that are developed centrally for the supply chain to end-user levels. Where specific guidelines and tools are unavailable, such as health sector-specific waste management guidelines for the supply chain, their development should be prioritized.

- For the MOH to fully understand the various supply chain human resource gaps in the health sector and determine the extent of resources required to achieve optimal outcomes, implement human resources for supply chain assessment for the health sector in Zambia.
- For the GRZ and MOH, invest in infrastructure and capabilities at last-mile facilities to enhance storage conditions and physical security of health commodities. Most Zambians access health services at this level, especially in rural areas. These facilities need to be properly equipped to ensure quality medicines are available when needed.

- For ZAMMSA and CHAZ, strongly consider deploying a distribution/transport management system to manage and automate the distribution system and ensure the consistent capture of transportation-related data for performance tracking.
- For the GRZ and MoH, make incremental investments or partner with the private sector to enhance and modernize waste disposal capacity. This includes implementing waste segregation before disposal and promoting recycling where feasible.

Overall, this assessment found widespread capabilities across the 11 supply chain functional areas assessed. It presents the GRZ and MOH with a detailed and updated understanding of Zambia's public health supply chain so that they can prioritize investments for improvement. The assessment team is confident that with empowered leadership, strategic targeting of supply chain weaknesses, and a commitment to equity within the health system, Zambia can implement appropriate reforms to further strengthen the supply chain and realize the country's vision of high-quality health care for the population.

Background

Zambia's Public Health Context

Zambia's public health context as of 2024 is shaped by many factors, including but not limited to infrastructure, disease burdens such as malaria and HIV/AIDS, and public health initiatives. Although achieving lower-middle-income country status in 2011, Zambia still faces challenges related to poverty and inequality, with 60 percent of the population living in poverty, a number that has grown from 54 percent in 2015. The economy relies heavily on unstable mining exports and has faced debt restructuring and disease outbreaks, such as the coronavirus disease 2019 (COVID-19) pandemic and the cholera outbreak of 2024. Located in Southern Africa, Zambia is bordered by the Democratic Republic of the Congo in the north. Tanzania lies to the northeast, while Malawi is in the east. In the southeast is Mozambique, followed by Zimbabwe and Botswana to the south. Namibia borders Zamia to the southwest and Angola to the west.

The disease burden in Zambia is led by malaria, which remains a significant health concern, especially in rural areas. Many control programs have been implemented, including the distribution of insecticide-treated bed nets and mosquito spraying. HIV/AIDS also poses an issue in the country, but despite the high burden, Zambia has made considerable progress in prevention efforts, treatment, and de-stigmatization. Tuberculosis (TB) also poses a serious health threat, and the government is working alongside partners such as the World Health Organization (WHO) to enhance TB detection and treatment.

In 2021, Zambia scored 0.565 points to rank 153 out of 191 countries on the United Nations Human Development Index (HDI). This score represents a growth of over 36 percent in the HDI over the past three decades (1990 to 2021). Zambia's population density varies region by region, with higher densities found in cities and urban areas. On average, the population density is 24 people per square kilometer, according to the World Bank. The total land area of the country is 752,618 square kilometers, consisting mostly of hills and mountains, with the lowest point in the country being the Zambezi River. Zambia is the 63rd largest country in the world and the 17th largest in Africa. Its population reached over 20 million people as of July 2023, with an annual population growth of 2.7 percent a year and an average life expectancy of 62 years. A total of 46 percent of Zambia's residents are under the age of 15.

The distribution of health facilities mirrors the pattern of population density, with more and more capable facilities generally found in urban areas. However, the country has made efforts to address these imbalances through community health worker programs in rural areas and outreach services. Zambia has a network of health facilities ranging from health posts to hospitals, managed under the Ministry of Health (MOH).

The Zambian government has launched many public health campaigns to address maternal and child health, vaccination, sanitation, and other areas of interest. Often, these initiatives are not undertaken by the government alone but are implemented alongside partnerships with international and nongovernmental organizations. Collaboration among these actors is vital to the public health sector in Zambia. Together, the MOH, the Zambia Medicines and Medical Supplies Agency (ZAMMSA), the Churches Health Association of Zambia (CHAZ), the Zambia Medicines Regulatory Authority (ZAMRA), and external donors like USAID and the Global Fund play key roles in policy coordination, strategic planning, procurement and distribution of medicines, quality assurance (QA), capacity building, and data sharing. ZAMMSA especially is a key player, being the central medical stores for the country, and is crucial in ensuring the availability of essential medicines across the country, including handling procurement, storage, and distribution.

In summary, Zambia's public health context is characterized by a network of health facilities and health workers, ongoing challenges with infectious diseases, difficulty in providing equitable and easy access to

health care for all citizens, and extensive collaboration among the MOH and its partners. The health system in Zambia still requires adequate infrastructure, human resources, and equipment to provide efficient services and meet the health needs of the population.

Actors and Organization of the Zambian Health System

Zambia's health system is a pyramid of three main levels: 1) central, 2) intermediate, and 3) community. Several streams of commodities run parallel, including the mainstream, the vaccine stream, and the tuberculosis stream. The central level includes the MOH, ZAMMSA, ZAMRA, development partners for funding and strategic planning, CHAZ, and the Expanded Program on Immunization (EPI) warehouse (for vaccines). At the intermediate level, provincial health offices (PHOs) and district health offices (DHOs) undertake much of the detailed planning for their respective jurisdictions. The regional hubs serve as branches to the central medical stores at ZAMMSA and are expected to provide the peripheral facilities with closer access to medicine and medical supplies. At the service delivery level, hospitals, health facilities, health posts, and community health workers provide patient services. For more information about the flow of information and commodities, see the supply chain maps in Exhibits 8 and 9. The health center, health post, or hospital, the gateway to the health care network, offers the primary health care package. According to available data, Zambia has 2,062 health centers, 1,500 health posts, and 222 hospitals (including 165 level 1 hospitals, the more basic hospitals, and 57 level 2 and 3 hospitals, which have more advanced capabilities and are often called referral hospitals).[1]

The health workforce in Zambia remains a major concern in terms of the number of staff, their skill set, and equitable distribution of staff. The Ministry has emphasized the need to ensure the availability of an adequate, competent, and well-distributed health workforce across the country. According to the 2020 WHO report, the Zambia doctor-to-patient ratio was 1 to 12,000, compared to the ideal doctor-patient ratio of 1 to 5,000. Further, the report revealed the nurse-to-patient ratio was 1 to 14,960, compared to the ideal of 1 to 700. The clear implication is that despite efforts to attain the WHO health worker-to-patient ratio, the recruitment of competent and adequate health staff needs to continue and be scaled up. The MOH recognizes this disparity and has made it a focus in the current 2022–2026 National Health Strategic Plan toward attaining quality universal health coverage through decentralization, with the hope that decentralizing medicine procurement, distribution, and health care can lead to more coverage in the country overall.[2]

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[1] Zambia Health Information Management System Data 2024
[2] National Health Strategic Plan 2022–2026

Zambia Public Health Supply Chain Priorities

As a fundamental component of the overall health system, an effective and efficient public health supply chain ensures that quality-assured medicines and medical supplies are available when and where they are needed and in the right quantities to meet the population's health needs effectively. Zambia considers the pharmaceutical sector and the public health supply system key components of the health system that are critical to achieving its objectives. So, the country has developed and implemented laws, policies, and guidelines to regulate the sector.

Two main documents lay out the health priorities of Zambia, with many one-off policies (such as the decision to close schools during the cholera outbreak of 2024) that continue to support public health across the country. Each stakeholder organization also has a strategic plan that is, in theory, aligned with these primary documents, the 1) Health Sector Supply Chain Strategy and Implementation Plan 2019–2021 and 2) 2022–2026 National Health Strategic Plan (NHSP).

The Health Sector Supply Chain Strategy and Implementation Plan 2019–2021 is the current strategic plan in circulation. This document focuses on ensuring "equitable access to medicines, vaccines and medical supplies for all Zambian citizens," focusing on four major areas: 1) forecasting and procurement, 2) storage and distribution, 3) strategic data, and 4) financing (page 8 of the plan). Through this plan, the hubs were created as an extension of ZAMMSA for optimized distribution and new last-mile delivery vehicles, strategies were created and procured, and data were used strategically at a macro level for forecasting and on a micro level at each SDP to track consumption and stock data.

The 2022–2026 NHSP creates a vision of a country where no people are excluded from the health system to establish "healthy and productive people." The plan focuses on improved health outcomes leading to improved socioeconomic outcomes and, in turn, supports the government's initiative to increase the country's status beyond lower-middle income. The national health priorities focus on strengthening prevention and primary health care, improving maternal, neonatal, child, and adolescent health and nutrition, controlling communicable diseases such as malaria, HIV/AIDS, and sexually transmitted infections, and preventing non-communicable diseases. They also aim to enhance integrated health support systems, guided by key values such as safety, quality, equity, access, affordability, efficiency, effectiveness, transparency, accountability, participation, partnerships, decentralization, and good governance.[3]

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[3] National Health Strategic Plan 2022–2026, page 2

Overview of the Supply Chain Assessment Activity

Under the leadership of the National Supply Chain Assessment (NSCA) Technical Committee, USAID and GHSC-PSM provided support for the requisite fieldwork for the NSCA in Zambia from January 22 to February 24, 2024.

The primary purpose of conducting a supply chain maturity assessment in Zambia is to provide comprehensive evidence and information about the state of the public health supply chain. This will inform long-term strategic planning and investments, contributing to Ministry priorities, such as:

- Ensuring a sustainable supply of high-quality medicines
- Enhancing capacity for innovation and research in the pharmaceutical sector
- Strengthening regulatory frameworks for product safety and efficacy
- Promoting local pharmaceutical manufacturing and reducing import dependence
- Developing a skilled workforce and improving pharmaceutical education
- Fostering collaboration among government, industry, and academia
- Ensuring equitable access to medicines for all citizens
- Enhancing the resilience of the pharmaceutical sector to respond to emergencies and crises

The NSCA 2.0 includes three distinct elements. It 1) results in a visual representation of the country's supply chain; 2) measures the overall capability, resources, processes, and functionality of the country's supply chain; and 3) collects site-level data on key performance indicators (KPIs) to measure supply chain performance.

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

The NSCA focused on those parts of the Zambian health supply chain directly financed or directed by the GRZ and those that funded or managed the CHAZ. The assessment team collected capability and performance at the MOH and the central-level supply chain entities such as ZAMMSA, the CHAZ central warehouse, the EPI warehouse for the storage of vaccines, and ZAMRA for pharmaceutical QA, pharmacovigilance (PV), and waste management. The regional hubs and service delivery entities (health posts, health centers, and hospitals) were also assessed.

Donors play a vital role in Zambia's public health system, especially in procurement and distribution of key commodities, and their actions certainly affect the public system. However, donor capabilities or performance are not directly assessed in the NSCA. Similarly, the private health market is an influential actor in Zambia but was outside the scope of this assessment. Future assessments on donor effectiveness and the private health market would be welcome complements to the NSCA.

The following discussion interprets the capability and performance results and translates them into recommendations for future supply chain interventions. The summary of findings and conclusions section highlights key takeaways and suggestions for future analysis. The report annexes in a second volume provide the complete assessment tools and other detailed information.

Methodology

Over a five-month period from September 2023 to January 2024, 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 GRZ, the MOH, the In-Country Technical Committee, USAID, and other in-country partners including the Program for Advancing Supply Chain Outcomes (PASCO), Clinton Health Access Initiative (CHAI), John Snow Health Zambia, UNICEF, and United Nations Population Fund (UNFPA). The team used the NSCA 2.0 toolkit to guide planning, data collection, and analysis. This section describes in greater detail this process and the assessment's methodology.

The National Supply Chain Assessment Toolkit

The NSCA 2.0 is an updated toolkit that measures the capability, functionality, and performance of supply chain functions at all desired levels of a national health supply chain system. It includes three primary assessment elements: 1) supply chain mapping, 2) the Capability Maturity Model (CMM) diagnostic tool, and 3) the KPI assessment tool (see Exhibit 2). It also includes resources for planning and implementing the assessment activity and for analyzing and disseminating findings. 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	This tool assesses capability and processes across functional areas and cross-cutting enablers (e.g., human resources (HR), financial sustainability) using interviews and direct observation.
KPI assessment tool	The KPIs measure supply chain performance in selected functional areas.

Scope of Work

The SOW required the assessment team to comprehensively assess Zambia's public health system across the central, provincial, and service delivery point levels. Specifically, the assessment is expected to:

- Analyze and measure the performance and operation capacity of Zambia's public-sector pharmaceuticals product supply chain in coordination with all stakeholders.
- Identify the gaps in supply chain performance that enable the development of hypotheses on root causes for the observed performance gaps and opportunities for future coordination for system strengthening efforts by stakeholders.

- Provide an updated map of the product and information flow within the public health ecosystem in Zambia.
- Assess GRZ's progress to date in implementing the country's supply chain strategic plans.

The assessment disaggregates data across multiple facility types: health posts, health centers, level 1 hospitals, level 2 and 3 hospitals, and regional hubs. At the central level, the team carried out assessments at the MOH, CHAZ, ZAMMSA, EPI warehouse, and ZAMRA. Exhibit 3 in the following section lists all sites where data were collected in February 2024. The complete SOW is attached in the annex.

The NSCA 2.0 was designed to assess country-level supply chain infrastructure, with disaggregation at the facility-type level. Some facility types (level 2 and 3 hospitals) were lumped together to account for similarities in size and capability and to reduce the overall sample size. In Zambia, the sample frame consisted of all public health facilities across the country, for which the national health database has a census of sites. The sampling frame thus consisted of 1,303 health posts, 1,607 health centers, 201 level 1 hospitals, 57 level 2 and 3 hospitals, and seven regional hubs. The MOH, ZAMMSA, CHAZ, EPI warehouse, and ZAMRA were also assessed for their roles in the supply chain. The sample frame excluded fully private facilities, as this assessment focused on public-sector entities.

The assessment team determined the minimum sample size using the hypergeometric sample-size formula, assuming a margin of error of +/–10 percent and a 90 percent confidence level, as the NSCA 2.0 guidance suggests. However, for health posts, the sampling was conducted at a margin of error of +/–15 percent and a confidence level of 85 percent to make optimal use of available resources. The team used a randomized two-stage process to select the health facilities. 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. The final sample is detailed below, along with the full sample frame (see Exhibit 3). We assessed a total of 205 sites. The full list of selected sites is provided in the annex of the NSCA.

Exhibit 3. NSCA Frame and Selected Sample		
Facility type	Population (sample frame)	Sample size
Health center	1,607	93
Health post	1,303	62
Hub*	7	7
Level 1 hospital	201	28
Level 2 and 3 hospitals	52	10
Central-level entities*	5	5
Total	3,172	205

*Denotes that this facility type was censused

At each selected facility, data collectors completed a CMM survey and collected data on KPIs. In all facilities, they sought to talk with key informants most qualified to speak on given assessment modules or technical areas (e.g., financial sustainability, warehousing and storage, policy and governance). In larger facilities, this often resulted in multiple interviews per site—e.g., with the financial officer, warehouse manager, and head pharmacist. This was especially the case for the central levels, 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 roles in the supply chain and thus answered multiple modules within the assessment.

Team Composition and Training

Central-level and field teams were formed and trained to conduct this assessment. Central-level interviews with MOH, ZAMMSA, CHAZ, EPI, and ZAMRA were led by the GHSC-PSM team. At the sub-central sites, 20 teams consisting of persons from the MOH and its agencies, GHSC-PSM, and partners traveled to 200 sites over 18 days to collect data. Data collectors were selected based on a set of outlined skills and credentials, including a deep understanding of key health care commodities, comfort with diverse supply chain functional areas, experience with large assessments, high levels of professionalism, and ability to operate with significant autonomy. All data collectors participated in an intensive five-day training on the assessment tools, SurveyCTO, tracer commodities, and best practices in survey methods. On the fourth day of training, participants conducted pilot assessments of five health facilities in Lusaka. The pilot served as a practice exercise for data collectors, a low-stakes chance to troubleshoot technology, and a final opportunity to provide targeted feedback to the assessment team to further refine the survey to the country context.

Procedures

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

Subcentral data were collected from February 5 to 23, 2024. On average, teams spent one full day assessing health centers and health posts and one to one and a half days at hospitals and regional hubs, with travel days in between. One team member would lead the CMM survey interviews while the other collected KPI data. If a team member completed their interview early (usually the CMM lead), that person would assist the other team member in completing the task at hand. A team of GHSC-PSM staff collected data from the central-level entities from February 12 to 22, 2024.

The CMM questionnaire measures the level of capability and functionality present in the supply chain across 11 functional areas, including strategic planning and management, policy and governance, human resources, financial sustainability, forecasting and supply planning, procurement and customs clearance, warehousing and storage, distribution, LMIS, quality assurance and pharmacovigilance and waste management. Only relevant modules were assessed at specific sites, depending on their facility level. For example, health facilities were not assessed on their forecasting and supply planning capabilities. Relevance was determined

by consultations with the NSCA technical committee to understand what supply chain functions were expected at different facility types throughout the system.

The survey consists primarily 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 standardized collection of data, 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., pallets, 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 several 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 annex includes a complete list of the facilities assessed and the geographic coverage in a map.

#	Functional modules assessed	Hubs	Level 2 and 3 hospitals	Level 1 hospitals	Health centers	Health posts
Exhibit 4. CMM Functional Area by Level in Zambian Supply Chain System—Noncentral Levels						
1	Strategic Planning and Management	x	x	x	x	x
2	Policy and Governance	✓	✓	✓	✓	✓
3	Human Resources	✓	✓	✓	✓	✓
4	Financial Management and Sustainability	✓	✓	✓	✓	✓
5	Forecasting and Supply Planning (FASP)	x	x	x	x	x
6	Procurement and Customs Clearance	✓	✓	✓	x	x
7	Warehousing and Storage	✓	✓	✓	✓	✓
9	Distribution	✓	x	x	x	x
	LMIS	✓	✓	✓	✓	✓
10	Quality and Pharmacovigilance	✓	✓	✓	✓	✓
11	Waste Management	✓	✓	✓	✓	✓

✓ denotes yes and x denotes no.

Exhibit 5. CMM Functional Area by Level in the Zambia Supply Chain System—Central Level					
Functional modules assessed	MOH	ZAMMSA	CHAZ	EPI warehouse	ZAMRA
Strategic Planning and Management	✓	✓	✓	x	x
Policy and Governance	✓	✓	✓	x	x
Human Resources	✓	✓	✓	x	x
Financial Management and Sustainability	✓	✓	✓	x	x
FASP	x	✓	✓	✓	x
Procurement and Customs Clearance	x	✓	✓	x	x
Warehousing and Storage	x	✓	✓	✓	x
Distribution	x	✓	✓	✓	x
LMIS	x	✓	✓	x	✓
Quality and Pharmacovigilance	x	✓	✓	✓	✓
Waste Management	x	✓	✓	✓	x

✓ denotes yes and x denotes no

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 aligned with international health supply chain management standards. KPIs included stocked according to plan percentages (by tracer), stock card accuracy, stockout rates (by tracer commodities), and temperature excursions. 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 LMIS, 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, state of documentation, and quantity of stock on hand, KPI data collection could be time-consuming, 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	ZAMMSA	CHAZ	Hubs	Level 2 and 3 hospitals	Level 1 hospitals	Health centers	Health posts
1	Stock data	✓	✓	✓	✓	✓	✓	✓
2	Delivery data			✓	✓	✓	✓	✓
3	Human resources	✓	✓	✓	✓	✓	✓	✓
4	Facility reporting rates	✓	✓	x	x	x	x	x
5	Temperature excursions	✓	✓	✓	✓	✓	✓	✓
6	Forecast accuracy	✓	✓	x	x	x	x	x
7	Supply plan accuracy	✓	x	x	x	x	x	x
8	Source of funds data	✓	✓	x	x	x	x	x
9	Prices paid	✓	x	x	x	x	x	x

✓ denotes yes and x denotes no.

Tracer Commodities

In collaboration with the NSCA Technical 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 Zambia public health supply chain, account for unique supply chain challenges (e.g., cold chain transport), are nominally available at the service delivery level, and provide enough information to inform strategic decision making.

Exhibit 7. Tracer Commodities			
Product name	Product dosage	Product category	Product unit
Tenofovir/lamivudine/dolutegravir (TLD) tablet	50/300/300	HIV	Bottle of 90 tablets
Pediatric dolutegravir (DTG)	10mg	HIV	Bottle of 90 tablets
Determine rapid test kits (RTKs)	Not applicable (N/A)	HIV	Kit
Rifampicin-isoniazid-pyrazinamide-ethambutol (RHZE)	(150mg/75mg/400mg/275mg)	TB	Kit
Rapid plasma reagent (RPR) test	N/A	Lab	Kit
Ethylenediaminetetraacetic acid (EDTA K2/K3) blood collection tubes	Tubes	Lab	Tubes
Bacille Calmette-Guéri (BCG) vaccine	Vial	Vaccine	Vial
Malaria rapid diagnostic test (RDT)	Kit	Malaria	Kit
Artemether-lumefantrine (AL) 20/120mg	20/120mg	Malaria	Blister of 24 tablets
Medroxyprogesterone acetate, 150mg injection	150mg	Family Planning	Vial
Levonorgestrel implant 750mcg/rod	750mcg/rod	Family Planning	Pieces
Male condoms	N/A	Family Planning	Pieces
Oxytocin (10 IU injectable)	10 IU	Maternal, newborn, and child health (MNCH)	Ampoule
Amoxicillin dispersible tablets	250mg	MNCH	Tablets
Examination gloves	Medium size	Non-drug Supplies	Pack of 100

Data Management

Each data collector was provided with an individual tablet programmed with SurveyCTO to electronically collect, enter, and upload data. All completed CMM and KPI questionnaires were uploaded daily to the SurveyCTO secure data server. After data upload, a team of four monitoring and evaluation (M&E) specialists from GHSC-PSM reviewed submitted data daily for quality assurance. In cases of data oddities or discrepancies, the specialists followed up directly with the data collection teams (through a Quality Assurance WhatsApp group, 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 identify unexpected issues, which were quickly and systematically addressed. After this daily review and response process, the M&E team accepted validated data 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 the 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.

Limitations

Comparison to NSCA 2017 results

The MOH conducted an NSCA with the support of USAID and Axios International in 2017. At the time, the NSCA 2.0 methodology was in the process of being finalized and codified to disseminate as a toolkit for use in other contexts and settings. Findings from the implementation experience in Zambia were used as inputs for finalizing the toolkit. As a result of changes made to the NSCA 2.0 methodology, after this report was published, variations are found across the CMM and KPI questionnaires from the 2017 version and the final version used during this 2024 implementation. This means that a direct comparison of CMM module scores from the 2017 and 2024 assessments is not strictly appropriate, as the methodologies (number of questions, nature of questions, etc.) varied. To circumvent this issue and analyze the current state of the supply chain in Zambia, the authors of this report used comparisons at the question level rather than the module level. For example, instead of drawing a comparison by saying that level 1 hospitals scored higher on the LMIS module in 2024 than in 2017, the report details more granular comparisons like 80 percent of level 1 hospitals reported using LMIS reports to inform ordering and inventory management, an increase from 50 percent in 2017. This statement is illustrative and does not represent the actual situation in 2017 or 2024 for district hospitals.

Sensitivity to country context

Implementation of this NSCA was sensitive to the country's social and political context, as guided by the in-country technical oversight committee led by the MOH. Major decisions on the scope of implementation and areas of assessment were all approved by the technical committee before tool configuration, assessment, and deployment. Where the technical committee expressed concerns about the potential sensitivity or suitability of specific NSCA questions to the country context, the appropriate adjustments or amendments were made.

Comparison of CMM and KPI scores

The NSCA 2.0 uses a two-stage cluster 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 (hubs, ZAMMSA, CHAZ, EPI warehouse, MOH), 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 that limits the discrimination of small differences of scores because the precision is too low or unknown. In this case, making definitive statements about one score being higher than the other (unless the

scores differ by more than 20 percent) is not appropriate. The underlying questions asked in the CMM are still insightful and will help drive analysis and recommendations.

Summary of Results

Overall, data were collected from 204 sites across all levels of the Zambian public health supply chain system, including:

- Central level (n=1): MOH, ZAMMSA, CHAZ, EPI warehouse, and ZAMRA

- Regional hubs (seven)

- Service delivery points, including health post (n=62), health centers (n=93), level 1 hospitals (n=23), and level 2 and 3 hospitals (n=10)

Some questions and responses were obtained for fewer facilities due to missing data, exclusions through data cleaning, or non-applicable questions.

In this section, we provide a snapshot overview of collected data. The supply chain maps are presented first to establish the flow of products and information through the Zambian public health supply chain system. Next, an overall table of CMM results, followed by select KPIs, synthesizes 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

As a first step, all NSCA 2.0 implementations include 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 January 25, 2024, participants convened for a one-day supply chain mapping workshop in Lusaka, Zambia. They included representatives from the MOH, ZAMMSA, and partners (USAID, USAID GHS-PSM, USAID PASCO, CHAI, and the University of Zambia. (See the report annex for the workshop slides, agenda, and final participant list.)

Participants were organized by their expertise into four working groups based on salient vertical programs, and each team was asked to produce a comprehensive map of commodity and information flows from procurement to service delivery. After the workshop, the assessment team integrated these maps into an illustration of the Zambian public health supply chain with the goal of illuminating bottlenecks, inefficiencies, and opportunities for improvement.

Exhibits 8 and 9 illustrate the organization and elements within the Zambian supply chain as well as the flow of commodities and information through the system. The final versions presented here have been reviewed and endorsed by the supply chain technical working group. These illustrations of commodity and information flow through the Zambian public health supply chain help to highlight key facets and challenges of the current system.

Exhibit 8. Map of Commodity and Information Flow

Public Health Supply Chain in Zambia — Flow of health commodities and information
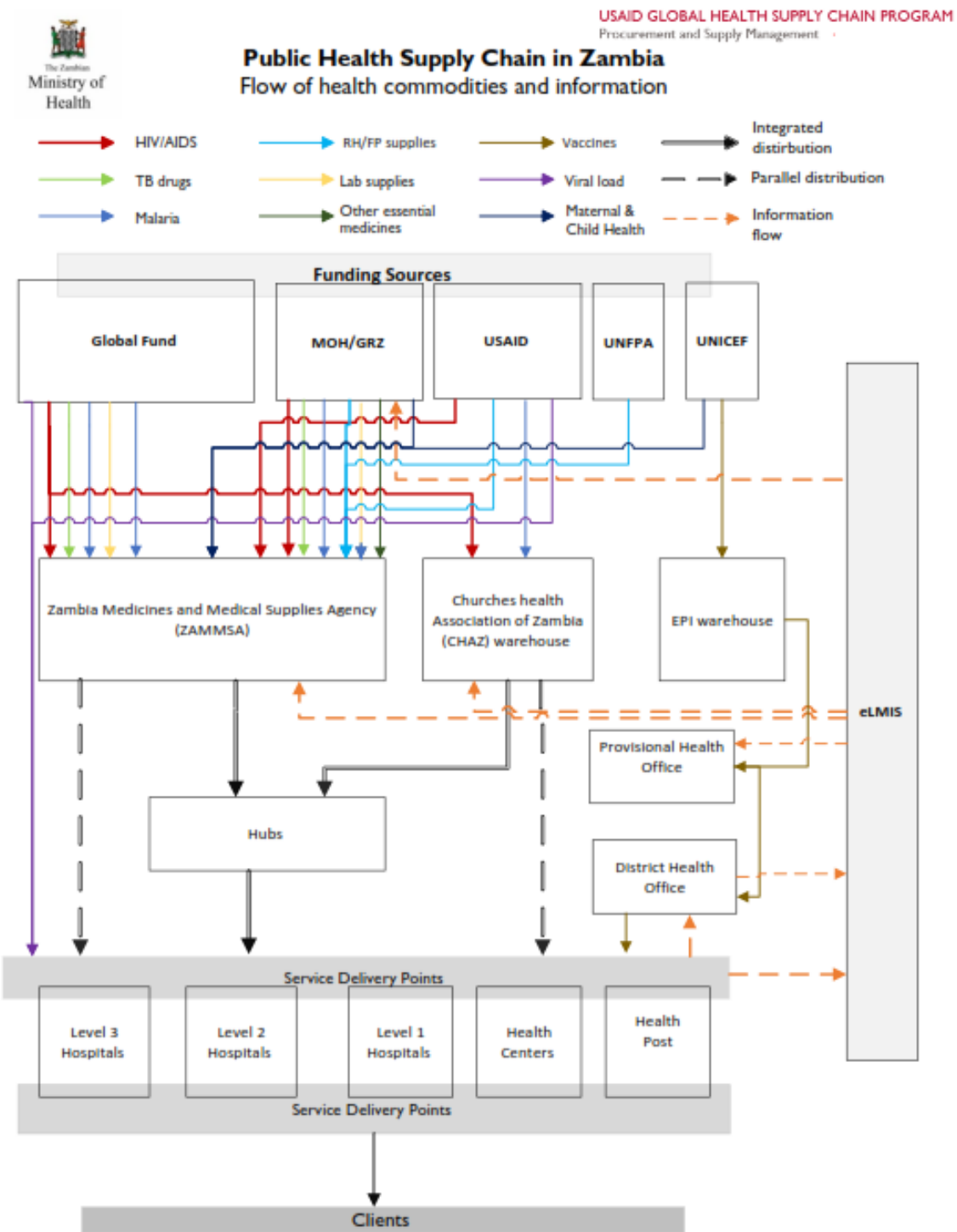
Exhibit 9. Consolidated Map of Commodity and Information Flow

Public Health Supply Chain in Zambia
Flow of health commodities and information
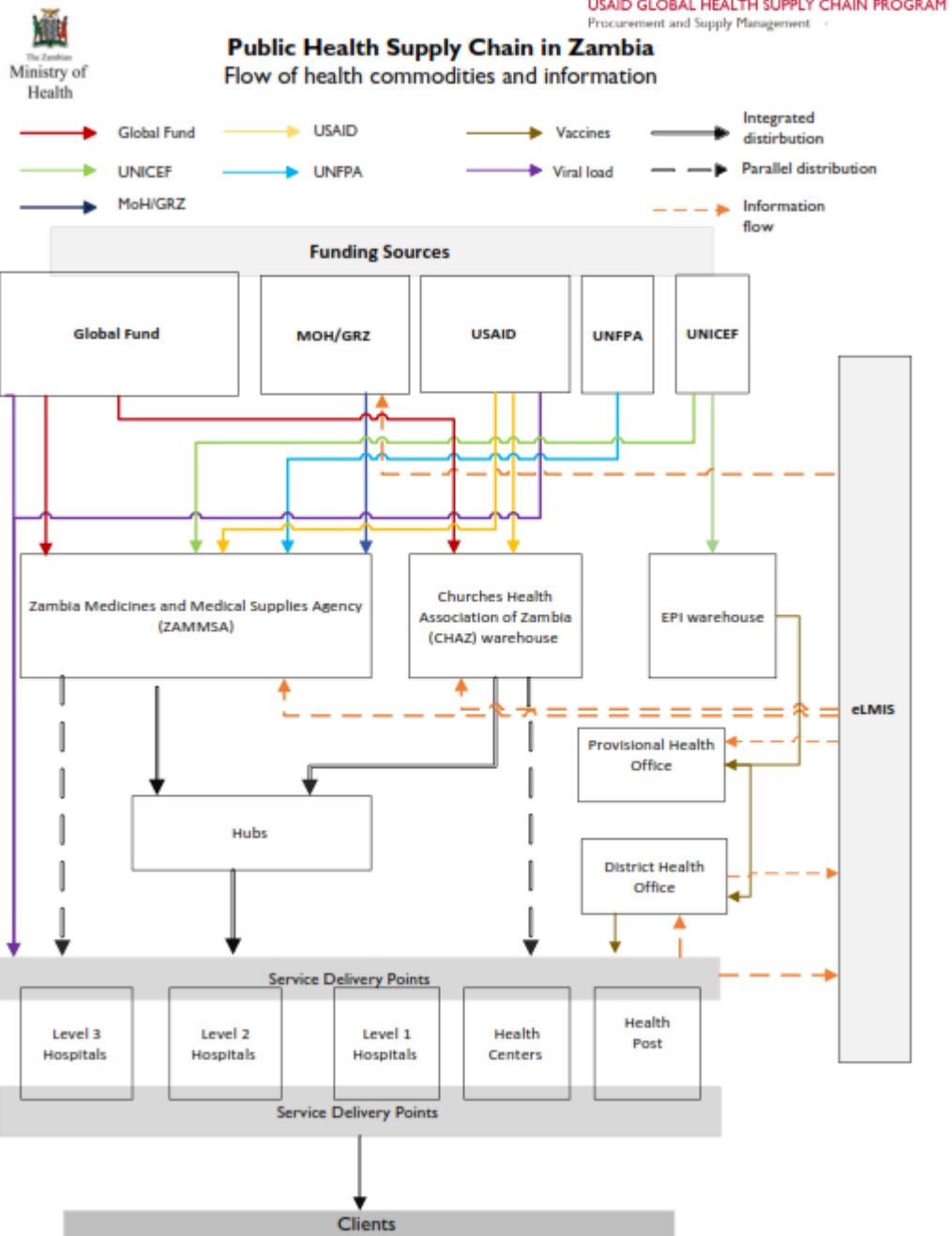
Centralized procurement of health commodities

Procurement of health commodities is primarily centralized, with minimal procurement at the peripheries of the health system. ZAMMSA procures commodities on behalf of the government and distributes some across the value chain to end-users. Donor-funded procurements are consigned to the MOH and ZAMMSA or conducted through CHAZ for downstream distribution. Specialized facilities such as level 2 and 3 hospitals may conduct internal procurement for specialized commodities but rely largely on ZAMMSA to supply health commodities. Centralizing procurements is advantageous because of the economies of scale and quality assurance; however, to guarantee commodity security, reliable and accurate data must be available for quantification and adequate funding made available at the central level.

Multiple distribution channels

The current logistics system design is that commodities are expected to flow from the central-level warehouses through the hubs to the SDPs. However, commodities are sometimes shipped directly from the central level to SDPs or from the central level through the provincial and district offices to health facilities. This situation increases the complexity of understanding the distribution process and complicates performance tracking.

Role of hubs

The hubs are structured as the immediate level of the supply chain, yet they have varied capacities, and their operations are not fully standardized. Incremental investment is needed to strengthen the capacity of the regional hubs to support decentralization of ZAMMSA operations (storage and distribution). As the intermediary level of the supply chain, hubs must be equipped with the required infrastructure, human resources, and equipment to play their role in the supply chain effectively.

Information flow

The eLMIS has streamlined the information flow in the supply chain. Health facilities installed with the eLMIS facility edition submit their monthly reports and requisitions directly to the systems, and those without direct access to eLMIS forward their data to the district health office for entry through the central edition of the eLMIS. Once data are entered into the eLMIS, this information is accessible to managers at the district, provincial, and central levels of the supply chain for decision making.

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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. Each question (or item) assessed within each functional module has one of four maturity levels assigned to it, ranging from basic to state-of-the-art (SOA); the overall CMM score for each module is the sum of scores at each maturity level. Exhibit 10 provides an overview of each level of maturity, its definition, and its contribution to the functional area's overall CMM score.

This functional area overall CMM score is a composite derived from the 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 functional areas. The components that make up the basic level are scored separately from those associated with the intermediate level; 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 does not necessarily indicate that every aspect of that function has achieved that level of maturity.

Exhibit 10. 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, and indicators (e.g., Excel).	30%
Advanced	**Nice-to-have** policies, structures, processes, procedures, tools, indicators, reports, and resources to operate a supply chain system (e.g., Rx solution, a stock management electronic tool).	15%
State of the art	**Nonessential SOA** policies, structures, processes, procedures, tools, indicators, reports, and resources for a supply chain system (e.g., an enterprise resource planning system for stock management and control).	5%

Benchmarks in the NSCA

NSCA methodology does not benchmark scores against a set of standards to denote a specific technical area having attained a specific level. As explained above, a mix of levels is expected in the final CMM score.

To help provide some structure around the analysis, the report authors use an 80 percent benchmark around which to discuss CMM scores. This benchmark has also been used in previous NSCA reports.

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

Capability Maturity Model: Summary Tables

Exhibits 11–16 summarize key data findings for capability maturity metrics across the 11 technical areas and seven facility disaggregation types.

Exhibit 11. CMM Scores, Average, and Ranges Presented by Level of Facility for Each Functional Module					
	Health posts	Health centers	Level 1 hospitals	Level 2 and 3 hospitals	Hubs
	62	93	28	10	7
Strategic Planning and Management	--	--	--	17% (0–78%)	45% (3–86%)
Policy and Governance	--	--	--	56% (6–100%)	42% (0–78%)
Human Resources	42% (3–84%)	51% (17–80%)	60% (38–80%)	48% (20–70%)	62% (37–76%)
Financial Management and Sustainability	57% (6–6%)	59% (6–86%)	70% (13–94%)	72% (5–89%)	48% (45–66%)
FASP	--	--	--	40% (21–70%)	7% (0–35%)
Procurement and Customs Clearance	--	--	--	50% (6-83%)	--
Warehousing and Storage	34% (18–51%)	41% (20–59%)	50% (30–66%)	49% (35–65%)	63% (49–74%)
Distribution	--	--	--	--	69% (60–82%)
LMIS	57% (30–75%)	55% (34–71%)	56% (43–71%)	75% (54–104%)	65% (48–77%)
Quality and Pharmacovigilance	13% (0–49%)	21% (0–76%)	25% (0–68%)	32% (0–54%)	16% (0–46%)
Waste Management	28% (4–77%)	32% (0–83%)	41% (17–72%)	45% (36–54%)	57% (35–75%)

Exhibit 12. CMM Scores, Average, and Ranges for Central Level Entities for Each Functional Module					
	EPI warehouse	CHAZ	ZAMMSA	MOH	ZAMRA
	I	I	I	I	I
Strategic Planning and Management	--	27%	65%	68%	--
Policy and Governance	--	65%	93%	65%	--
Human Resources	--	36%	52%	58%	--
Financial Management and Sustainability	--	46%	69%	64%	--
Forecasting and Supply Planning	70%	41%	84%	74%	
Procurement and Customs Clearance	--	75%	81%	--	--
Warehousing and Storage	53%	65%	78%	--	--
Distribution	53%	56%	69%	--	--
Logistics Management Information System	--	74%	56%	--	--
Quality and Pharmacovigilance	30%	60%	72%	--	74%
Waste Management	51%	65%	66%	--	38%

Select KPIs: Summary Tables

Exhibit 13. Select Key Performance Indicators, Average, and Ranges Presented by Level of Facility					
	Health posts	**Health** centers	**Level 1** hospitals	**Level 2 and 3** hospitals	Hubs
	62	93	28	10	7
Stocked according to plan (tracer commodities)	14% (0–25%)	13% (0–24%)	12% (0–22%)	13% (0–28%)	--
Stockout on day of assessment	26% (5–85%)	29% (8–91%)	30% (10–92%)	23% (0–86%)	63% (17–100%)
Average number of stockout days for 181-day period	25.9 days (15%)	28.4 days (16%)	28.5 days (16%)	20.5 days (12%)	79.5% (44%)
Average number of days per month with stockouts, given that there was a stockout	9.4 days	9.1 days	8.1 days	6.9 days	17.2 days
Stock card accuracy: percentage of facilities at 100 percent accuracy	60%	70%	67%	52%	94%
Stock card accuracy: average deviation from 100 percent accuracy across facilities (no deviance = 0)	38%–34,675%	52%–9,553%	35%–3,987%	10%–8,596%	--
eLMIS record accuracy: percentage of facilities at 100 percent accuracy	57%	42%	52%	46%	80%
eLMIS record accuracy: average deviation from 100 percent accuracy across facilities (no deviance = 0)	42%–253%	0%426%	0%–3348%	0%–325%	63–209%
Waste from damage, theft, and expiry: damaged, lost, and expired stock as a percentage of the total stock available	0%	0%	0%	0%	--

Exhibit 14. Heat Map, Capability Maturity Model, Non-Central Facility

Module	Level of the supply chain			
	Health Posts	Health Centers	Level 1 Hospitals	Level 2&3 Hospitals
	n = 61	n = 94	n = 28	n = 10
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

Exhibit 15. Heat Map, Capability Maturity Model Central

Module	ZAMMSA	CHAZ warehouse	EPI warehouse	MOH	ZAMRA
	n = 1	n = 1	n = 1	n = 1	n = 1
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 16. Heat Map, KPI Scores, Non-Central Facility Levels

KPI	Level of supply chain					
	Health Post	Health Center	level 1 Hospital	Level 2&3 Hospital	Hubs	CHAZ warehouse
	n = 62	n = 91	n = 28	n = 10	n = 7	n = 1
Stockout						
Stockout on day of assessment, average across tracer commoditie					..	..
Stockout days for period July 2023 through December 2023						
Average # of days per month with stockout, if there was a stockou						
Accuracy of stock records						
Stocked according to plan						
Stock card accuracy: Percentage of facilities at 100% (Paper)						
Stock card accuracy: Percentage of facilities at 100% (electronic)						
Distribution - Responsiveness						
Percentage of orders adjusted	.....	.....	.....	.....		
Order turnaround time						
Percentage of orders delievered in-full	.....	.....	.....	.....		
Percentage of orders as emergency orders						
Percentage of orders delivered on or before promised delivery da	.....	.....	.....	.....	.....	.....
Percent of total stock lost, damaged or expiry during December-M						
Other						
Percentage of days with a temperature excursion in cold storage						
Percentage of supply chain staff leaving (2016)	.....	.....	.....	.....	.....	.....

Farthest from suggested performance standard   Meets/exceeds performance standard

Analysis, by Functional Module: Capability Maturity and KPI Results

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

Strategic Planning and Management

Strategic planning and management ensure that supply chain priorities are identified, roles and responsibilities clarified, goals and changes directed, and frameworks for monitoring progress and performance established. Strategic planning and management are the purview of the MOH, but all health system levels are responsible for understanding their role in the strategic plans. Major areas that were factored into the scoring for this CMM module are the existence of strategic plans; appropriate monitoring mechanisms, such as formal oversight committees that have broad stakeholder inclusions; and clear plans for private-sector engagement (see Exhibit 17).

Exhibit 17. 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 (PPPs) 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.

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Zambia's first Health Sector Supply Chain Strategy (HSSCS) was developed for 2015–2017 to address identified challenges in the supply chain through specific strategies and interventions in line with the country's health sector priorities. A needs assessment conducted after plan implementation identified several areas of success, such as establishing core teams and working groups for the supply chain, expanding the central warehouse, constructing hubs, and improving data visibility at the SDPs.

The 2015–2017 strategy was succeeded by the HSSCS 2019–2021, which was crafted to ensure equitable access to medicines, vaccines, and medical supplies for the population. In this strategy, the MOH, working with partners, identified 22 priority interventions across four functional groups: 1) Forecasting, Procurement, and Rational Use; 2) Storage and Distribution; 3) Strategic Data; and 4) Finance and

Resources. The focus on these four areas is expected to enable the public health supply chain to become more functional, more efficient, and better placed to serve the people of Zambia.

Following the 2019–2021 supply chain strategy, a new HSSCS for 2023–2026 has been developed, pending official sign-off by the MOH. However, since the HSSCS for 2023–2026 is technically under development, the assessment team elected to use the HSSCS 2019–2021 as the base document for assessing strategic planning, with references made to the draft strategy where necessary.

Strategic planning and management capabilities were assessed at three central-level entities (MOH, ZAMMSA, and CHAZ) and two sub-national sites (regional hubs and level 2 and 3 hospitals). Responses from peripheral entities (regional hubs and level 2 and 3 hospitals) regarding strategic planning and management should be interpreted as their awareness of the existence of these strategic plans, how they fit into those plans, and their relevant responsibilities.

Findings from this NSCA align with findings of the 2017 NSCA, which scored the MOH as the strongest entity in strategic planning. Improvements in strategic management capabilities have been recorded at ZAMMSA, while challenges persist at the sub-national levels. Details of the NSCA 2017 findings are presented in Exhibits 18 and 19.

2024 NSCA findings and analysis

Exhibit 18. Strategic Planning and Management Capability
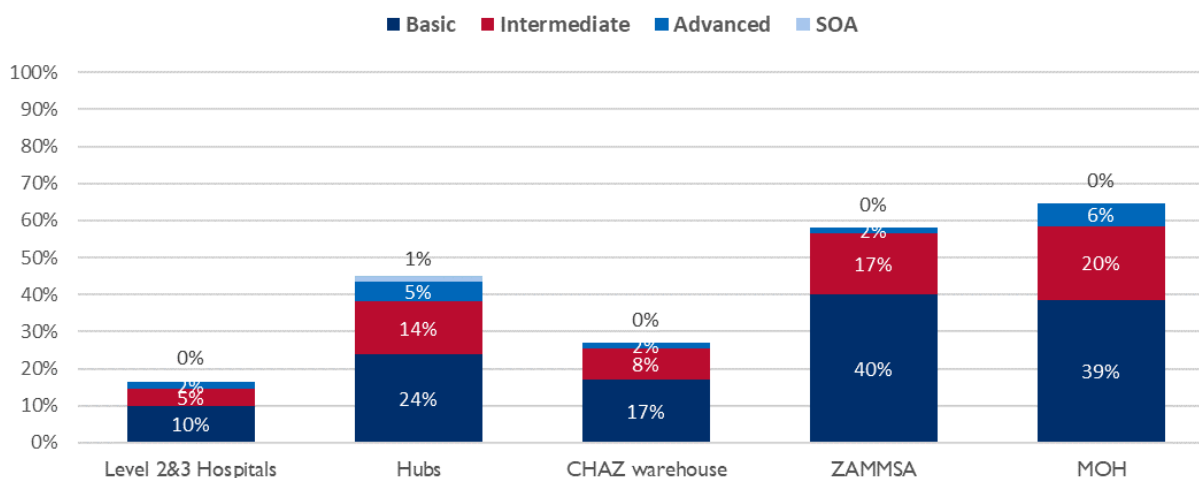
Note on interpreting results: Remember that CMM scores are a composite of assessed basic (max 50 percent), intermediate (30 percent), advanced (15 percent), and SOA (5 percent) capabilities. Reported percentages are the scored results averaged across all assessed sites, for each capability level and facility type. For more information, refer to the Understanding the CMM Results section above.

Exhibit 19. Strategic Planning and Management Capabilities Maturity Scores and Select Question Responses					
	Level 2 and 3 hospitals	Hubs	CHAZ	ZAMMSA	MOH
n =	10	7	1	1	1
Overall maturity score (range)	17% (0–78%)	45% (3–86%)	27%	65%	68%
Presence of an approved supply chain strategic plan	10%	43%	X	✓	✓
Is the supply chain strategic plan updated yearly or more often?	30%	14%	X	X	X
Stakeholder mapping exercise	20%	29%	N/A	✓	X
Presence of a supply chain implementation plan	20%	57%	✓ (1 year or less)	✓	✓ (Every 3 years)
Supply chain implementation plan is monitored (timeframe)	30%	43%	✓ (Biannually)	(Annually)	✓ (Less frequently)
Supply chain reforms are being implemented	10%	43%	X	✓	✓
Existence of performance monitoring plan tracking supply chain performance	20%	57%	✓	✓	✓
Formal structure exists to monitor supply chain performance at this level	40%	57%	✓	X	X
Existence of a risk management and mitigation/prevention plan	0%	57%	X	X	X
Coordination or engagement with private-sector companies	X	87	No	Formal	Formal

✓ denotes yes and x denotes no.

Strategic planning capabilities. The MOH and the ZAMMSA central warehouse obtained the highest capability maturity scores of 68 percent and 65 percent respectively among the entities assessed for strategic planning. This is because the two entities have in place comprehensive supply chain strategic plans that clearly articulate their vision, mission, priorities, objectives, and activities over a defined period.

Since 2017, the MOH has developed a series of three-year strategic plans to provide the governance framework for the country's supply chain. HSSCS 2019–2021, the penultimate strategy implemented by the MOH, will be replaced by HSSCS 2023–2026 when approved. Also, specific gaps in HSSCS 2019–2021, such as the absence of a comprehensive stakeholder analysis and risk management plan and its non-focus on human resources for the supply chain, are being addressed in the next strategic plan.

ZAMMSA has in place a 2022–2026 strategy that articulates its mission, vision, and priorities for the stated period. However, components such as the development of a risk management plan and the creation of a centralized M&E system for performance tracking are not fully in place. In relation to the CHAZ warehouse, the capacity maturity score of 40 percent was obtained due to the absence of a supply chain–specific strategy or high-level systems operational plan that adequately accounts for all domains of supply

chain management. CHAZ has an annual work program that is routinely monitored, but this is not a substitute for a comprehensive strategy or an institutional operational plan for its supply chain operations.

The CMM scores of 47 percent and 17 percent obtained by the regional hubs and level 2 and 3 hospitals respectively are indicative of the low priority given to strategic alignment at this level of the supply chain. Fundamentally, the hubs are a part of ZAMMSA, so they must receive guidance on the process for strategic or operational planning they must undertake. Similarly, the level 2 and 3 hospitals must be provided with guidelines and templates on how to develop strategic/operational plans that align with the MOH strategic plans.

Supply chain plans. A subsection of this technical area focuses on the presence and monitoring of supply chain implementation plans. All central-level entities (MOH, ZAMMSA, and CHAZ) have supply chain implementation plans that articulate activities that have been planned for a specific year and expected results. These plans are monitored, and corrective measures are implemented to ensure that the objectives of the plans are realized within the stated period. Among the regional hubs and level 2 and 3 hospitals, implementation plans were found in 57 percent and 20 percent of the entities assessed, respectively. Thus, while strategic planning and operational planning are regular practices at the top of the supply chain, the situation is different at the intermediary and service delivery levels of the supply chain. Again, while strategic planning is not entirely necessary at the intermediary and service delivery level, developing annual supply chain activity and monitoring plans should be strongly encouraged. This result reinforces the need to strengthen operational planning at the regional hubs and service delivery points to ensure clear plans for activities and expected results for defined periods.

Public-private partnerships. PPPs are considered a key feature to strategically engage and manage robust public health supply chain systems. The optimal role of the private actors within Zambia's public supply chain system continues to evolve. The ZAMMSA strategic plan fully articulates the role of the private sector in its operation and potential areas for collaboration, while the MOH HSSCS 2019–2021 provides minimal guidance on the role of the private sector in the public health supply chain. CHAZ's supply chain operations are fully funded by the cooperating partners (mainly Global Fund), so its engagement in the private sector is mostly limited to supplementary distribution services. However, an incremental role in the supply chain should be considered for the private sector with the goal of improving efficiency and reducing the need for initial capital investment by government and donors.

Performance monitoring: Both the HSSCS 2019–2021 and ZAMMSA strategic plans 2022–2026 provided insightful frameworks for monitoring supply chain performance. However, these plans must be condensed into a comprehensive M&E or results framework for supply chain performance monitoring. This framework should define each indicator for the supply chain, the levels at which they should be applied, and how they are measured. In addition to having a country-specific supply chain M&E framework in place, a structured entity or technical unit is needed within the MOH and ZAMMSA that comprehensively tracks and reports on indicators for supply chain performance. Cooperating partners may provide technical assistance to the MOH and ZAMMSA in tracking system performance, but a functional technical entity within the supply chain must be responsible for performance monitoring.

Supply chain risks. The ZAMMSA strategic plan anticipates the development of a risk management plan in 2023, but this has been delayed. The HSSCS 2019–2021 was silent on risk management, but the draft strategy for 2023–2026 is expected to re-centralize the concept of risk management in supply chain

management. CHAZ has a risk register with mitigation measures, but this needs to be upgraded to articulate the concept of risks, approaches, and specific measures for mitigation. Below the central level, risk management is hardly prioritized in supply chain management and should be the focus of future capacity building and investments. Exhibit 20 presents perceptions of the top risks as reported by key informants interviewed at each site. The most reported supply chain risks flagged were financial, human resource, and operational.

Exhibit 20. Top Risks Experienced in the Supply Chain					
	Level 2 and 3 hospitals	Hubs	CHAZ	ZAMMSA	MOH
n =	10	7	1	1	1
Financial	50%	57%	100%	0%	0%
Human resources	50%	100%	X	✓	X
Technology	20%	14%	X	X	✓
Operational					
Economic (e.g., exchange rate)	10%	43%	X	X	✓

✓ denotes yes, and x denotes no.

Recommendations

The HSSCS 2019–2021 has elapsed and will be replaced by a new 2023–2026 strategy, which is going through final approval. This approval process must be accelerated to provide strategic direction for supply chain investment in the next few years. Given the time required to develop and implement strategic plans, it may be important for the country to consider extending the tenure of future plans to five years to provide other stakeholders in the value chain ample time to align their aspirations with the vision of HSSCS. Strategic planning is well established within ZAMMSA, but the regional hubs must be assisted to play significant roles in the process. Also, the level 2 and 3 hospitals and other lower-level entities must be provided with guidance and tools to encourage operational planning.

To this end, the following recommendations are offered:

- For the GRZ and MOH, immediately approve the 2023–2026 supply strategy to provide a comprehensive framework for prioritizing supply chain investments and decision making in Zambia. Also, CHAZ, given its critical role in the supply chain, must be encouraged to develop a standalone strategic plan supply chain specific or high-level systems operational plan to articulate its role in the Zambian public supply chain.
- Revise the timeframe for developing and implementing subsequent national supply chain strategic plans from three years to five years to enable adequate time for subnational structures to develop and implement strategies that align with national priorities. This should include re-aligning the timeframes for implementing the national supply chain strategic plans with the ZAMMSA strategic plan.
- Prioritize the development of a risk management and response plan for critical supply chain levels in the country. The MOH should lead the development of an overall supply chain risk management

strategy and guide other entities, such as ZAMMSA, CHAZ, and major health facilities, to prioritize risk management.

- For the MOH, develop a comprehensive country supply chain performance monitoring framework to provide clear guidelines on performance monitoring at each level of the supply chain. The framework should include the country supply chain results framework, definition of indicators, applicable indicators at each level of the supply chain, priority indicators, and indicator reference sheets.
- Ensure ZAMMSA centrally coordinates with the hubs more closely on strategic planning. As the hubs take direction from ZAMMSA on all things strategic planning and management, the head office needs to ensure they know how they fit into the five-year strategic plan.

Supplemental exhibit

Exhibit 21. Strategic Planning and Management: 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
Level 2 and 3 hospitals (4)	30	1.7%	18	1.7%	9	1.7%	2	2.5%
Hubs (30)	36	1.4%	13	1.2%	6	2.5%	1	5.0%
ZAMMSA (1)	36	1.4%	13	1.2%	6	2.5%	1	5.0%
CHAZ (1)	36	1.4%	13	1.2%	6	2.5%	1	5.0%
MOH (1)	36	1.4%	21	1.4%	10	1.5%	1	5.0%

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

Policy and Governance

Clear policies, guidelines, and oversight are important to ensuring that public health systems are procuring essential medicines, practicing effective medicine, and revising policies to reflect changing best practices and onboard new technologies. For the supply chain, national policies and governance should inform the full system, from procurement to patient treatment, ensuring that all actors operate based on standardized guidance. Major areas that were factored into the policy and governance capabilities scoring in this assessment are outlined in Exhibit 22, including the existence of a national medicines policy with supply chain components, an oversight committee with broad representation from all levels of government and civil society, drug registration lead times, and Standard Treatment Guidelines (STGs).

During the period of assessment, HSSCS 2019–2021 had lapsed, and the new strategic plan, the 2023–2026 HSSCS, was pending final approval. This assessment was conducted in February 2024, the midway point for the new strategic plan that had not yet been approved. So, accelerating the process of approving the plan and possibly extending the tenure to ensure its full implementation will be beneficial to the supply

chain. However, since the updated version was not yet approved, the 2019–2021 version of the strategic plan was the reference plan for this NSCA.

The HSSCS and Implementation Plan 2019–2021 explicitly outlined a near-term objective to address policy gaps, fractured supply chain functions, and implementation delays by examining the governance structure and performance management. The last strategy before this one (the 2017 version) also experienced delayed implementation due to a lack of governance. In fact, the 2019–2021 strategic plan mentions that 40 percent of supply chain activities are designated to only one person in the MOH, the assistant director of pharmaceutical services, who was responsible for drafting the strategy. When the NSCA team visited the MOH, this seemed to be the case still. Only the director of logistics was available to answer questions about the supply chain (no staff were designated for supply chain management). Monitoring of implementation remained inconsistent, and partners were relied on to fill the void. This gap in supply chain governance at the MOH poses a major risk to the overall durability and sustainability of the supply in the long term. Hence, further investment in central governance of the supply chain is necessary to insulate the country from the most impactful shocks in the future.

While not being reviewed in the NSCA scores, the HSSCS 2023–2026 is significantly more comprehensive, with good governance again listed as a value and principle. Many sections address policy, strategic linkages, implementation arrangements, the planning approach, governance arrangements, management framework, partnership framework, and coordination mechanisms. In this plan, the MOH commits to taking the "overall responsibility for coordinating and ensuring successful implementation" and lays out the roles of MOH partners. However, it does not mention specifically how this coordination will improve or change and how many staff will oversee the supply chain, particularly at the MOH.

Exhibit 22. Examples of Scored Policy and Governance Capabilities	
Basic	Existence of a national medicines policy that includes objectives for supply chain management
	Five-year updates of national policies related to supply chain management
	Existence of national STGs and a National Essential Medicines List (NEML)
	Existence of a process for registering new drugs, products, and technologies
	Publicly available list of registered drugs and products
Intermediate	Quarterly meetings by a supply chain oversight and governance body to discuss supply chain issues
	Adaptation of national STGs from universal clinical guidelines
Advanced	Existence of a formal, high-level body that provides oversight and governance for the supply chain
SOA	Civil society is a part of the formal supply chain oversight and governance body

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

2024 NSCA findings and analysis

Exhibits 23–24 show the NSCA results assessing the policy and governance capabilities extant in Zambia's public health supply chain. There is an unequal presence of policy and governance capabilities at the central level, most notably at ZAMMSA, which scored 93 percent, clearing the recommended 80 percent easily,

while both MOH and CHAZ obtained a score of 65 percent. At the non-central level, level 2 and 3 hospitals and hubs obtained scoring 56 and 42 percent, respectively.

As seen in other examples in this assessment, the average score does represent a wide variation in capabilities across the same category of entity in different geographical locations, with the 28 level 2 and 3 hospitals individually scoring from 6 percent to 100 percent and the hubs scores ranging from zero to 78 percent, indicating potential regional capability disparities. Very few policy and governance aspects are evaluated at health posts, health centers, and level 1 hospitals because most of the governance occurs in district offices or higher within the chain of command. They are not given a cumulative score, but the different aspects measured are mentioned in the analysis below.

Exhibit 23. Policy and Governance Capability
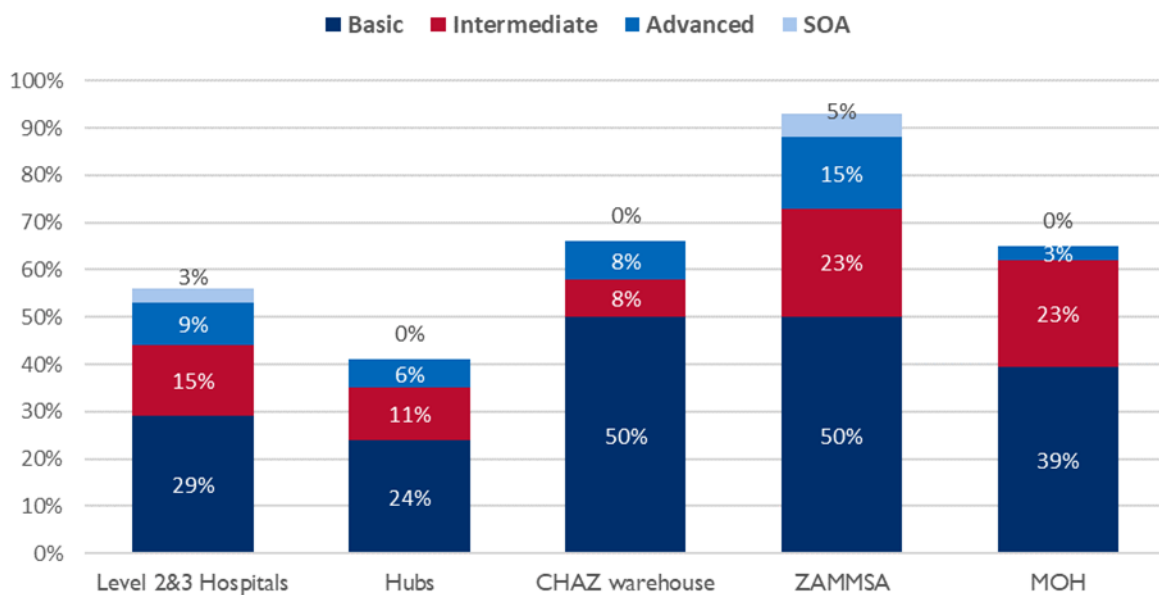
Note on interpreting results: Remember that CMM scores are a composite of assessed basic (max 50 percent), intermediate (30 percent), advanced (15 percent), and SOA (5 percent) capabilities. Reported percentages are the scored results averaged across all assessed sites, for each capability level and facility type. For more information refer to the Understanding the CMM Results section above.

Exhibit 24. Supply Chain System Guidelines and SOPs Available

	Level 2 and 3 hospitals	Hubs	CHAZ warehouse	ZAMMSA	MOH
n =	10	7	1	1	2
Overall maturity score (range)	56% (6–100%)	42% (0–78%)	65%	93%	65%
Percent of basic items in place (range)	59% (11–100%)	49% (0–92%)	100%	100%	79%

Central-level entities

In policy development and governance, the MOH is the key area of focus. The MOH has a National Medicines Policy that includes objectives for supply chain management and STGs that are adapted from universal clinical guidelines, such as those put forth by the WHO, and revised every two years. Unfortunately, the MOH capability maturity scores are affected by the absence of an active supply chain strategy for the country since the current one has elapsed, and the next one is pending approval. Despite the availability of many policies and guidelines for the supply chain, the assessment noted deficiencies in policies or guidelines for the health sector supply chain in waste management, quality assurance, procurement, and human resources for supply chain management.

Exhibit 25. Key Central-Level Policy and Governance Capabilities and Gaps	
MOH establishment of a National Pharmaceutical Policy	✓
Formal body that provides oversite and governance for the supply chain	In some entities
Frequency of governance body meetings	Bi-annually or more frequent
Existence of national STGs	Outdated but present
Adaptation of STGs from the universal clinical guidelines	✓
Public list of registered products	No

The MOH partners with many other central entities, such as ZAMMSA (and its hubs), ZAMRA, and CHAZ. ZAMMSA is the central medical store, and the hubs work as ZAMMSA's outreach centers to further districts for drug distribution. CHAZ has an entirely separate mandate from ZAMMSA and is funded by grants and donors. However, it works closely with ZAMMSA on the procurement and distribution of medicines that fall within its jurisdiction. ZAMMSA, its hubs, CHAZ, and the MOH (in conjunction with ZAMRA) are evaluated in this NSCA on their development of a governing body for supply chain functions. This body might be a governing board, other governmental body, or oversight committee, which is responsible for driving forward the strategic direction for the supply chain, setting government and/or business priorities for the supply chain, ensuring the performance of supply chain leadership, and managing risk and accountability in the supply chain.

The MOH has a multi-stakeholder coordination committee that oversees the supply chain. However, this is not a substitute for a fully functional technical unit that provides technical oversight and supervision, such as the proposed MoH supply chain control tower. The control tower can enhance the MOH's capacity to provide supervision and oversight for the rest of the supply chain.

ZAMMSA obtained a near-perfect score because, as an autonomous agency with its own governing board, it has many policies and guidelines that regulate its activities as a central-level supply chain entity. However, hubs are an extension of ZAMMSA, and the policy percolation at the central level must fully extend to its peripherals. Where the assessment asks, "Is there a formal, high-level body or committee that provides oversight and governance for the supply chain?" ZAMMSA and CHAZ responded with a resounding "yes," but only 71 percent of respondents in the hubs said "yes." CHAZ is considered a major player in the supply chain; hence, its score is affected by the absence of a supply chain-specific strategy. It must take steps to implement key measures such as a supply chain-specific strategic plan and clear policies for strengthening its human resource capacity for the supply chain, amongst others.

Peripheral levels

While most policy and governance questions in NSCA pertain to central-level entities and not to lower-level health facilities, level 2 and 3 hospitals are the exception; being large hospitals, they often own their governing practices. When asked if there were formally documented management policies or guidelines for the supply chain system, only 50 percent of level 2 and 3 hospitals answered, while 71 percent of hubs answered that there were. For those that answered yes at level 2 and 3 hospitals, respondents answered that the policies or guidelines covered waste management (60 percent), quality assurance (60 percent), forecasting and quantification (60 percent), inventory management (60 percent), and LMIS (60 percent). Only half of these respondents said that the guidelines covered storage (50 percent) or supply planning (50 percent), and even less mentioned financing (40 percent) or human resources (40 percent). The hubs had similar responses for waste management (71 percent), storage (71 percent), inventory management (71 percent), LMIS (71 percent), supply planning (57 percent), and financing (43 percent). Hub respondents, however, had much lower percentages of respondents mentioning quality assurance (43 percent), human resources (29 percent), procurement (14 percent), and forecasting and quantification (14 percent). The hubs do not mention procurement and forecasting/quantification because the actual work for those areas is mostly done at ZAMMSA central, not at the hubs. However, developing these policies and guidelines could be an opportunity to strengthen the governance of the supply chain in Zambia further.

Exhibit 26. Supply Chain System Guidelines and SOPs Available					
	Level 2 and 3 hospitals	Hubs	CHAZ warehouse	ZAMMSA	MOH
n =	10	7	1	1	1
Guidelines or SOPs for the supply chain system exist, covering:	50%	71%	✓	✓	✓
Waste management	60%	71%	✓	✓	X
Quality assurance	60%	43%	✓	✓	X
Storage	60%	71%	✓	✓	✓
Procurement	50%	14%	✓	✓	X
Forecasting	60%	14%	✓	✓	✓
Supply planning	50%	57%	X	✓	✓
Inventory management	60%	71%	✓	✓	✓
LMIS	60%	71%	✓	✓	✓
Financing	40%	43%	✓	✓	✓
Human resources	40%	29%	X	✓	X
None of the above	0%	0%	0%	0%	0%

✓ denotes yes, and x denotes no.

At all health facilities, including health posts, health centers, level 1 hospitals, and level 2 and 3 hospitals, respondents were asked if the national STGs were available at the site/facility in either electronic or paper copy. This was identified as a major issue during the assessment, with some facilities claiming they have the STGs but possessing outdated versions, some of which are decades old. The assessment team clarified that the STGs needed to be considered valid from 2020 or later, even though the 2022 version should have been distributed to health facilities since the 2024 version was under development. Despite this flexibility regarding the STG version, just over two-thirds of health posts had any copy of the STGs available, 76 percent of level 1 hospitals, and 86 percent of health centers. Level 2 and 3 hospitals, as well as the MOH itself, had copies available for verification. Distributing the updated STGs is crucial for ensuring quality health care in the country and should be a priority for the MOH.

Exhibit 27. Availability of National STGs				
	Health posts	Health centers	Level 1 hospitals	Level 2 and 3 hospitals
n =	61	94	28	10
STGs available at site (physically verified)	71%	86%	78%	100%

Caveat on implementation. One caveat to this section is important. This portion of the NSCA assesses policy and governance capabilities by determining the existence of fundamental building blocks—policies, laws, and regulations—along with institutions and formal processes to support them. This section of the assessment does not, however, attempt to measure the level of implementation or effectiveness of these planning and governance policies, laws, and regulations in Zambia. As existence cannot be automatically equated with effective implementation.

Recommendations

For Policy and Governance, maturity scores range between 65 and 93 percent at the central level, but with a very high percentage of basic items in place. At lower levels of the supply chain, we see an expected decline in basic elements, and average maturity scores hide a wide variation in capabilities between entities at the same level in different locations. Scores for individual facilities range anywhere from zero to 100 percent. The following recommendations are proposed:

- For the GRZ and MOH, work to strengthen supply chain governance at the central level of the supply chain. Making the MOH supply chain control tower functional could be a great step in this direction. Developing a CHAZ-specific supply chain strategy could also be a good step in strengthening supply chain governance within the entity.
- The MOH and ZAMRA should work together to make the most updated version of the STGs available and accessible to end-users at the SDPs.
- Facilitate the dissemination of policies, guidelines, and tools developed centrally for the supply chain to end-user levels. Where specific guidelines and tools are unavailable, such as health sector-specific waste management or guidance on human resources for the supply chain, prioritize their development.

Exhibit 28. Policy and Governance, Distribution of Questions, and Assignation of Weight Across Capability and Facility Levels

Module	Basic (50%)		Intermediate (30%)		Advanced (15%)		SOA (5%)	
	# of Qs	Weight	# of Qs	Weight	# of Qs	Weight	# of Qs	Weight
Level 2 and 3 hospitals (10)	9	5.6%	1	30.0%	1	15.0%	1	5.0%
Hubs (10)	12	4.2%	4	7.5%	2	7.5%	1	5.0%
CHAZ (1)	12	4.2%	4	7.5%	2	7.5%	1	5.0%
ZAMMSA (1)	12	4.2%	4	7.5%	2	7.5%	1	5.0%
MOH (1)	12	4.2%	4	7.5%	2	7.5%	1	5.0%

Human Resources

Effective supply chains require significant human resources across a wide range of technical areas, all levels of the health care system, and all geographic areas of the country to ensure that quality health commodities are distributed safely and promptly. The NSCA outlines core HR supply chain capabilities and performance metrics to assess the extent to which facilities have the needed resources, supply chain functions have formally allocated responsibilities, and staff have the necessary training, knowledge capacity, time, and scope to support supply chain operations. Major areas that were factored into the scoring for this CMM module are appropriate supply chain functions in job descriptions, regular capacity-building efforts for staff, and mechanisms for supportive supervision and performance improvement (see Exhibit 29).

Exhibit 29. 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, refer to the NSCA toolbox, available at www.ghsupplychain.org.

The HSSCS 2019–2021 fell short of capturing clear goals and directions for enhancing Zambia's human resources supply chain. However, the upcoming HSSCS for 2023 to 2026 appears to address this issue,

with a focus on boosting the numbers of pharmacists and pharmacy technologists at SDPs to bolster supply chain management.

In the National Human Resource for Health Strategy Plan (NHRHSP) 2018–2024, the inadequacy of critical human resources for health is acknowledged as one of the factors impeding the quality of health service delivery. Hence, there is a national consensus through the strategy to scale up health workforce recruitment and ensure equitable distribution and retention of staff. However, the NHRHSP did not recognize the supply chain cadre as a separate professional grouping, as this role has been considered traditionally to be part of pharmaceutical services. It is important to establish that supply chain management is distinct from pharmaceutical management, although the functions are not mutually exclusive.

In the 2018–2024 NHRHSP, insufficient critical human resources for health are identified as one of the factors hindering the quality of health service delivery. So, the strategy prioritizes health workforce recruitment to ensure equitable distribution and retention of staff. However, the NHRHSP 2018–2024 does not recognize the supply chain cadre as a distinct professional group, as this role is traditionally considered to be a part of pharmaceutical services.

Results of the 2017 NSCA acknowledge stronger HR supply chain capabilities at the central level of the supply chain in comparison to the lower levels but also acknowledge human resources for supply were not prioritized as much as other service delivery factors in the health system. So, the assessment team recommended capacity building and development of job descriptions to enhance the outputs of persons involved in health commodity supply chain management.

2024 NSCA Findings and Analysis

In this NSCA, human resource capabilities scores vary across the facility types assessed and do not follow a specific trend as observed in other countries where central-level capabilities are usually the strongest.

The capability maturity scores obtained by the assessed entities ranged from 36 percent to 62 percent, with the presence of basic capabilities ranging from 31 percent to 58 percent. Among the service delivery points, level 2 and 3 hospitals achieved the highest score at 62 percent, followed by level 1 hospitals at 60 percent, health centers at 51 percent, and health posts at 42 percent. The hubs scored 56 percent, while ZAMMSA scored 52 percent. The MOH achieved a score of 45 percent, while the CHAZ warehouse obtained a score of 38 percent. Exhibits 30 and 31 detail HR capability scores as well as select KPI results for supply chain human resources.

Exhibit 30. Human Resources Capability Maturity Model Scores
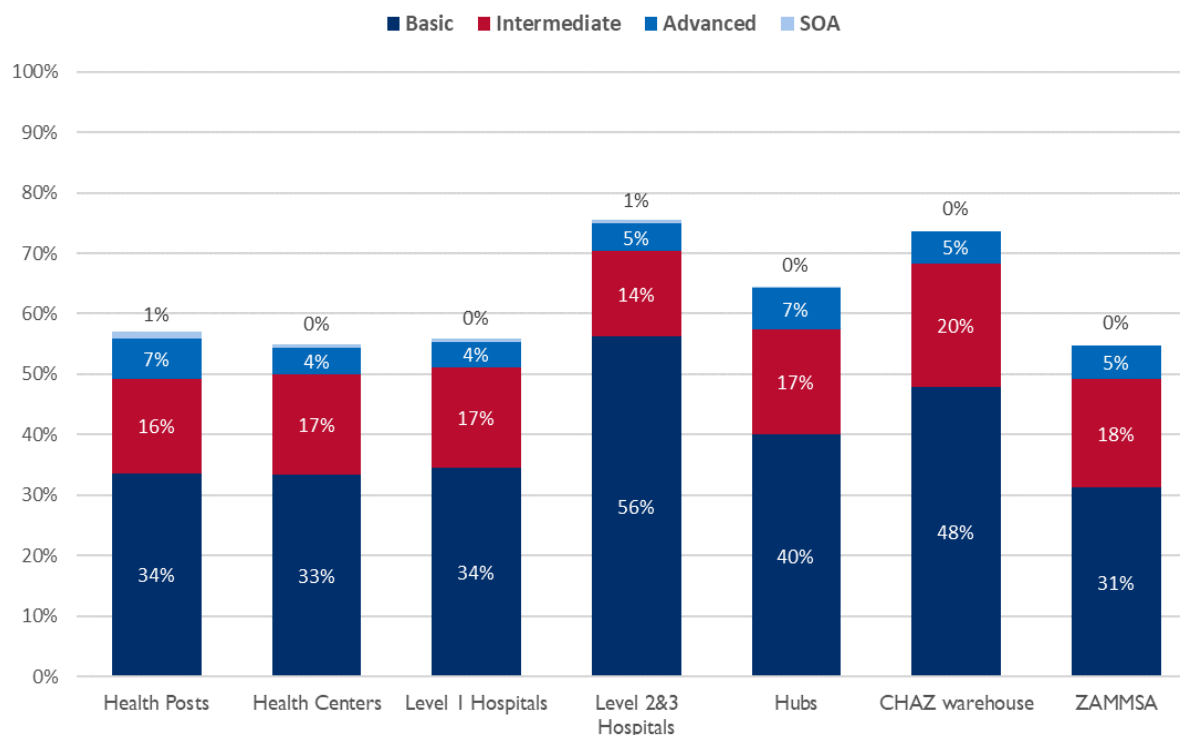
Legend: ■ Basic ■ Intermediate ■ Advanced ■ SOA

Facility	Basic	Intermediate	Advanced	SOA
Health Posts	34%	16%	7%	1%
Health Centers	33%	17%	4%	0%
Level 1 Hospitals	34%	17%	4%	0%
Level 2&3 Hospitals	56%	14%	5%	1%
Hubs	40%	17%	7%	0%
CHAZ warehouse	48%	20%	5%	0%
ZAMMSA	31%	18%	5%	0%

Note on interpreting results: Remember 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, refer to the Understanding the CMM Results section above.

Exhibit 31. Human Resources KPIs, Maturity Score, and Basic Capabilities in Place

	Health posts	Health centers	Level 1 hospitals	Level 2 and 3 hospitals	Hubs	CHAZ	ZAMMSA	MOH
n =	61	94	28	10	7	1	1	1
Overall maturity score (range)	42% (3-84%)	51% (17–80%)	60% (38–80%)	62% (37–76%)	56% (45–66%)	36%	52%	45%
Percent of basic items in place (range)	47% (6–94%)	54% (17–83%)	67% (39–83%)	58% (33–79%)	52% (35–71%)	31%	48%	38%
Staff turnover ratio	8%	10%	6%	0%	4%			
Percentage of positions vacant	34%	35%	22%	3%	21%			

Central-level entities and hubs: Among the central entities, the MOH obtained a CMM score of 45 percent; ZAMMSA, 52 percent; CHAZ, 36 percent; and the hubs, 55 percent. These scores are below the desirable NSCA CMM benchmark score of 80 percent. They are reflective of some missing capabilities,

such as inadequate numbers of supply chain–specific human resources, inadequate documentation of HR practices, and reliance on external funding for supply chain HR needs.

For the MOH, the capability maturity score of 45 percent is informed by the absence of a human resource workforce plan or staff recruitment policy that tilts toward the supply chain. In practice, the supply chain functions are subsumed under the role played by pharmacists or pharmacy technologists, but these two functions are dissimilar, though not mutually exclusive. While supply chain functions are now typically handled by pharmacists or pharmacy technologists, these roles are distinct and must be accounted for separately. Job descriptions were in place for personnel working at the logistics unit of the MOH's Pharmacy Directorate, and the unit provided supervision to the other levels of the supply chain. However, there were no human resource capacity development plan chains, although personnel benefitted from various capacity-building programs sponsored by donors recently, regardless of barriers such as finance, workload, and availability of training materials.

At the ZAMMSA central warehouse, the capability maturity score of 52 percent is informed by human resource plans specific to supply chain personnel, recruitment policies that favor supply chain personnel, and unified capacity-building programs for supply chain operatives, regardless of financial and time constraints. However, documentation of these plans and ongoing capacity initiatives was sparse and not readily available for inspection during the assessment. The budget for human resources is not fully funded by government or facility revenue as there is dependence on donor funds, and staff performance reviews must be streamlined so that they occur at least once a year. As the country's largest supply chain entity, ZAMMSA needs to augment its role in supervising the other entities in the supply and position itself as a reference for supply chain capacity building in the country.

The CHAZ warehouse scored 36 percent due to its minimal focus on building a cadre of personnel to support its supply chain operations. No human resource workforce plans are in place that project future needs or specific plans to develop the supply chain's personnel capacity. Staff benefited from capacity-building opportunities offered by the government or donor partners, but there were no internal capacity-building plans. Nonetheless, performance reviews were conducted annually, and the results were used to inform performance development plans and the provision of incentives.

The capability maturity scores obtained by the hubs (54 percent) are similar to those obtained by ZAMMSA since the HR policies governing the central warehouse apply to operations at the hubs. Hence, staff working in the hubs must be aware of these policies and guidelines to apply them effectively. Additionally, there is a need for reliable recording, keeping track of beneficiaries of capacity development programs, and evaluating the outcomes of these programs to determine the return on investment.

SDPs: Among the SDPs, the capacity maturity scores were 62 percent at level 2 and 3 hospitals, 60 percent at level 1 hospitals, 51 percent at health centers, and 42 percent at the health posts, which are below the desirable NSCA CMM score of 80 percent. These scores are largely informed by the minimal availability of specific job descriptions for supply chain roles, the absence of capacity development plans, and limited participation in capacity-building opportunities. No consolidated records are in place to track staff participation in training courses, and the outcomes of these trainings are not largely evaluated. On a positive note, the percentage of facilities benefiting from supportive supervision and feedback is between 77 percent and 100 percent.

At this level of the supply chain, functions are performed by multiple cadres of health workers. At the hospitals (level 1, 2, and 3 hospitals), supply chain functions are performed by pharmacists, pharmacy technologists, biomedical scientists, and storekeepers who are more familiar with logistics management. The supply chain functions at the health centers and health posts were driven by nurses, midwives, community health assistants, and others who might not be that familiar with supply chain roles. Hence, maintaining training and supportive supervision at the lower levels of the supply chain is essential to maintain quality service.

Exhibit 32. Select Supply Chain Human Resource Capabilities at Institutions					
	Level 2 and 3 hospitals	Hubs	ZAMMSA	CHAZ	MOH
Existence of HR workforce plan that project future needs for supply chain personnel	60%	86%	✓	X	X
Existence of general staff recruitment policies that are applied to supply chain personnel	50%	0%	✓	✓	✓
Existence of unified supply chain capacity-building plan or staff development plan for current employees	70%	86%	X	X	X
Most (51–99%) of staff have participated in a capacity-building session within the last year	30%	0	✓	X	✓

✓ denotes yes and x denotes no.

Dedicated supply chain staff. Results from the 2024 NSCA reveal that the definition of supply chain functions and responsibilities in the job descriptions of last-mile facility staff remains inadequate. For example, health post–level staff have minimal mention of the fundamental supply chain functions as part of their job responsibility. Inventory management, LMIS, waste management, and quality assurance were listed in job descriptions 8 to 13 percent of the time for the above functions. At the health centers, about 30 percent of job descriptions have these functions listed, while the results improve to over 60 percent among level 1 hospitals and beyond 80 percent at the level 2 and 3 hospitals. Staff cannot be held accountable for work that is officially not part of their job description. Ensuring that staff understand the supply chain functions they are responsible for and allocating sufficient staff to complete those tasks are essential steps if supply chain operational capacity is to be strengthened at last-mile health facilities.

Exhibit 33. Supply Chain Functions and Job Descriptions

Supply chain functions are included in the job descriptions for at least one site personnel, including:	_Percent of facilities reporting:_						
	Health posts	Health centers	Level 1 hospitals	Level 2 and 3 hospitals	Hubs	CHAZ	ZAMMSA
Forecasting and quantification	--	--	--	80%	71%	✓	✓
Procurement	--	--	--	60%	14%	✓	✓
Storage and inventory management	12%	35%	60%	80%	71%	✓	✓
Distribution	--	--	--	--	100%	✓	✓
Ordering and reporting	13%	32%	60%	80%	100%	✓	✓
LMIS	13%	32%	85%	70%	100%	✓	✓
Waste management	8%	26%	71%	70%	43%	✓	✓
Quality and/or pharmacovigilance	9%	25%	90%	70%	43%	✓	✓

✓ denotes yes and x denotes no.

Supply chain capacity-building training. Exhibit 34 details the capacity-building opportunities that staff have had within the last year across essential supply functions. As inferred in the NHRHSP 2018–2024, building the capacity of current staff is essential to bolster skills and retain them in the workforce. In Zambia, structured on-the-job learning programs, certificate programs, university degree programs, and post-graduate courses are in place that can be leveraged to enhance HR capacity for the supply chain. Nonetheless, assessment results reveal that 24 percent and 25 percent of personnel at the health posts and health centers, respectively, had not received any capacity building in the supply chain in the past two years, while this was the case among 10 percent and 11 percent among the level 1 and level 2 and 3 hospitals respectively, Available opportunities should be explored to ensure an optimal approach in bolstering the knowledge and skills of the personnel who manage the supply chain.

The NHRHSP 2018–2024 also highlights the need to leverage e-learning opportunities to deliver capacity-building programs for health personnel. Developing e-learning modules tailored to the country context is essential to provide continuous training for field personnel, particularly those at the last mile.

Exhibit 34. Areas Covered in Capacity-Building Sessions in the Last Year

	Health posts	Health centers	Level 1 hospitals	Level 2 and 3 hospitals	Hubs	CHAZ	ZAMMSA
	Percent of facilities reporting:						
Warehousing and inventory management	34%	46%	21%	70%	100%	✓	✓
LMIS	37%	53%	87%	71%	71%	✓	✓
Ordering and reporting	40%	57%	59%	65%	100%	✓	✓
Waste management	21%	44%	63%	--	--	✓	✓
Medicine quality assurance	7%	23%	23%	50%	--	✓	✓
Treatment guidelines	37%	49%	49%	80%	--	✓	✓
Forecasting and quantification	--	--	--	0%	0%	✓	✓
Procurement	--	--	--	50%	29%	✓	✓
Distribution	--	--	--	60%	86%	✓	✓
None of the above	38%	21%	10%	20%	0%	--	--

✓ denotes yes and x denotes no.

Presenting opportunities for capacity building is not enough and does not readily resolve the capacity-building gap. Staff must be encouraged and allowed to organize work responsibilities in a manner that allows participation in programs. Exhibit 35 details the proportion of staff from each assessed facility type that could participate in capacity-building sessions. At the level 2 and 3 hospitals, the most common response was some (30 percent) or most 30 percent) staff could participate, while at the level 1 hospitals, the most common response was minimal (41 percent) or some (28 percent) staff could participate. At the health center level, the most common responses were no staff (25 percent) and most staff (25 percent) could participate in capacity building, while at the health-post level, 24 percent of personnel could not participate in capacity-building sessions. It is important, then, to engineer structural changes for staff at last-mile facilities so they can participate more regularly in capacity-building opportunities.

Digging into the challenges a bit more, several barriers are limiting participation. Exhibit 36 details the critical barriers to supply chain management capacity-building programs. 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 opening capacity-building opportunities for staff in the supply chain system. The MOH needs to make the appropriate structural changes to enable staff to build their skills, so they continue to be motivated in their jobs.

Exhibit 35. Proportion of Staff Participating in Capacity-building Sessions in the Last Year							
	Percent of facilities reporting:						
	Health posts	Health centers	Level 1 hospitals	Level 2 and 3 hospitals	Hubs	ZAMMSA	CHAZ
None	24%	25%	11%	10%	0%		
Minimal (1–25%)	18%	25%	41%	20%	29%		✓
Some (26–50%)	20%	22%	28%	30%	0%		
Most (51–99%)	19%	28%	11%	30%	0%	✓	
All (100%)	13%	3%	3%	0%	71%		

Exhibit 36. Critical Barriers to Supply Chain Management Capacity-building Programs							
	Percent of facilities reporting:						
	Health posts	Health centers	Level 1 hospitals	Level 2 and 3 hospitals	Hubs	ZAMMSA	CHAZ
Finances	61%	69%	87%	90%	86%	✓	✓
Workload	46%	44%	63%	70%	57%		
Materials	22%	34%	40%	20%	29%		
Skilled trainers	30%	23%	29%	40%	0%		
Time	19%	20%	20%	20%	43%	✓	
Lack of interest	4%	6%	1%	10%	29%		

Supervision. Encouragement and support are crucial enabling factors to ensure the success of the supply chain workforce in carrying out their mission. Exhibit 37 details the prevalence of supportive supervision across the SDP facility types assessed. It is encouraging to see a high degree of coverage of supportive supervision across the supply chain in Zambia. This demonstrates the MOH and partners' commitment to ensuring that staff feel supported in their roles and know the methods for accessing assistance and guidance. With such strong coverage of supportive supervision, the MOH should use these touchpoints as a method for better understanding the challenges facing their health facility staff so they can develop policies and programs that help address these issues.

Exhibit 37. Supportive Supervision							
	Percent of facilities reporting:						
	Health posts	Health centers	Level 1 hospitals	Level 2 and 3 hospitals	Hubs	ZAMMSA	CHAZ
Supply chain staff received supportive supervision in the last year	77%	93%	100%	100%	100%	X	X
Staff received immediate feedback after supportive visits	77%	92%	100%	100%	86%	--	--
Corrective actions are taken after supervision visits	77%	93%	92%	100%	100%	--	--

✓ denotes yes, x denotes no and – not applicable.

Recommendations

While the concept of human resources for the supply chain is evolving in the Zambian health system, taking decisive actions to professionalize and advance these roles within the sector is critical. Although supply chain operations intersect significantly with pharmacy, biomedical, and other disciplines, it is essential to recognize that supply chain professionals can constitute a distinct cadre within the health system, even though these responsibilities may be assumed by other professionals where resources are limited. While evidence is found of significant focus and efforts in this area, particularly in nationwide supportive supervision and capacity building, focus on last-mile facilities is still needed. The MOH needs to strategically deploy programmatic and financial support in line with the following recommendations:

- Strongly consider developing a human resource workforce plan specific to supply chain management in the health sector. Such a plan should project the sector's HR needs, including the types of staff required at each level and the approach for filling such roles.

- The GRZ should prioritize the recruitment and onboarding of professionals with the requisite competencies in supply chain management to fill critical roles at the central and service delivery levels with the end goal of building a supply chain cadre within the MOH.

- Implement human resources for supply chain assessment for the health sector in Zambia. to fully understand the various supply chain HR gaps in the health sector and determine the extent of resources required to achieve optimal outcomes.

- Prioritize the implementation of pre-service training in supply chain management for professionals such as pharmacists, nurses, and allied professionals to provide a continuous stream of persons with the requisite skills to support supply chain management functions at SDPs.

- Incorporate supply chain functions into formal job descriptions at all levels, especially at health posts and health centers, ensuring that all basic supply chain functions are designated to at least onsite personnel. Simultaneously, ensure appropriate funding, capacity training, and performance measurement (within existing supportive supervision processes) are allocated to empower designated personnel to assume and execute supply chain roles.

- Leverage the extensive supportive supervision mechanism in the health sector to provide training and coaching for a large cadre of staff, particularly nurses who perform supply chain roles as an auxiliary function. Many professionals perform supply chain functions in addition to their core responsibilities, so a structured system should be in place that provides support, avenues, and opportunities for such persons to improve their knowledge and skills to excel in these roles.

- Revisit staffing norms and capacity-building budgets for last-mile facilities. Workload and finances remain barriers to further strengthening supply chain capabilities at the last mile.

Supplemental exhibit

Exhibit 38. Human Resources: Distribution of Questions and Assignation of Weight Across Capability and Facility Levels								
Module	Basic (50%)		Intermediate (30%)		Advanced (15%)		SOA (5%)	
	# of Qs	Weight	# of Qs	Weight	# of Qs	Weight	# of Qs	Weight
Health posts (n=61)	18	2.8%	14	2.1%	7	2.1%	3	1.7%
Health centers (94)	18	2.8%	14	2.1%	7	2.1%	3	1.7%
Level 1 hospitals (28)	18	2.8%	14	2.1%	7	2.1%	3	1.7%
Level 2 and 3 hospitals (10)	21	2.4%	17	1.8%	8	1.9%	3	1.7%
Hubs (7)	23	2.2%	27	1.1%	10	1.5%	6	0.8%
CHAZ (1)	23	2.2%	27	1.1%	10	1.5%	6	0.8%
ZAMMSA (1)	23	2.2%	27	1.1%	10	1.5%	6	0.8%
MOH (1)	16	3.1%	24	1.3%	9	1.7%	6	0.8%

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

Financial Management and Sustainability

Effective supply chains require sufficient and predictable funding streams supported by sound financial management practices. The NSCA assesses financial sustainability across all health system levels 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 getting a high score without some degree of self-sufficiency is difficult, the module intends to understand how facilities manage the funds they receive.

Exhibit 39. 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, refer to the NSCA toolbox, available at www.ghsupplychain.org.*

Zambia's Health Financing Strategy (HFS) 2017–2027 provides a framework for improving and developing health financing in Zambia to contribute to overall health system goals and objectives. The strategy aligns with the country's vision of having a healthy nation by 2030, the National Health Strategic Plan 2017–2021. The Plan emphasizes the need to mobilize resources through equitable and sustainable means to provide cost-effective quality health care that is as close to the family as possible.

The HFS seeks to achieve adequate, sustainable, and predictable financing from both existing and new sources to improve health outcomes. It aims to tackle the country's healthcare financing challenges by enhancing private-sector participation. The strategy will leverage PPPs, efficiently manage household payments through prepayment and pooling mechanisms, and continue collaborating with cooperating partners (CPs) to secure funding for the health sector. The key focus is to advocate for increases in the

share of government funds allocated to the health sector and to ensure that households are not exposed to financial hardships in seeking health services.

The 2017 NSCA recommended the creation of medium- to long-term strategic plans to address budget deficits and ensure the sustainability of procurement funding by the MOH and GRZ. With the passage of the ZAMMSA Act in 2019, the Medicines and Medical Supplies Fund (MMSF) was established to support the procurement of medicines and medical supplies for public health facilities. The fund is designed to ensure a reliable supply of essential medicines, facilitate procurement and distribution, and serve other related functions. It is expected to receive funding from various partners, including the National Health Insurance Management Authority, founded in 2019.

In this NSCA, financial management and sustainability concerns, such as vulnerability to imports and exchange rates and inconsistent monitoring of finances, were identified. The results and findings of NSCA are presented below,

2024 NSCA Findings and Analysis

Financial Management and Sustainability results for maturity model scores and the percentage of facilities reporting key capabilities are displayed in Exhibits 40 and 41. With a capability maturity score of 64 percent, the MOH fell short of the NSCA's recommended score of 80 percent due to budget shortfalls and persistent reliance on donors and partners for supply chain funding. The reported presence of capabilities to financially manage the public health supply chain at the other central-level entities was generally more aligned with the high capabilities expected. ZAMMSA scored highly at 69 percent, while CHAZ scored slightly lower at 46 percent, mostly due to its higher reliance on donors and potential difficulty addressing budget shortfalls. ZAMMSA had 93 percent of basic elements in place, CHAZ had 79 percent, and MOH had 86 percent. The regional hubs are still finding their footing, with only 56 percent of basic elements in place and an overall score of 48 percent. This is expected, as the development of the hubs is ongoing and will likely improve processes soon.

On average, all facility types had two-thirds or more basic items in place, although the assessment found significant variation in available financial capabilities within facility types. At the non-central level, except for level 2 and 3 hospitals at 83 percent (57–100 percent), where capability is consistently higher than average, there is a wide range of variability between sampled facilities: level 1 hospitals, 80 percent (14–100 percent); health centers, 68 percent (0–100 percent); and health posts, 65 percent (0–100 percent). District health offices support or perform many of the financial responsibilities of sites within their jurisdiction. However, the level and type of support vary considerably among different health facility types, with level 2 and 3 hospitals managing many of their finances.

Before highlighting key findings, we 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. They are not a measure of the fiscal health or solvency of the public health supply chain. The high percentage of facilities across all levels of the public health system reporting donor reliance, strategic planning gaps in financing, and insufficient revenue generation, cost recovery, or insurance schemes indicates that financial solvency remains a significant challenge in Zambia's public health supply chain, independent of the simultaneous presence of key financial management capabilities.

Exhibit 40. Financial Management and Sustainability Capability Maturity Model Scores
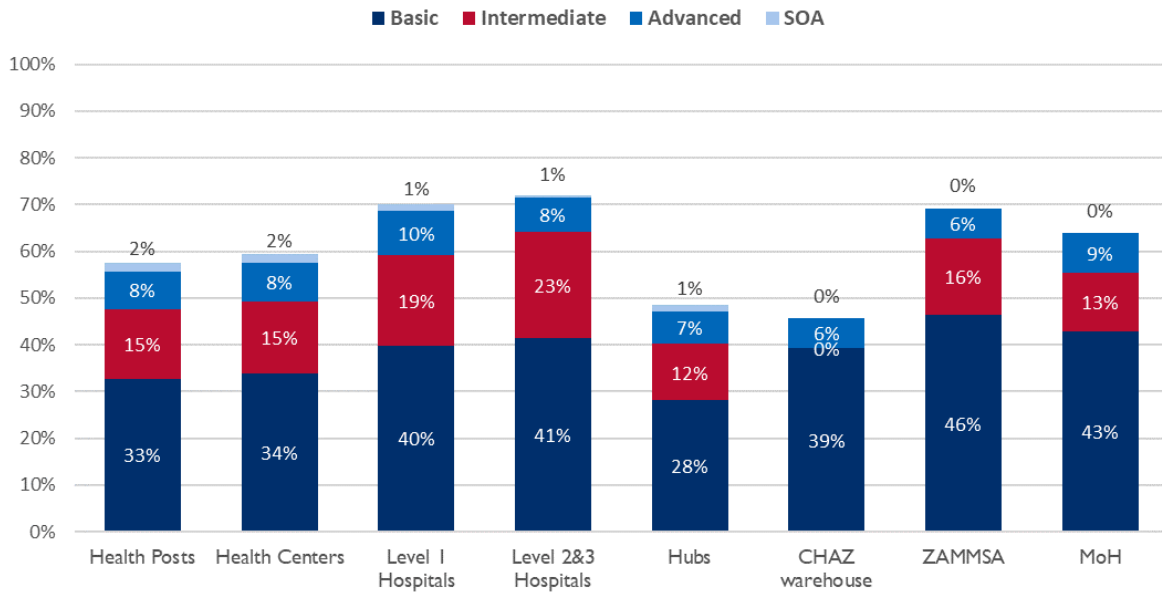
■ Basic ■ Intermediate ■ Advanced ■ SOA

Note on interpreting results: Remember 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, refer to the Understanding the CMM Results section above.

Exhibit 41. Financial Management and Sustainability KPIs, Maturity Score, and Percentage of Facilities With Key Capabilities Related to Supply Chain Management in Place

	Health posts	Health centers	Level 1 hospitals	Level 2 and 3 hospitals	Hubs	CHAZ	ZAMMSA	MOH
n =	61	94	28	10	7	1	1	1
Overall maturity score	57% (6–86%)	59% (6–86%)	70% (13–94%)	72% (5–89%)	48% (45–66%)	46%	69%	64%
Percent of basic items in place	65%	68%	80%	83%	56%	79%	93%	86%
Budgets are prepared or updated annually	76%	75%	89%	90%	100%	✓	✓	✓
Budgets include miscellaneous funds for unexpected issues	52%	54%	65%	60%	29%	X	X	X
Supply chain costs explicitly are recorded and records maintained	51%	52%	71%	80%	86%	✓	✓	✓
Funding strategy that explicitly includes supply chain costs exists	17%	10%	32%	60%	71%	X	X	X
In the past year, was there a health commodities budget shortfall?	32%	23%	42%	20%	14%	X	X	X

✓ denotes yes and x denotes no.

Presence of financial management best practices

Most central entities have several capabilities the NSCA understands as key to financial management and sustainability, including the most basic items. Budgets are prepared and updated annually at the MOH, ZAMMSA, and CHAZ, and the government contributes to supply chain and health commodity costs at ZAMMSA. Exhibit 41 points out places where the GRZ might adopt best practices for supply chain financial management, including budgeting miscellaneous funds for unexpected issues and explicitly incorporating supply chain costs into the broader funding strategy.

Exhibit 41 also demonstrates that significant financial management capabilities exist lower in the supply chain, except for some health posts, health centers, and hubs (currently undergoing development within Zambia). Given the central procurement role ZAMMSA and CHAZ have in the lower levels of Zambia's public health system, it is important and valuable that the central level averaged higher capability maturing scores and mostly confirmed the presence of key financial capabilities, in contrast with the lowest-level health facilities, which had slightly lower scores, except both hospital types, which surprisingly scored higher than some central-level entities. Almost all hospitals reported annual budget preparations, and many reported allocating funds for unexpected issues and explicitly recording supply chain costs. Lower-level SDPs reported diminishing financial capabilities and a high variability within groups.

Strategy and costs

In all facility types except for ZAMMSA, supply chain costs are explicitly recorded and records maintained. While ZAMMSA has a financial department, much of the financial management is done at the Ministry level for ZAMMSA's procurement process. Because ZAMMSA has undergone some leadership changes in the last few months, MOH has taken on financial management. Also, the funding strategy that manages ZAMMSA and MOH does not explicitly include supply chain costs. This strategy can be found in the National Strategic Plan, which is currently under revision. None of the central levels have done a costing study in the last five years, which may be an opportunity for growth within the new strategy under revision.

Exhibit 42. Sources of Funding for Supply Chain Operations								
	Health posts	Health centers	Level 1 hospitals	Level 2 and 3 hospitals	Hubs	ZAMMSA	CHAZ	MOH
n =	61	95	27	10	7	1	1	2
Government budget (central or decentralized level)	97%	97%	100%	100%	86%	100%	0%	50%
Facility revenue/cost recovery	2%	3%	34%	90%	0%	100%	0%	0%
Donor/implementing partners	25%	28%	41%	60%	86%	100%	100%	50%
Percentage of sites reporting government and/or facility revenue contributing most or all of the supply chain budget last year	74%	74%	81%	40%	57%	0%	0%	0%

Exhibit 43. Sources of Funding for Health Commodities								
	Health posts	Health centers	Level 1 hospitals	Level 2 and 3 hospitals	Hubs	CHAZ	ZAMMSA	MOH
n =	61	95	27	10	7	1	1	1
Government budget (central or decentralized level)	99%	100%	100%	100%	86%	0%	100%	50%
Facility revenue/cost recovery	4%	5%	50%	80%	0%	0%	0%	0%
Donor/implementing partners	29%	39%	45%	50%	86%	100%	100%	50%
Percentage of sites reporting government and/or facility revenue contributing most or all of health commodities last year	79%	86%	80%	70%	14%	0%	0%	50%
Percentage of sites reporting a budget shortfall for health commodities last year	32%	23%	42%	20%	14%	0%	0%	50%

Donor relationships and financial sustainability

In the Zambia health care system, most services are free of charge, except for some more advanced procedures at hospitals, for which insurance can be offered and accepted, although only 38 percent of level 1 hospitals and 30 percent of level 2 and 3 hospitals report the insurance reimbursements are timely, and only 24 percent and 60 percent report the amount as sufficient, respectively. Therefore, facility revenue and cost recovery do not play a major role in either funding for supply chain operations or health commodities at facilities. ZAMMSA is an interesting case because it is undergoing development in the facility revenue area—exploring concepts like renting out the excess space within the warehouse, providing logistics services on returning trucks, and possibly looking into offering a procurement service. ZAMMSA expects its facility revenue to continue to grow in the future.

The system for financial sustainability of the health supply chain seems to be well supported by the findings of the NSCA, with some exceptions; however, external donors are relied on heavily, which many of the supply chain staff noted as a weakness in the system. While 86 percent or more of lower-level health facilities report having funding from the central government, more than half of all level 2 and 3 hospitals surveyed, and the central-level entities (ZAMMSA, MOH, and CHAZ) report heavy reliance on donor and implementing partner funding. Even if the health facilities say they have mostly government funding, the government depends greatly on donors to provide the funding. Donors have a hand in a large portion of the metaphorical pie, even if it is unseen by the health facilities. Donors provide money to the MOH (or to CHAZ directly), which then provides funding for ZAMMSA for the procurement of medicines. While procurement is addressed in a different section of this report, we note that ZAMMSA and CHAZ do most of the procurement for the health facilities. It's important to consider this perspective when analyzing health facilities, as they may claim that government funding provides all the necessary resources. However, much of that funding originates from donors upstream. Only facilities directly involved in the procurement and financial management of commodities, such as the level 2 and 3 hospitals, are typically aware of this dynamic.

When asked, "How much do government budgets, or facility revenue/cost recovery contribute to the total supply chain operations budget at this level?" responses varied significantly across facilities. Nearly half of health posts and centers responded "all," compared to only one-third of level 1 hospitals and 10% of level 2 and 3 hospitals.

At the national level, both ZAMMSA and the Ministry of Health (MOH) acknowledged the ongoing need for donor support. ZAMMSA staff answered "some," while MOH staff said "minimal." When asked, "What proportion of the total financial need for supply chain operations was covered by government budgets or facility revenue in the past year?" Donor dependency is evident across the board, with both the government and donors playing significant roles in funding health commodities.

ZAMMSA and CHAZ regularly address budget shortfalls, engaging various stakeholders, including donors, during budgeting processes. More than half of level 2 and 3 hospitals, nearly all hubs, ZAMMSA, CHAZ, and the MOH provide opportunities for donor input. However, experts at CHAZ e recognized that this heavy reliance on donors is a weakness in the supply chain, as unpredictable grant cycles lead to delays and insecurity.

ZAMMSA, CHAZ, and the MOH agree that donor/implementing partner funding is usually consistent with the country's supply chain operations budget needs and priorities. While ZAMMSA and CHAZ do not have a cost-sharing policy with donors for the supply chain, the main donor partnership is with the MOH, which has a cost-sharing plan and routinely tracks donor support. Some of the donors have standing agreements with GRZ. Still, others choose their level of support in the system. These are referred to as "cooperating partners" (i.e., those with standing agreements) or "health financing partners" (i.e., those who fill a need on an ad hoc basis).

Recommendations

This assessment suggests that many best practices in the financial management of public health supply chains are currently in place. However, some gaps in financial capabilities throughout the system undermine supply chain functions and, ultimately, health commodity availability. Therefore, the authors of this report offer the following recommendations:

- The GRZ, through the MOH, should prioritize implementing the HSF 2017–2027, with an emphasis on providing incremental funding to ZAMMSA through the MMSF for the procurement, storage, and distribution of health commodities to reduce reliance on donors.
- With the penetration of the national health insurance scheme increasing, the GRZ and MoH should consider piloting the introduction of drug-revolving funds with the long-term objective of ensuring cost recovery in the health system.
- The MOH and CHAZ intensify discussion on funding options for long-term sustainability as donor support and resources continue to decline.
- Consider implementing a costing study to understand the cost burden of supply chain operations so that the MOH and GRZ have accurate data to project the financial investment required for the long-term sustainability of the public health supply chain system.
- The MOH should document cost-share policies and arrangements and make them available and accessible to system managers and stakeholders.

Supplemental exhibit

Module	Basic (50%)		Intermediate (30%)		Advanced (15%)		SOA (5%)	
	# of Qs	Weight	# of Qs	Weight	# of Qs	Weight	# of Qs	Weight
Health posts (n=61)	7	7.1%	11	2.7%	6	2.5%	4	1.3%
Health centers (94)	7	7.1%	11	2.7%	7	2.1%	4	1.3%
Level 1 hospitals (28)	7	7.1%	11	2.7%	6	2.5%	4	1.3%
Level 2 and 3 hospitals (10)	7	7.1%	11	2.7%	7	2.1%	4	1.3%
Hubs (30)	14	3.6%	11	2.7%	7	2.1%	4	1.3%
CHAZ (1)	14	3.6%	11	2.7%	7	2.1%	4	1.3%
ZAMMSA (1)	14	3.6%	11	2.7%	7	2.1%	4	1.3%
MOH (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 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, refer to the NSCA toolbox, available at www.ghsupplychain.org.

The HSSCS 2019–2021 grounded the availability of quality public health commodities and medical supplies in effective and efficient forecasting, procurement, and rational use. Consequently, the MOH established a dedicated multidisciplinary core team to coordinate all national FASP activities and equipped them with the necessary tools, methods, and processes.

In 2023, the MOH, in collaboration with partners like USAID GHSC-PSM, developed SOPs for national quantification in Zambia. These SOPs provide guidance to the national quantification team and stakeholders on procedures, roles, and responsibilities, ensuring consistency in methodology among various actors. However, gaps remain in capacity and in defining the roles of sub-national structures such as hubs and large hospitals (level 2 and 3). While the development of SOPs in 2023 and the training of personnel address some recommendations from the 2017 NSCA, other recommendations, such as the use of KPIs to standardize and strengthen forecasting and supply planning in the health system, have not been fully addressed.

The CMM scores for the entities assessed for FASP are presented in Exhibits 46 and 47. Note that NSCA typically assumes that FASP capabilities should be present at the "central" level of the supply chain and not very much at the sub-national levels (regional hubs and level 2 and 3 hospitals). In Zambia, the regional hubs and level 2 and 3 hospitals are not necessarily expected to conduct FASP themselves but should at least be aware of their role in the centrally managed process.

2024 NSCA Findings and Analysis

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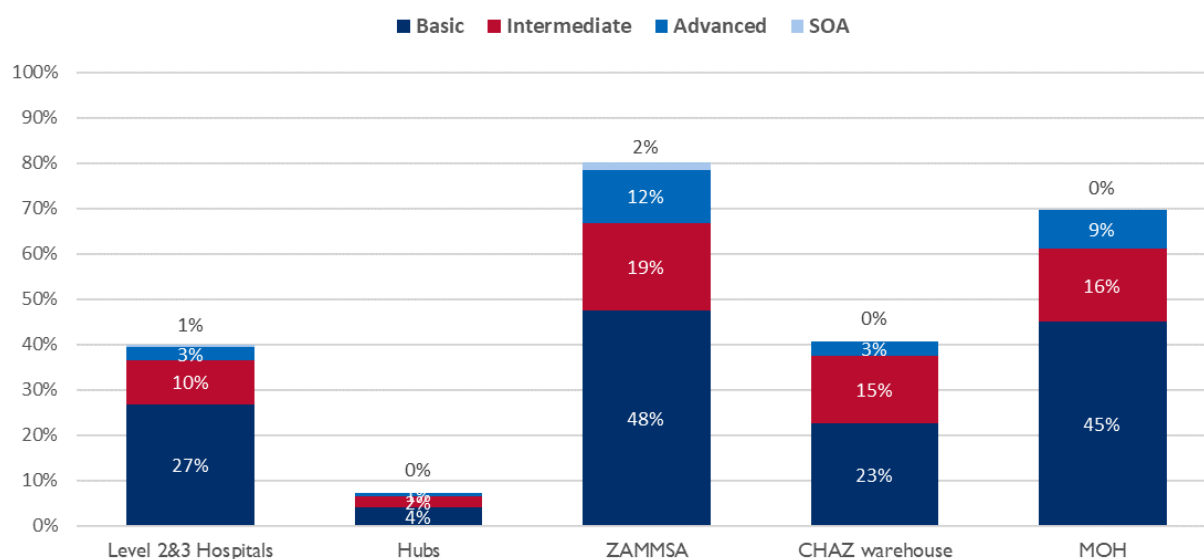
Note on interpreting results: Remember that CMM scores are a composite of assessed basic (max 50 percent), intermediate (30 percent), advanced (15 percent), and SOA (5 percent) capabilities. Reported percentages are the scored results averaged across all assessed sites, for each capability level and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

Exhibit 47. Forecasting and Supply Planning Maturity Score and Basic Capabilities in Place						
	Level 2 and 3 hospitals	Hubs	CHAZ warehouse	ZAMMSA	EPI warehouse	MOH
n =	10	7	1	1	1	1
Overall maturity score (range)	40% (21–70%)	7% (0–35%)	41%	84%	70%	74%
Percent of basic items in place (range)	54% (27–91%)	8% (0–35%)	45%	100%	95%	90%

With the expectation of the CHAZ warehouse, the NSCA revealed strong FASP capabilities among central entities (MOH, ZAMMSA, EPI warehouses) as opposed to much weaker capabilities at the subnational levels (regional hubs and level 2 and 3 hospitals). The MOH obtained a capability maturity score of 74 percent with 90 percent of expected basic elements in place, while the ZAMMSA warehouse had a capability maturity score of 84 percent, exceeding the NSCA benchmark of 80 percent. Also, the EPI warehouse, which stores vaccines, achieved a CMM score of 70 percent with 95 percent of basic elements present.

These high scores are a result of the continuous investments made into the FASP process over the years, such as the development of SOPs, a structured process for conducting FASP-related activities, reliance on local capacity, use of specialized software, and the availability of tools and resources. Still, gaps are found in process documentation, access and retrieval of information, and minimal government funding for FASP. For instance, forecast accuracy was assumed to be generally measured as part of the performance monitoring process. However, the availability of reports on previous performance was limited. Also, the MOH, being the central coordinating entity for the supply chain, must consider strengthening its technical unit to coordinate and supervise the FASP among the various entities involved in the process. The country must assume greater responsibility in all aspects of the process so that donor or cooperating partner roles become more complementary.

The CHAZ warehouse recorded a capability maturity score of 41 percent, with 46 percent of expected basic elements in place. This is because although the entity conducts its own forecasting for commodity requirements, its supply plan is embedded within the MOH supply plan for the entire country. While this situation may not significantly affect performance in commodity supply and availability, the NSCA process considers the separation of the two processes as a performance risk and, therefore, scores the entity low. The CMM scores obtained by the regional hubs and level 2 and 3 hospitals, i.e., 7 percent and 40 percent, respectively, are evidence of where that country needs to prioritize capacity building for FASP. These entities may not conduct FASP rigorously at the central level, yet their awareness of the process, their specific roles and responsibilities, and how to conduct the process at their level must be established. For the regional hubs, capacity in this process must be enhanced if their scope of operation is to be expanded in the future.

Methodology	Level 2 and 3 hospitals	Hubs	CHAZ warehouse	ZAMMSA	EPI warehouse	MOH
Morbidity based	30%	0%	✓		✓	✓
Consumption based	100%	29%	✓	✓	✓	✓
Demographic projections	40%	0%	✓		✓	✓
Service statistic-based	60%	14%	✓		✓	✓

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

✓ denotes yes, and x denotes no.

Reviewing the scores in Exhibit 49, it is evident that government funding for FASP activities is minimal and can be improved to enhance sustainability. Thus, the role played by donors should be considered transitional as the country takes greater responsibility in the area. Exhibit 49 shows the multiplicity of methods (morbidity, consumption, demographic projections, service statistics), including the reliance on transactional data that is used in quantifying health commodities. While using multiple methods is not injurious. a concerted effort should be made to arrive at the "gold standard" of using consumption data in all cases so that other methods become complementary.

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

	Level 2 and 3 hospitals	Hubs	CHAZ warehouse	ZAMMSA	EPI warehouse	MOH
Minimal (less than 25%)	0%	100%	100%	100%	100%	100%
Some (25–50%)	10%	0%	0%	0%	0%	0%
Most (51–99%)	40%	0%	0%	0%	0%	0%
All (100%)	30%	0%	0%	0%	0%	0%
Don't know						

FASP activities performance monitoring: Performance monitoring is critical for the success of FASP activities. Exhibit 50 shows NSCA calculations of forecast accuracy for the underlisted tracer commodities at the national level using available data for 2023.

Exhibit 50. FASP Accuracy for All Tracer Products at the National Level			
Product	Forecast accuracy	Supply plan accuracy	MAPE
TLD tablet 50/300/300	–60%	--	160%
Pediatric DTG 10mg	70%	82%	30%
RHZE	0%		100%
AL 20/120mg	57%	64%	43%
BCG vaccine	100%	100%	0%
Oxytocin (10 IU injectable)	97%	88%	3%
Medroxyprogesterone acetate, 150mg, injection	84%	91%	16%
Amoxicillin dispersible tablets	55%	–1891%	45%
Combined oral contraceptives (Microgynon)	–384%		484%
Male condoms	59%	–13%	41%
Examination gloves	43%	–716%	57%
EDTA K2/K3 blood collection tubes	88%	81%	12%
Malaria RDT	85%	–600%	15%
RPR test			
Determine RTKs	94%	92%	6%

Recommendations

The NSCA found a disparity of capabilities in FASP across entities, with a reassuringly solid performance at the central level and, to a lesser point, at the sub-national level. However, even at the central level, some gaps must be closed to strengthen the process further. The recommendations, therefore, are to:

- Incrementally improve government ownership, funding, and technical leadership for FASP. The MOH leadership for FASP should be reinforced by strengthening the control tower to own the tools for the process, manage data, monitor performance, and enforce corrective actions.
- Institutionalize the monitoring and reporting of FASP-related performance indicators such as forecast accuracy, supply plan accuracy, and others at the national and publish such reports so that they are accessible for performance tracking.
- Initiate steps to build capacity for FASP at subnational levels (large hospitals and regional hubs) with SOPs to clarify roles and responsibilities.
- Strengthen data quality to increase confidence in the reliance on consumption data for quantification

Supplemental exhibit

Exhibit 51. 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
Level 2 and 3 hospitals	22	2.3%	26	1.2%	12	1.3%	3	1.7%
Hubs	20	2.5%	7	4.3%	14	1.1%	3	1.7%
ZAMMSA	20	2.5%	7	4.3%	14	1.1%	3	1.7%
EPI warehouse	20	2.5%	7	4.3%	14	1.1%	3	1.7%
CHAZ	20	2.5%	7	4.3%	14	1.1%	3	1.7%
ZAMMSA	20	2.5%	7	4.3%	14	1.1%	3	1.7%
MOH	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 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 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 ensure 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 52 provides various examples of procurement capabilities at different levels.

Exhibit 52. Examples of Scored Procurement and Customs Clearance Capabilities	
Basic	Existence of an approved vendor list All tenders include terms and conditions A documented process is in place for identifying and qualifying vendors A contract management or an order and delivery management system is in place
Intermediate	Procurements are approved by authorized personnel/stakeholders Vendor performance results are communicated to vendors Entity benchmarks or compares its purchase prices against market indices
Advanced	A procurement ethics or anticorruption program is in place External audits of the procurement system are conducted annual Procurement appeal decisions are made publicly available
SOA	Data in the contract management system are updated in real time or daily An electronic procurement (e-procurement) process is used

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

Procurement of medicines for the Zambia public health supply chain is principally the responsibility of ZAMMSA. The ZAMMSA Act 2019 empowers it to be the principal entity for the procurement of medicines and medical supplies for the public health system in Zambia although other entities such as the level 2 and 3 hospitals procure specialized products for their use. Through the MMSF, which receives funding from the NHIA and other partners, ZAMMSA is expected to support the procurement and distribution of medicines and medical supplies for public health facilities. The CHAZ plays a complementary role in procurement, storage, and distribution of health commodities in Zambia through donor funding. Consequently, the assessment of procurement in the supply chain was limited to ZAMMSA, the CHAZ warehouse, and level 2 and 3 hospitals.

The 2017 NSCA recommended the MOH develop procurement SOPs and make them available at all levels of procurement. It further recommended the introduction of additional controls, such as internal procurement audits to reduce risks and value-for-money analysis with benchmarking and price negotiations to obtain savings. Results of 2024 indicate significant progress made in these areas, among others, and indicate where gaps persist for the action to be taken. Areas of progress are also noted, such as the GRZ's significant funding of procurement of medicines and supplies for the health sector.

2024 NSCA Findings and Analysis

Exhibits 53 and 54 display capability maturity scores for procurement at ZAMMSA, CHAZ, and the level 2 and 3 hospitals. ZAMMSA attained the NSCA capability maturity benchmark score of 80 percent with 87 percent of the required basic elements in place. The CHAZ warehouse also obtained an appreciable

score of 75 percent, while the level 2 and 3 hospitals achieved a much lower capability maturity score of 50 percent. Overall, the capability maturity scores obtained by the entities assessed can be described as strong with some of the entities achieving the preferred benchmark score of 80 percent and above.

Exhibit 53. Procurement and Customs Capability Maturity Scores
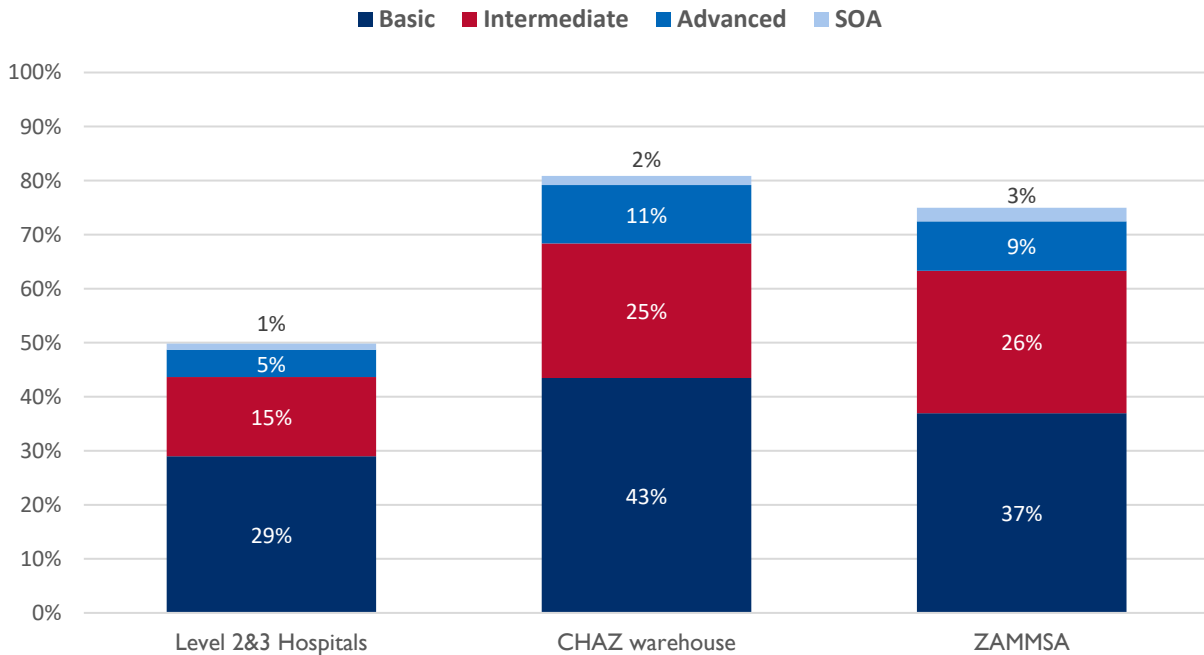
■ Basic   ■ Intermediate   ■ Advanced   ■ SOA

Note on interpreting results: Remember 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, refer to the Understanding the CMM Results section above.

Exhibit 54. Procurement and Customs Clearance Maturity Score, and Basic Capabilities in Place

	Level 2 and 3	CHAZ warehouse	ZAMMSA
n =	10	1	1
Proportion of assessed facilities reporting that site procures some pharmaceuticals directly	100%	100%	100%
Overall maturity score (range)	50% (6–83%)	75%	81%
Percent of basic items in place (range)	58% (10–90%)	74%	87%

Procurement processes

The CMM scores are indicative of procurement capabilities across the entities assessed. ZAMMSA, the state agency for procuring medicines and medical supplies, obtained a score of 81 percent because of the presence of key capabilities that promote procurement integrity and efficiency. These include the presence of a regulatory framework and SOPs to guide the process. Procurements at ZAMMSA are based on the NEML that is updated regularly, national treatment guidelines, user specifications, or user department specifications from an approved vendors list that is kept in a database. Internal control systems, such as value thresholds, contracts oversight committees, separation of roles, and legal reviews, are in place to maintain integrity throughout the procurement process. External audits of the procurement system take place annually or more often when required. Process transparency is enhanced by the use of the Public Procurement Authority website so that vendors can see current bid opportunities, solicitation schedules, and bid results. Measures for tender evaluations are clearly defined, and both successful and unsuccessful bidders are formally notified of bid results. Still, large segments of the procurement process at ZAMMSA are conducted manually, although plans are in motion to transition to a fully electronic procurement system. Although KPIs are in place to track procurement performance, they are not often applied consistently, and record-keeping is not optimal for information access and retrieval for verification. Sustainability threats are also apparent, as large portions of the procurement budget remain donor driven.

CHAZ conducts complimentary procurements for the health system through donor funding. It obtained a capability maturity score of 75 percent with 74 percent of expected basic elements in place. Like ZAMMSA, CHAZ has strong procurement systems, including internal and external control systems, to ensure the process is of the highest standards. These include anti-corruption programs and annual external audits of the procurement system. Still, gaps are seen in performance tracking and process documentation for performance verification, and the entire process is donor-financed, posing risks to sustainability.

Among the level 2 and 3 hospitals, procurement capability maturity scores reached 50 percent, with 58 percent of the expected basic elements in place. As noted in the 2017 NSCA, the availability of SOPs and regulatory frameworks for procurement at this level is yet to be fully in place. The processes these entities must follow during their local procurements should be clearly outlined and documented for verification. These facilities must be assisted in putting measures in place, such as an approved vendors list, bidding calendar, and criteria for vendor evaluation. Performance tracking also has gaps, so the selection and use of KPIs would be beneficial to these facilities.

Exhibit 55. Key Procurement Capabilities (Resources, Practices, and Items) and Percentage of Facilities Reporting

	Level 2 and 3 hospitals	CHAZ	ZAMMSA
n =	10	I	I
Procurements approved by authorized personnel or stakeholders	100%	✓	✓
Internal control systems	Value thresholds; protocols; tender committee; contract mgt	Value thresholds; tender and contract committees; separation of roles; legal review	Value thresholds; tender committee; tender and contract committees; separation of roles; legal review
Annual external audits of procurement system	90%	✓	✓
Procurement ethics or anticorruption program in place	70%	✓	✓
Procurement guidelines, manuals, or SOPs available (and onsite)	40%	✓	✓
Documented process for identifying and qualifying vendors	30%	X	✓
Approved vendor list exists	50%	✓	✓
Vendor information is maintained in a database	50%	✓	✓
Most common system for maintaining procurements information	Electronic file (50%); software (20%); manual (80%)	Electronic file (100%)	Software I (100%)

✓ denotes yes and x denotes no

Exhibit 56. Procurement KPIs for Central Level entities

	CHAZ	ZAMMSA
Vendor on time and in full rate*	--	--
Vendor fill rate*	--	--
Percentage of procurements placed as an emergency order	--	3%
Average number of days for customs clearance	2.5	--
Stock turn per annum	3.0	4.1
Percent of incoming batches tested for quality	100%	100%
Percent of product batches tested that meet quality standards	100%	100%

*These were not measured due to unavailable data.

Source of funds for procurement. Another important component of Zambia's procurement environment is the funding sources for those procurements. Exhibits 57 and 58 detail the source of funds

for procurements for Zambia's public health programs in the past year. Since donors are significantly involved in procuring health commodities, the government must make incremental contributions as donor contributions continue to narrow globally.

Exhibit 57. Source of Funds for Procurement			
Funding source	Level 2 and 3 hospitals	CHAZ	ZAMMSA
Government	80%		✓
Donor/implementing partners	20%	✓	✓
Facility revenue/cost recovery	70%		

✓ denotes yes and x denotes no

Exhibit 58. Funding Split for the Procurement of Health Commodities in 2023		
Funding entities	CHAZ	ZAMMSA
USAID	--	32.9%
GRZ	--	52.0%
Global Fund	100%	11.5%
UNFPA	--	2.0%
OIS	--	1.6%

Prices paid

Exhibit 59 shows the percentage of international reference prices paid for the different commodities that were procured by ZAMMSA in 2023. Prices were, in principle, expected to be relatively less competitive, considering the need to use local currency, while international prices are rendered in U.S. dollars and the fact that supply to landlocked countries such as Zambia is more expensive than to countries with access to a seaport. Despite these factors, an average price deviation of 127 percent and a range of 316 percent when compared to the international reference justifies the need to prioritize value-for-money analysis and price benchmarking for the procurement of medicines and medical supplies. Note that the calculations will show lower prices as a percentage less than 100 percent.

Exhibit 59. Percentage of International Reference Price Paid by ZAMMSA for Select Commodities

Commodity	Percentage of average international price paid	Commodity	Percentage of average international price paid
Albendazole 400mg tablet	208%	Feeding tubes CH14 disposable 80cm	31%
Atropine 1mg/ml injection	106%	Folic acid 5mg tablet	132%
Azithromycin capsules 500mg (150)	52%	Hypodermic needle 22G (100)	323%
Benzathine benzylpenicillin 2.4 mega injection	101%	Insuline, 30/70IU injection 10ml Vial (1)	58%
Calcium gluconate 10%, 95mg/ml,10ml amp (1)	123%	Metronidazole 200mg tablet	157%
Ceftriaxone sodium USP 1g powder for injection	182%	Nasal oxygen cannula adult	8%
Ciprofloxacin infusion 2mg/ml 100ml bottle (1)	98%	Nasal oxygen cannula infant	7%
Dexamethasone 4mg tablet	79%	Paracetamol 100mg tablet	177%
Dexamethasone 4mg/ml injection, 2ml (100)	15%	Pyridoxine 50mg tablet	84%
Dextrose 5% + sodium chloride 0.9% solution 1,000ml	111%	Ringers lactate IV 500ml (28)	101%
Dextrose 50% injection 50ml (1)	246%	Ringers lactate solution 500ml (24)	122%
Diclofenac sodium 50mg tablet (200)	189%	Sodium chloride 0.9% solution 500ml	83%
Doxycycline 100mg tab/cap (500)	266%	Sodium chloride 0.9% 500ml (25)	73%
Erythromycin stearate 250mg tablet	79%	Vitamin B complex tablet	183%
Esomeprazole tablet 20mg (500)	92%	Zinc sulphate 20mg tablet	322%

Customs clearance. As detailed in Exhibit 60, NSCA found strong customs clearance capabilities at ZAMMSA and CHAZ warehouses. The turnaround time for clearing goods arriving through the land borders or the airport was mostly within a day.

Exhibit 60. Customs Clearance Capabilities			
	Level 2 and 3 hospitals	CHAZ	ZAMMSA
The entity responsible for customs clearance	N/A	✓	✓
Parties are notified of shipment arrivals	--	✓	✓
Customs clearance outsourced	--	✓	✓
Duration of clearance at the airport	--	I day	I day
Duration of clearance of shipments by road	--	I day	I day

. ✓ denotes yes and x denotes no

Recommendations

The overall maturity score of the central-level entities active in procurement was strong at ZAMMSA and the CHAZ warehouses, although data on key performance indicators were limited. At the level 2 and 3 hospitals, significant gaps in capacity still must be addressed to bring them to desirable levels of performance. The following recommendations are proposed:

1. Improve procurement transparency through enhanced process documentation, centralization, and the application of key performance indicators to track performance. This should include process digitalization to reduce manual processes and facilitate access to documents and data for performance tracking.
2. Strengthen the dissemination and application of procurement regulation and standard operating procedures to subnational entities involved in procuring health commodities.
3. Ensure the government makes incremental investments and increases resource allocation for the procurement of medicines and medical supplies so that donor investment will be minimal in the long term.
4. Continue to monitor procurement performance, including price benchmarking, to ensure value for money in the procurement process.

Exhibit 61. Procurement and Customs Clearance: 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
Level 2 and 3 hospitals (10)	20	2.5%	33	1.1%	16	1.0%	4	1.2%
CHAZ warehouse (1)	20	2.5%	33	1.1%	16	1.0%	4	1.2%
ZAMMSA (1)	20	2.5%	33	1.1%	16	1.0%	4	1.2%

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

Warehousing and Storage

The Warehousing and Storage section seeks to ensure pharmaceuticals are stored using the most appropriate method to confirm their quality for patient use. Major areas that were factored into the scoring for this CMM module are existence of, and adherence to, SOPs for storage and inventory management, adequate physical infrastructure, and safety equipment for storage of commodities, and appropriate security and accountability mechanisms in place (see Exhibit 62). Exhibits 63 and 64 show warehousing and storage results.

Exhibit 62. Examples of Warehousing and Storage Capabilities	
Basic	Inbound shipments are checked for quantity, carton/pallet count, and documentation Stock cards are used to track and manage inventory A repair and maintenance plan is in place for all equipment and utilities
Intermediate	Facilities receive distribution schedule in advance from the issuing warehouse or supplier Different batches of quarantined product are segregated in the quarantine area
Advanced	Temperature is electronically monitored and linked to audible alarms when temperature is outside established range Warehousing and storage data and information are backed up offsite
SOA	Proof of deliveries are maintained through an automated system (such as barcodes scanned) An 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, refer to the NSCA toolbox, available at www.ghsupplychain.org.

The MOH and its partners have made significant strides in enhancing storage and distribution systems in recent years. Aligning with the MOH's vision of bringing health services closer to families, the MOH and GRZ have established seven regional hubs. These hubs boast a storage capacity of 10,416 pallets distributed across various parts of the country to facilitate last-mile delivery of health commodities. Additionally, the central warehouse's storage capacity has been expanded from approximately 8,000 to 32,000 pallets and modernized with several improvements in hard and soft infrastructure to boost service delivery.

Despite these advancements, storage challenges persist nationwide. Many health facilities continue to face stockkeeping and storage issues, which adversely impact the provision of adequate services.

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As anticipated, warehousing and storage capabilities improve further up in the supply chain beyond the last mile. ZAMMSA achieved the highest score of 78 percent among all entities in the supply chain. The CHAZ and EPI warehouses attained 65 percent and 53 percent, respectively, while regional hubs scored 63 percent. Among the SDPs, capability maturity scores ranged from 34 to 50 percent. Level 1 hospitals scored 50 percent, followed by level 2 and 3 facilities with 49 percent, and health centers and health posts with 34 percent and 41 percent, respectively. Exhibits 63 and 64 present the capability maturity scores for warehousing and storage, categorized by facility type. Results will be analyzed across several sections, including storage practices, stock card use, storage conditions, and stock availability.

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

	Health posts	Health centers	Level 1 hospitals	Level 2 and 3 hospitals	Hubs	CHAZ warehouse	EPI warehouse	ZAMMSA
n =	61	93	28	10	7	1	1	1
Overall maturity score (range)	34% (18–51%)	41% (20–59%)	50% (30–66%)	49% (35–65%)	63% (49–74%)	65%	53%	78%
Percent of basic items in place (range)	44% (18–66%)	52% (25–75%)	63% (44–84%)	64% (41–82%)	73% (55–84%)	80%	65%	85%

Exhibit 64. Warehousing and Storage Capability Maturity Scores
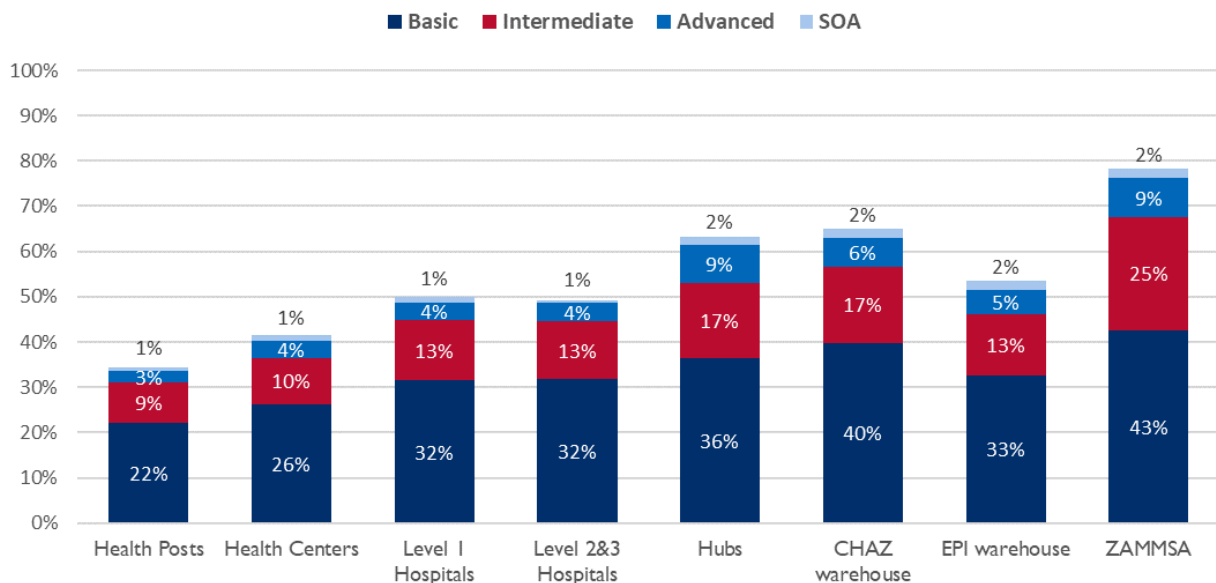
Note on interpreting results: Remember that CMM scores are a composite of assessed basic (max 50 percent), intermediate (30 percent), advanced (15 percent), and SOA (5 percent) capabilities. Reported percentages are the scored results averaged across all assessed sites, for each capability level and facility type. For more information, refer to the Understanding the CMM Results section above.

Inventory management practices. Exhibits 66 and 67 provide insights into aspects of the inventory management practices assessed. The MOH has SOPs for logistics management to guide inventory management in the supply chain, albeit there are specific SOPs for some health programs. Results of the assessment indicated that at least 50 percent of SDPs were unable to produce a copy (for verification either as hard or soft copies). Indeed, the SOPs manuals for the logistics management of the essential medicines and the national anti-retroviral logistics system were recently revised, but these must be finalized and disseminated to all levels of service delivery to standardize practices and provide effective

guidance for logistics management in a system where human resource for supply chain capacity and availability is limited.

While the central level of the supply chain has developed distribution schedules for the supply of commodities, only 25–57 percent of respondents were aware of the distribution schedule and how it related to them. With respect to maximum and minimum stock levels set for SDPs throughout Zambia, their acknowledgment and application across the system were inconsistent. When asked whether their inventory management system employs max/mins levels, 90–100 percent of SDPs and the hubs responded in the affirmative. However, the information provided by respondents during data collection pointed to the non-uniformity of max-min levels application at similar levels of the supply chain. For the hubs, it was difficult to determine their max-min levels since they were originally designed as cross-docks for reaching the last mile and not stock-holding locations. However, as the country intends to decentralize warehousing to this level, it is important to initiate the conversation on the applicable level of maximum and minimum stocks the hubs are expected to maintain.

Exhibit 65. Inventory Management Practices Reported by Facilities					
	Health posts	Health centers	Level 1 hospitals	Level 2 and 3 hospitals	Hubs
SOPs physically verified	26%	51%	42%	50%	86%
Presence of a distribution schedule	25%	26%	50%	40%	57%
Presence of proof of delivery	100%	96%	91%	100%	14%

Exhibit 66. Practices and Methodology Used for Ordering as Reported by Facilities					
	Health posts	Health centers	Level 1 hospitals	Level 2 and 3 hospitals	Hubs
Using min-max guidance	81%	87%	80%	70%	57%
Using previous consumption to inform ordering	12%	7%	9%	30%	14%
Using intuition to inform ordering	0%	0%	0%	0%	0%

Evidence of good inventory management practices is found throughout the system. For example, most SDPs checked inbound shipments for quantity and remaining shelf life. Also, 66–90 percent of health posts, health centers, and hospitals will 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. Equally commonplace was maintaining proof of delivery (POD) records for all products received. Maintenance of PODs ranged from 91 percent for the level 1 hospitals to 96 percent for health centers and 100 percent for the health posts and the level 2 and 3 referral hospitals.

Stock card use and inventory tracking

Exhibit 67 displays the percentage of facilities, by tracer commodity, that were found to have perfectly accurate stock cards on the day of the visit. This performance is good with most of the tracer products assessed achieving accuracy levels of above 50 percent. Overall, the average accuracy rates obtained we 60 percent for health posts, 70 percent for health centers, 67 percent for level 1 hospitals, 52 percent for level 2 and 3 hospitals, and 94 percent for regional hubs.

Exhibit 67. Percentage of Facilities with 100 Percent Accurate Stock Card, by Tracer Commodity					
	Health posts	Health centers	Level 1 hospitals	Level 2 and 3 hospitals	Hubs
n =	62	91	28	10	7
TLD 90	--	68%	100%	100%	100%
DTG 10mg	88%	74%	94%	100%	100%
RHZE	40%	66%	87%	100%	0%
AL 20/120mg	--	64%	95%	75%	60%
BCG vaccine	--	84%	100%	100%	100%
Oxytocin	57%	57%	100%	100%	--
DMPA I.M	56%	65%	100%	75%	100%
Amoxicillin disp. tabs 250mg	23%	79%	92%	100%	100%
CoC	56%	65%	93%	100%	100%
Male condoms		66%	73%	100%	60%
Examination gloves	100%	73%	79%	67%	75%
EDTA K2/K3		46%	88%	75%	100%
Malaria RDT	44%	54%	67%	75%	60%
RPR test	100%	71%	--	--	--
Determine RTKs	--	55%	70%	50%	33%
AVERAGE	60%	70%	67%	52%	94%

Storage conditions. For infrastructure, many of the basic components are in place at varying degrees across the system. Exhibit 68 outlines the basic infrastructure at the hubs and SDPs.

Exhibit 68. Specialized Storage Capabilities at Service Delivery Points

	Health posts	Health centers	Level 1 hospitals	Level 2 and 3 hospitals	Hubs
Permanent and leak-free roofing	79%	87%	98%	70%	100%
Insulated and leak-free ceiling	47%	63%	94%	70%	86%
Adequate ventilation	45%	58%	76%	70%	100%
Smooth and non-porous floor	88%	91%	98%	90%	86%
Electric lightening	40%	69%	100%	100%	100%
Products stored on pallets, away from walls	--	--	--	--	71%
Warehouse room temperature monitored	48%	66%	82%	90%	100%
Warehouse humidity levels	4%	9%	1%	0%	14%

Permanent, leak-free roofing in facilities is ubiquitous across the country, but deficits are found at the health posts, health centers, and level 2 and 3 hospitals. The floors in the storage areas were smooth and non-porous in 86–98 percent of the SDPs and the hubs. However, there are gaps in adequate ventilation, which could increase humidity and cause damage to medical supplies. In a system where monitoring storeroom temperature and humidity is irregular, this observation must be prioritized for attention. Electricity coverage was 40 percent for health posts and 69 percent for health centers, although the hospitals and hubs had 100 percent access to electricity. However, the availability of backup power at the SDPs is also a challenge, with about 26 percent of health posts, 35 percent of health centers, and 13 percent of level 1 hospitals reporting the absence of backup power. At the central level, the massive investment made by the government and partners in recent times has resulted in the development of infrastructure that ensures all the basic elements are in place for commodity storage.

Cold chain storage was available in 67 percent of health posts and 87 percent of health centers. Except for two level 2 and 3 hospitals, all the hospitals and the hubs had cold storage facilities available during the assessment. The ZAMMSA, CHAZ, and EPI warehouses have cold rooms, and temperature is monitored regularly to maintain product integrity. However, temperature monitoring is manually documented, although digital devices are used to measure temperature. Temperature logs were at all the central storage locations, the hubs, and 72–79 percent of the SDPs. Notably, temperature excursions outside the 2–8-degrees Celsius range were observed in fewer than 2 percent of sites within the six months preceding the assessment.

Exhibit 69. Cold Storage Capabilities at Service Delivery Points and Hubs

	Health posts	Health centers	Level 1 hospitals	Level 2 and 3 hospitals	Hubs
Percentage of facilities that have cold chain storage	67%	87%	100%	80%	100%
Percentage of that have a temperature log	72%	78%	79%	70%	100%
Percentage of time with a temperature excursion	1%	2%	0%	0%	1%

Exhibit 70 details specialized storage capabilities at service delivery points and the hubs regarding designated quarantine areas for storage, storage for hazardous substances, and storage of controlled substances. Health posts had the least capacity, with only 14 percent and 18 percent having designated quarantine areas and storage areas for controlled substances. At the health centers, designated quarantine area availability was 29 percent, as opposed to 40 percent at the level 2 and 3 hospitals and 66 percent at the level 1 hospitals.

Two of the seven hubs did not have a designated quarantine area, as was the case at ZAMMSA; however, the CHAZ and EPI warehouses have clearly labeled quarantine areas. At ZAMMSA, commodities that are quarantined will not be available for picking and dispatch, regardless of their location, because the warehouse management system (WMS) removes these items from the available inventory.

Exhibit 70. Specialized Storage Capabilities at Service Delivery Points					
	Health posts	Health centers	Level 1 hospitals	Level 2 and 3 hospitals	Hubs
Percentage of facilities that have a designated quarantine area	14%	29%	66%	40%	71%
Percentage of facilities that have designated storage for hazardous substances	12%	22%	53%	40%	71%
Percentage of facilities that have designated storage for controlled substances	18%	40%	88%	90%	71%

Stock availability. The NSCA examined stock levels over the previous six months before the assessment by reviewing historical stock records. Exhibit 71 displays the stocked according-to-plan (SATP) rates, defined as the number of observations of stock levels within min/max levels over the defined period. SATP rates were low, averaging between 13 and 33 percent at the SDPs, and not possible to determine at the hubs since they were designed to be cross-docks for delivery to SDPs, not to be inventory-holding locations. The SATP rates point mostly to stockouts, understocking, or overstocking at the SDPs levels.

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

Legend:
- TLD 90
- BCG Vaccine
- CoC
- Malaria RDT
- DTG 10mg
- Oxytocin
- Male Condoms
- RPR Test
- RHZE
- DMPA I.M
- Examination Gloves
- AL 20/120mg
- Amoxicillin disp. tabs 250mg
- EDTA K2 / K3
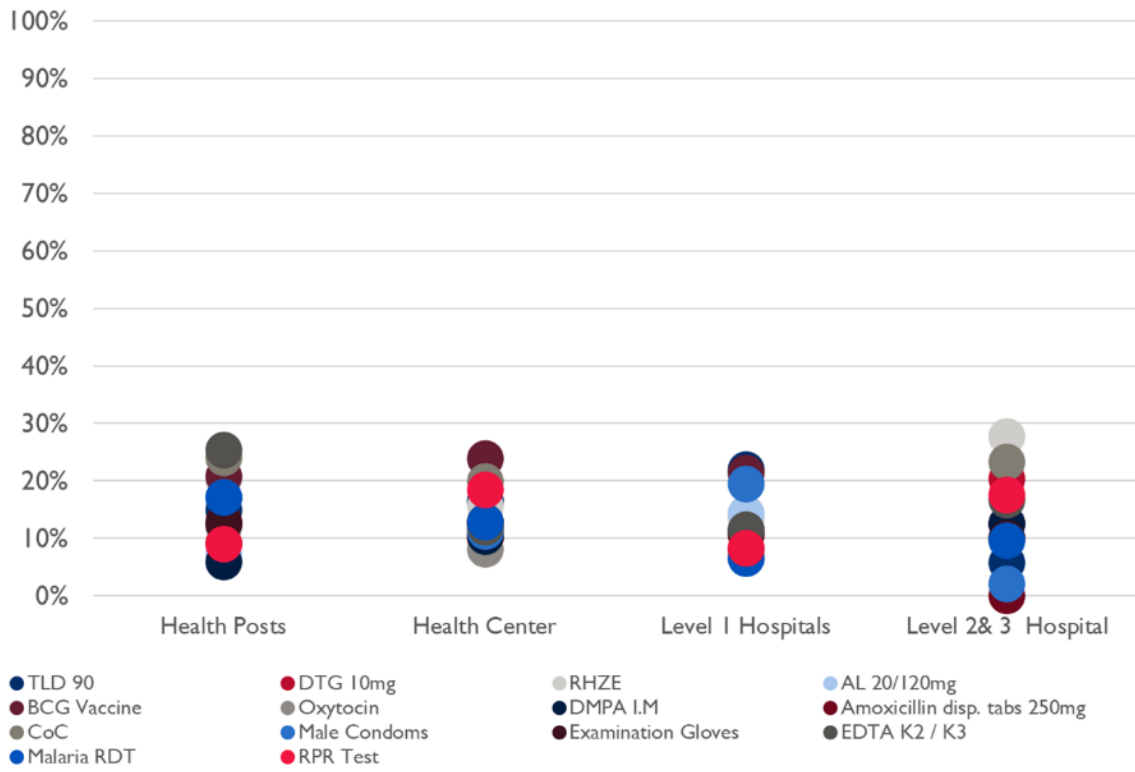
Exhibit 72. SATP Rates for All Tracer Products by Level in the Supply Chain					
	Health posts	Health centers	Level 1 hospitals	Level 2 and 3 hospitals	Hubs
n =	62	91	28	10	7
TLD 90	15%	17%	22%	6%	29%
Pediatric DTG 10mg	9%	10%	8%	20%	17%
RHZE	20%	16%	14%	28%	--
AL 20/120mg	7%	12%	14%	13%	8%
BCG vaccine	21%	24%	21%	13%	--
Oxytocin (10 IU injectable)	12%	8%	8%	10%	0%
DMPA 150mg injection	6%	10%	11%	13%	4%
Amoxicillin dispersible tablets	13%	13%	11%	0%	50%
Combined oral contraceptives (CoCs)	24%	20%	7%	23%	94%
Male condoms	17%	11%	19%	2%	8%
Examination gloves	13%	13%	11%	10%	44%
EDTA K2/K3 tubes	25%	12%	12%	17%	8%
Malaria RDT	17%	13%	6%	10%	38%
RPR test	9%	18%	8%	18%	100%
	0%	0%	0%	--	--
Average	14%	13%	12%	13%	33%

The availability of commodities at SDPs is the top priority of any well-functioning pharmaceutical supply chain. The NSCA found that stock was mostly available throughout the system, with no specific commodity or facility type being singled out. No facility stood out as having more consistent availability. Average stockout rates at SDPs for commodities assessed ranged from 23 to 30 percent and 63 percent at the regional hubs. This is a possibility because commodities move rapidly from the hubs to SDPs, so products are more available at the SDPs than at the hubs, which serve as cross-docks. Hence, to minimize overstocking and stockouts, there must be a clear relationship between product availability SDPs and stocking levels.

Exhibit 73. Percentage of Facility Stockout of a Tracer Commodity on the Day of the Assessment

Legend: TLD 90, DTG 10mg, RHZE, AL 20/120mg, BCG Vaccine, Oxytocin, DMPA I.M, Amoxicillin disp. tabs 250mg, CoC, Male Condoms, Examination Gloves, EDTA K2 / K3, Malaria RDT, RPR Test, Determine RTKs
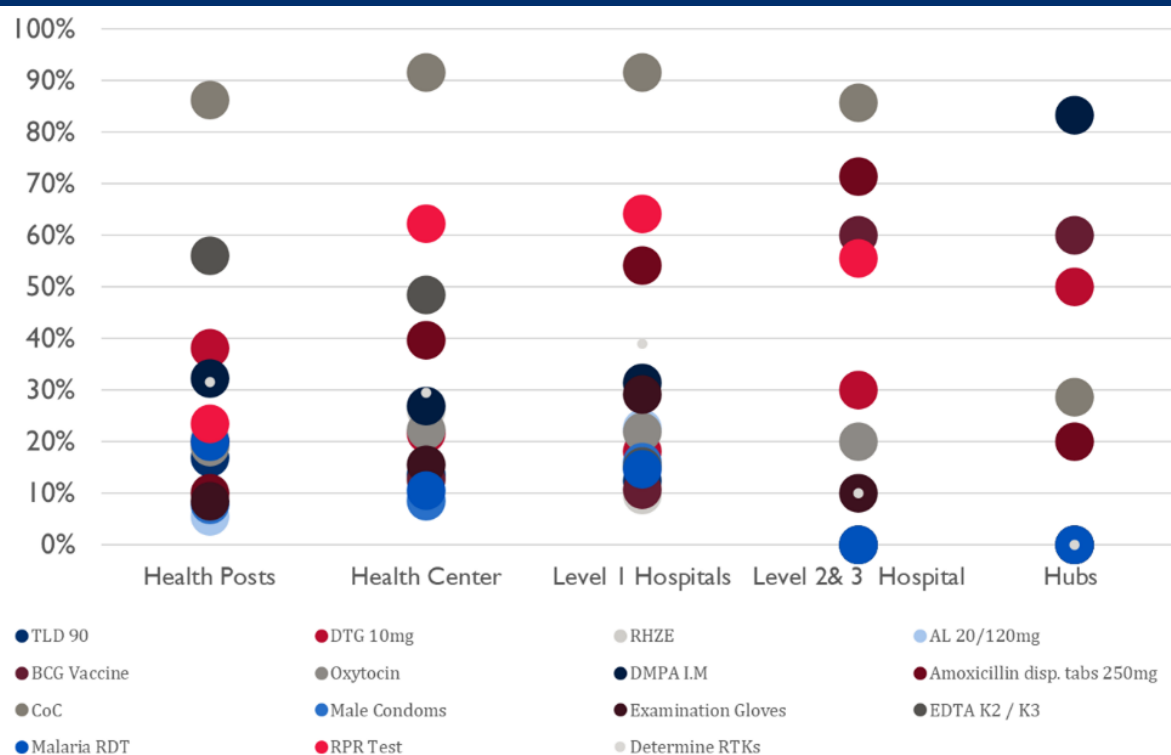
Exhibit 74. Percentage of Facilities With Stockout on the Day of Assessment

	Health posts	Health centers	Level 1 hospitals	Level 2 and 3 hospitals	Hubs	CHAZ	ZAMMSA
Number of observations:	62	91	28	10	7	1	1
TLD 90	17%	14%	12%	0%	33%	--	0%
Pediatric DTG 10mg	38%	22%	18%	30%	17%	0%	0%
RHZE	21%	26%	10%	0%		--	0%
AL 20/120mg	5%	9%	23%	0%		--	0%
BCG vaccine	20%	12%	11%	60%		--	0%
Oxytocin (10 IU injectable)	19%	22%	22%	20%	57%	--	0%
DMPA 150mg, injection	32%	27%	31%	0%	71%	--	0%
Amoxicillin dispersible tablets	10%	40%	54%	71%	86%	--	100%
CoCs	86%	91%	92%	86%	86%	--	0%
Male condoms	8%	8%	16%	0%	29%	--	0%
Examination gloves	8%	15%	29%	10%	43%	0%	0%
EDTA K2/K3 tubes	56%	48%	15%	0%	86%		0%
Malaria RDT	20%	10%	15%	0%	50%	100%	0%
RPR test	23%	62%	64%	56%	100%	--	100%
Determine RTKs	32%	29%	39%	10%	100%	--	--
Average	26%	29%	30%	23%	63	--	--

Safety and security: Exhibit 75 describes the presence of safety and security measures at SDPs and warehouses. It indicates that the principal areas of focus for security and safety of commodities in storage should be the health posts and health centers.

Exhibit 75. Safety and Security Measures in Place							
	Health posts	Health centers	Level 1 hospitals	Level 2 and 3 hospitals	Hubs	CHAZ	ZAMMSA
Physically verified maintenance log	8%	6%	28%	10%	57%	✓	✓
Presence of fire extinguishers	18%	49%	83%	100%	100%	✓	✓
Presence of heat, flame, or smoke detectors	0%	2%	41%	0%	71%	✓	✓
Fire extinguishers serviced within inspection label (tag) is within one year	2%	7%	25%	70%	100%	✓	✓
Spill kits (these contain absorbent pads, acid/base neutralizers, goggles, etc.)	1%	7%	19%	0%	14%	0%	0%
Controlled access (e.g., limited access to keys)	80%	85%	99%	90%		✓	✓

Central warehouses: Over the years, the government and partners have invested in central warehouses, installing modern infrastructure at ZAMMSA and CHAZ warehouses.

ZAMMSA leverages modern technology, including end-to-end WMS, for its management of medicines and medical supplies. However, it must strive toward standardization and certification to ensure that the warehouse's multiple complex operations are benchmarked to international standards.

The CHAZ warehouse is certified by ZAMRA and equipped with modern infrastructure to store and manage inventory under optimal conditions. The warehouse is guided by SOPs and leverages WMS to manage its operations. However, updating its SOPs to meet international standards and upgrading its maintenance program further enhances operations. EPI's warehouse conditions can be improved by ensuring that the warehouse's design, layout, and construction meet the requirements for storing pharmaceutical products.

Regional hubs. The regional hubs are expected to play a crucial role in the warehousing and distribution of health commodities to last-mile facilities and, ultimately, patients. Yet despite this being a crucial node in warehousing and distribution, the potential of the hubs is yet to be fully realized as much of the supply chain is centralized. The ZAMMSA central warehouse still dominates the supply chain and breaks bulk to supply the peripheral levels of the supply chain instead of transferring this responsibility to the hubs. During the assessment, it was impossible to determine and measure the stocking level according to plan at this supply level because max-min levels are not standardized, and stockout rates were highest. Hence, the proposed decentralization of supply chain operations should be revisited so that the hubs can assume greater responsibility.

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:

- Intensify efforts to standardize operations of the central-level warehouse, particularly at ZAMMSA, by achieving International Organization for Standardization (ISO) certification. This is important to ensure consistent quality management, operational efficiency, regulatory compliance, and enhanced customer and stakeholder confidence.
- Prioritize the decentralization of supply chain operations, including the phased transformation of ZAMMSA from fine-picking to bulk supply-only so that the hubs assume this responsibility.
- Invest in infrastructure and capabilities at last-mile facilities to enhance storage conditions and physical security of health commodities. This should include increased access to critical utilities such as electricity and backup power systems to provide optimal conditions for the storage and security of commodities. Most Zambians access health services at this level, especially in rural areas. These facilities need to be properly equipped to ensure quality medicines are available when needed.
- Review and consolidate the SOPs for the various health areas into a single SOP for the logistics management of health commodities. Any peculiarities for individual health programs can be accommodated in specific sections of the consolidated SOPs.
- Review the national logistics system to provide a common understanding of using max-min levels within the supply chain. Max-min stock levels must be aligned with the distribution cycles and demand of health facilities and the desired level of distribution system efficiency.
- 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 76. Warehousing and Storage: Distribution of Questions and Assignation of Weight Across Capability and Facility Levels

Module	Basic (50%)		Intermediate (30%)		Advanced (15%)		SOA (5%)	
	# of Qs	Weight	# of Qs	Weight	# of Qs	Weight	# of Qs	Weight
Health posts (61)	48	1.0%	29	1.0%	13	1.1%	7	0.7%
Health centers (93)	48	1.0%	29	1.0%	13	1.1%	7	0.7%
Level 1 hospitals (28)	48	1.0%	29	1.0%	13	1.1%	7	0.7%
Level 2 and 3 hospitals (10)	53.3	0.9%	30	1.0%	13	1.2%	6	0.8%
Hubs (30)	74.7	0.7%	37	0.8%	14	1.1%	5	1.0%
CHAZ (1)	74.7	0.7%	37	0.8%	14	1.1%	5	1.0%
EPI warehouse (1)	74.7	0.7%	37	0.8%	14	1.1%	5	1.0%
ZAMMSA (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 77).

Exhibit 77. 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, refer to the NSCA toolbox, available at www.ghsupplychain.org.*

In the past 10 years, the GRZ, with the support of its cooperating partners, has made considerable progress in the distribution of health commodities. These include investments into the expansion of the central warehouse operated by ZAMMSA, the construction of regional hubs, and acquisition of distribution fleets to promote medicines and medical supplies up to the last mile.

Generally, the public health system operates a two-tier distribution system, with supplies moving from the ZAMMSA central warehouse in Lusaka to regional hubs and then from hubs to individual health facilities. However, hospitals receive supplies directly from the central warehouse or the regional hubs. Distribution through the public health system is complemented by the CHAZ warehouse, which also transports specific commodities from its central warehouse to the hubs and other peripheral levels of the supply chain. For vaccines, the products are distributed from the central warehouse in Lusaka through the PHOs and then to the DHOs before distribution to the SDPs. Generally, the distribution system is a hybrid in that it is

supported by the government and its CPs. The CP support is in the form of direct financing for the distribution and contracting third-party logistics (3PL) services to conduct the last-mile distribution.

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Exhibits 78 and 79 detail the distribution maturity scores for all four entity types assessed and the proportion of basic elements in place.

Exhibit 78. Distribution Maturity Scores

Note on interpreting results: Remember 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, refer to the Understanding the CMM Results section above.

Exhibit 79. Distribution Maturity Score, and Basic Capabilities in Place

	Hubs	CHAZ warehouse	EPI warehouse	ZAMMSA
n =	7	1	1	1
Overall maturity score (range)	69% (60%–82%)	56%	53%	69%
Percent of basic items in place (range)	83% (71%–90%)	76%	67%	76%

Like the results of the 2017 NSCA, all the entities assessed for distribution obtained capability maturity scores above 50 percent.

The ZAMMSA central warehouse and the regional hubs attained a capability maturity score of 69 percent, with 76 percent of expected basic elements in place. This performance is driven by the presence of clear policies and standard operating procedures that govern the distribution process. Well-established distribution plans are communicated to beneficiaries ahead of schedule and reviewed bi-annually.

Distribution operations are integrated with ongoing cost monitoring to optimize resource use. However, the process is not fully automated for the real-time tracking of location and distance covered by Global Positioning System (GPS) or the tracking of distribution-specific KPIs. ZAMMSA and regional hubs have their own fleet to conduct distribution, but this is heavily complemented by outsourcing to the private sector through donor funding. Government funding is insufficient to cover the distribution budget, so dependence on donor funds remains substantial.

The CHAZ warehouse obtained a capability maturity score of 56 percent, although 76 percent of the expected basic elements for distribution were in place. The entity has clearly established distribution plans and pre-planned routes that are regularly updated and communicated to clients. Internal policies and procedures also guide commodity distribution. However, its capability maturity score is impacted by the heavy reliance on its own fleet for distribution with minimal outsourcing to the private sector. limited collection of distribution-specific data for performance tracking, and a large reliance on donor funding for distribution activities. The distribution process is mainly manual, although the requisition data are received through the LMIS, and temperature monitoring is not conducted throughout the distribution cycle, particularly for goods in transit.

The EPI central warehouse in Lusaka obtained a capability maturity score of 51 percent, with 67 percent of the expected basic elements in place. This is because elements such as an approved distribution plan, pre-planned distribution routes, and regular review of distribution plans are all in place. It also has policies and procedures that guide the distribution process. However, gaps are evident, such as the absence of a comprehensive system for capturing and reporting distribution data, inadequate tracking of KPIs, insufficient temperature monitoring for goods in transit, and the lack of a surveillance system for the security of goods in transit.

Exhibit 80. Downstream Order Key Performance Indicators (July to December 2023)				
	Hubs	CHAZ	EPI	ZAMMSA
Total number of orders (randomly selected over a six-month period_	80	20	10	--
Order turnaround time (days)	60	7	2	
Percentage of orders adjusted	80%	90%	10%	
Average deviance from 100 percent fill rate	57%	56%	8%	
Percentage of orders delivered in-full	41%	0%	90%	

In general, the entities assessed exhibited strong capabilities in planning and executing the distribution of health commodities to intended beneficiaries. However, gaps are found in consistently capturing and reporting data so that data can be used for tracking key performance indicators. Security measures for goods in transit have some weaknesses as does temperature monitoring. At the beginning and end of the distribution. temperatures are monitored but temperature monitoring for goods in transit is not fully done. Although government makes incremental investments in the transport of health commodities, donor support is still relied upon and must be reduced over time.

Exhibit 81. Delivery Key Performance Indicators (July–December 2023)					
	Health posts	Health centers	Level 1 hospitals	Level 2 and 3 hospitals	Hubs
n =	62	91	28	10	7
Total number of orders reviewed	293	866	183	93	56
Percentage of orders that had all relevant data available	3%	1%	3%	94%	68%
Percentage of orders that are planned	100%	100%	92%	94%	99%
Percentage of orders with order turnaround time data	100	146	72	46	47
Turnaround time (as reported by receiving facility)	36.5 days	42.3 days	34 days	33.7 days	29.9 days

Distribution KPIs: In addition to assessing the capability maturity levels of the key entities implicated in the transport of health supplies, the NSCA team also collected data to measure distribution-specific key performance indicators. However, as shown in Exhibit 83, the proportion of entities with the full complement of data in place for measuring KPIs was low. Key data points, such as the order date, quantities ordered, quantities supplied, dispatch date, and reception date, must be made available in the LMIS in a way that enables easy access, traceability, and comparability for analysis. Reviewing the results in Exhibit 81 indicates that most of the orders submitted by health facilities were planned.

Recommendations

Zambia's distribution system has solid foundational capabilities that will serve it well for years to come. However, a concerted focus on collecting, interpreting, and using data to guide distribution planning and operations is needed to bring the system to the highest levels of effectiveness and efficiency.

- Strongly consider deploying a distribution/transport management system to manage and automate the distribution system and ensure the consistent capture of transportation-related data for performance tracking.
- Institute formal tracking of transportation and distribution-related KPIs and establish a formal structure for monitoring and reporting these KPIs. Empower managers to use this information to further drive distribution efficiency and effectiveness.
- Prioritize expanding the current 3PL distribution system to benefit all provinces. Institutions such as CHAZ, which fully relies on its fleet, should consider incrementally introducing outsourcing to the private sector to complement its internal capacity as part of its long-term sustainability strategy.
- The central-level warehouses (ZAMMSA and CHAZ) must prioritize the security and safety of goods in transit and fully deploy systems such as GPS tracking and in-transit temperature monitoring, among others.

Exhibit 82. 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
Hubs	21	2.4%	43	0.7%	17	0.9%	7	0.7%
CHAZ warehouse	21	2.4%	43	0.7%	17	0.9%	7	0.7%
EPI warehouse	21	2.4%	43	0.7%	17	0.9%	7	0.7%
ZAMMSA	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 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 83).

Exhibit 83. Examples of Scored Logistic Management Information System Capabilities	
Basic	Paper-based LMIS tools Quarterly reporting frequency Internal data quality assessments (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, refer to the NSCA toolbox, available at www.ghsupplychain.org.

In 2017, the NSA assessment recommended the roll-out of the eLMIS to lower-level health facilities with the training and supervision of personnel and data quality assessments to improve data accuracy. Subsequently, the country, with the support of partners, deployed a nationwide eLMIS for an efficient and cost-effective management of health commodities at all levels of the supply chain.

The HSSCS 2019–2023 projected the roll-out of the facility edition of the eLMIS to all health facilities in 2021, but this is now expected to be achieved in 2026. While the facility edition of the eLMIS has yet to be rolled out to all health facilities, the central edition of the tool is available at the district level for the entry of paper-based data originating from facilities that have yet to be onboarded.

2024 NSCA Findings and Analysis

LMIS capability and performance results from the 2024 NSCA are presented in Exhibits 84 through 86. Overall, capability scores were consistently above 50 percent across most assessed service delivery points, with variations in performance among the central-level institutions. The NSCA revealed a baseline of important basic capabilities in the system, such as using LMIS data to inform ordering, reporting, and inventory management. However, adherence to standard processes and eLMIS accuracy continues to remain low. The analysis here is broken down into subsections of institutions, paper LMIS, eLMIS, HR for LMIS, and data quality assessments.

Exhibit 84. Logistics Management Information System Capability Maturity Scores
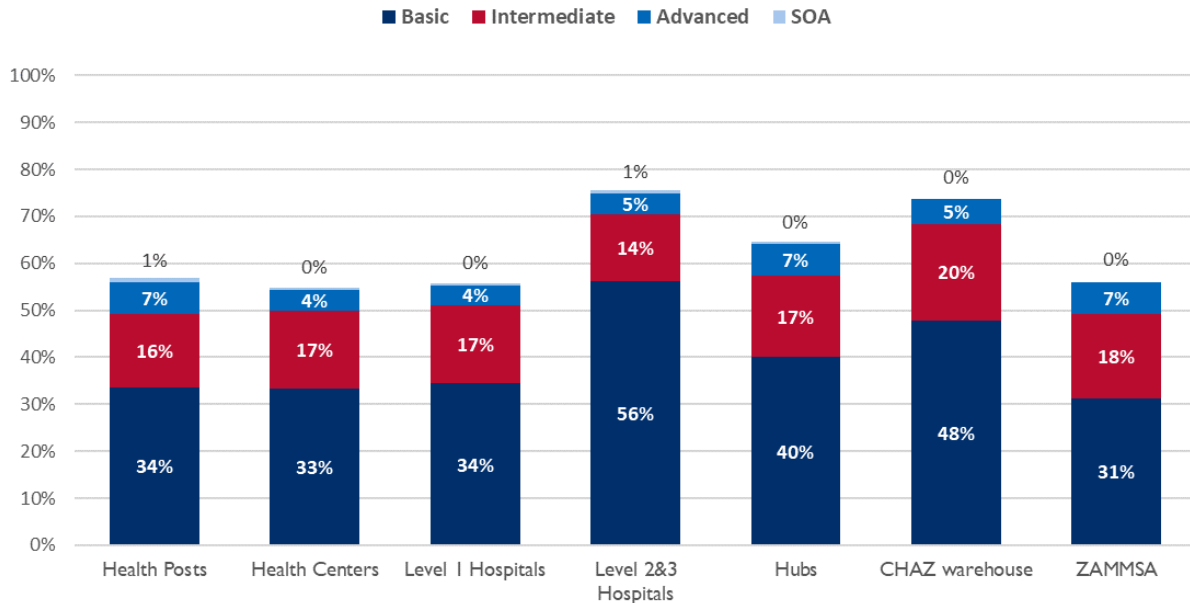
Legend: ■ Basic ■ Intermediate ■ Advanced ■ SOA

Facility	Basic	Intermediate	Advanced	SOA
Health Posts	34%	16%	7%	1%
Health Centers	33%	17%	4%	0%
Level 1 Hospitals	34%	17%	4%	0%
Level 2&3 Hospitals	56%	14%	5%	1%
Hubs	40%	17%	7%	0%
CHAZ warehouse	48%	20%	5%	0%
ZAMMSA	31%	18%	7%	0%

Note on interpreting results: Remember 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, refer to the Understanding the CMM Results section above.

Exhibit 85. LMIS Maturity Score, and Basic Capabilities in Place for Sub-national Entities

	Health posts	Health centers	Level 1 hospitals	Level 2 and 3 hospitals	Hubs	CHAZ warehouse	ZAMMSA
n =	61	94	28	10	7	1	1
Overall maturity score (range)	57% (30-75%)	55% (34–71%)	56% (43–71%)	61% (42–75%)	65% (48–77%)	74%	56%
Percent of basic items in place (range)	67% (36–92%)	67% (27–80%)	59% (44–81%)	83% (53–100%)	80% (36–67%)	74%	63%

Central level: Typically, the strongest capabilities within supply chain functions are expected be found at the central level, and those capabilities will decrease progressively in going through the health system to last-mile facilities. However, the capability maturity score of 55 percent with 63 percent of elements obtained by the ZAMMSA warehouse does not follow the expected trend in comparison with the scores obtained by the other entities in the supply chain. The scores obtained by ZAMMSA are informed by the absence of clear processes for internal and external data quality assessment and limited direct funding by

the government for operation of the LMIS. Data exchanges between the LMIS and the WMS remain a work in progress, and tracking of performance indicators is not entirely consistent within the organization. Although the MOH has set up a control tower to coordinate and manage supply chain data this entity is yet to be fully operational.

The CHAZ warehouse obtained a more favorable capacity maturity score of 74 percent because there was evidence of internal data quality checks and moderate calculation of performance indicators related to reporting. However, the process at CHAZ can be improved through systems integration (LMIS and WMS) and automation of the indicator reporting system.

Regional hubs: The hubs obtained an appreciable capability maturity score of 65 percent, with 80 percent of the expected basic elements in place. Basic elements, such as the presence of reporting tools and harmonized reporting schedules, were in place, but like the central-level DQAs, were limited, and challenges, including Internet connectivity, persisted.

Service delivery points: For the SDPs, the capability maturity scores ranged from 57 percent among the health posts to 75 percent at the level 2 and 3 hospitals. These scores follow the expected trend of high-level scores as one moves from the lower-level facilities to the higher-level entities. Among the SDPs, the use of paper-based LMIS decreases as one moves up the hierarchy of the health system. For instance, 70 percent of health posts use paper-based LMIS compared to none of the level 2 and 3 hospitals. Key issues associated with the LMIS at the SDPs include low availability of SOPs for verification, a limited number of DQAs, and limited Internet connectivity, among others. However, the LMIS is relied upon by the SDPs for requisitioning, inventory management, reporting, and other supply chain functions such as waste management.

Exhibit 86. Type of LMIS Used by SDPs				
	Health posts	Health centers	Level 1 hospital	Level 2 and 3 hospitals
Paper-based LMIS only	70%	25%	16%	0%
Electronic LMIS (eLMIS) only	9%	8%	2%	10%
Both paper-based LMIS and eLMIS	22%	67%	82%	90%
None	0%	0%	0%	0%

Exhibit 87. Key Capabilities in Place, eLMIS							
	Health posts	Health centers	Level 1 hospitals	Level 2 and 3 hospitals	Hubs	CHAZ warehouse	ZAMMSA
n =	61	93	28	10	7	1	1
Percentage of facilities reporting tracking of timeliness, completeness, and accuracy of reporting by lower-level facilities					X	X	X
Percentage of facilities reporting presence of manuals or SOPs on eLMIS	26%	42%	17%	60%	71%	✓	✓
Percentages of facilities reporting inclusion of LMIS in the overall organizational budget	15%	11%	36%	11%	0%	✓	✓
Percentage of facilities reporting a standard process to review LMIS data	34%	41%	42%	50%	71%	✓	✓
Percentage of facilities reporting existence of reliable Internet connectivity at facility ("always or almost always works")	36%	62%	49%	90%	100%	✓	✓
eLMIS record accuracy: Percentage of facilities with 100 percent accurate stock card, average across tracers	57%	42%	52%	46%	80%	80%	--
eLMIS record accuracy: Percentage points deviation from 100 percent accuracy (range across tracer commodity)	42–253%	0–426%	0–3,348%	0–325%	63–209%	--	--

✓ denotes yes, x denotes no, and -- not applicable

Paper LMIS. Paper LMIS is mostly common among health posts and some health centers that have yet to install the facility edition of the eLMIS. These facilities prepare their reports and submit them to the district health office for entry into the central edition of the eLMIS. Noting that Internet connection is still a challenge in the rural areas where most health posts are situated, a full transition to the facility edition of the eLMIS at all health facilities may not be feasible soon. So, there must be a stream of technical support and supervision to ensure data quality is achieved at these levels even if paper-based LMIS is maintained longer than expected. Key challenges with using the paper LMIS include stockout of tools, data sharing and retrieval challenges, and insufficient human resource capacity. With the lowest capability scores of any facility type assessed, there is a clear need to conduct foundational capacity building for staff at the health posts to ensure that these last-mile facilities have the essential building block of LMIS to contribute consistent, high-quality logistics data to the supply chain.

eLMIS. The eLMIS is a significant feature of the advancements made in the Zambian supply chain. The system has been deployed from the central level to the SDP level albeit some facilities collect data on paper and submit to the district level for entry into the system.

A closer look at LMIS processes shows room for improvement. Exhibit 89 details key LMIS capabilities in place across various service delivery points as well as related key performance indicators. Specifically, less than half of health posts, health centers, and hospitals reported having a standard process for reviewing LMIS data and reports. This is further compounded by many facilities reporting the non-availability of eLMIS SOPs. It was established during the assessment that electronic SOPs were loaded on the eLMIS platform but if facility staff are unaware of this fact or not trained in how to access them, they are effectively not available. As detailed in the HR for LMIS section below, capacity building on eLMIS is not optimal throughout the health system. So, the MOH needs to review the process for capacity building on the eLMIS and ensure a mechanism is in place to track and trace the personnel who have been trained. It is also important that staff are oriented to understand that training on the LMIS need not be classroom training; targeted supervision and self-directed learning are also avenues for training.

Another key issue to consider is the accuracy of the data that are in the eLMIS; the percentages of SDPs with 100 percent accurate data ranged from 42 to 57 percent, and the points deviated from 100 percent accuracy point to a high degree of variability in most facilities. This situation, coupled with the low penetration of DQAs at all levels of the supply chain (see Exhibit 93), makes a real case for prioritizing quality data for decision making within the supply chain. instances. Exhibits 89 and 90 display both metrics at the tracer product level to demonstrate the high degree of variability found during the assessment.

Putting these capability and performance issues into context helps clarify the challenges the eLMIS faces. Exhibit 91 details the challenges health centers and hospitals cited most often with using the eLMIS. Internet connectivity continues to be a major challenge for health facilities nationwide—a problem that was found and highlighted during the 2017 NSCA as well. Insufficient training or human resource capability was also a frequently cited challenge, indicating that there continues to be room for improvement in the quality of this training or support.

Exhibit 88. Percentage of Facilities With 100 Percent Accurate eLMIS Record, by Tracer Commodity

- TLD 90
- DTG 10mg
- RHZE
- AL 20/120mg
- BCG Vaccine
- Oxytocin
- DMPA I.M
- Amoxicillin disp. tabs 250mg
- CoC
- Male Condoms
- Examination Gloves
- EDTA K2 / K3
- Malaria RDT
- RPR Test
- Determine RTKs
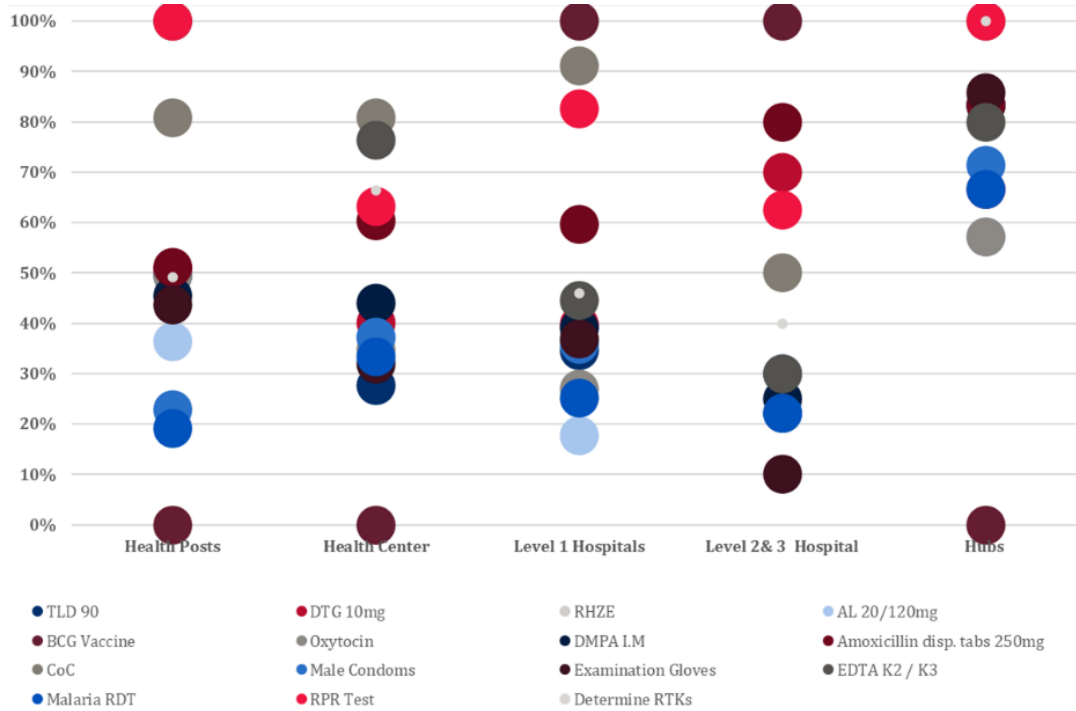
Exhibit 89. Percentage of Facilities With 100 Percent Accurate eLMIS Record, by Tracer Commodity

- TLD
- DTG
- RHZE
- AL
- BCG Vaccine
- Oxytocin
- DMPA I.M
- Amoxicillin disp. Tabs
- CoC
- Male Condoms
- Examination Gloves
- EDTA K2 / K3
- Malaria RDT
- RPR Test
- Determine RTKs
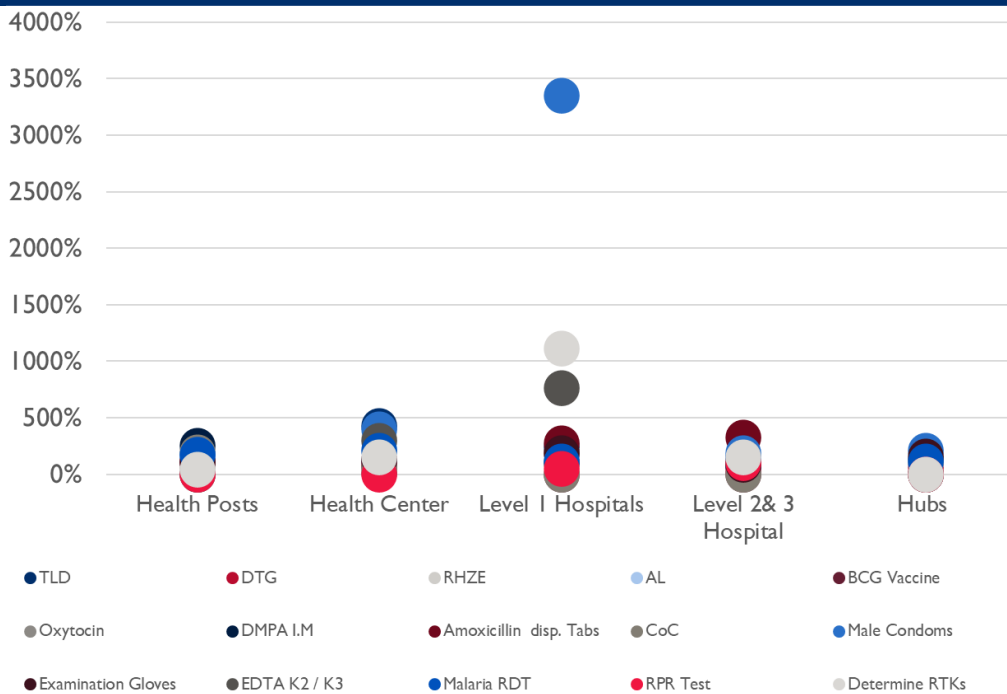
Exhibit 90. Most Frequently Cited Challenges With eLMIS

Level 1 hospitals (eLMIS)	Percent facilities	Health centers (eLMIS)	Percent facilities
Internet connectivity	69%	Internet connectivity	80%
Lack of time due to other tasks	78%	Lack of time due to other tasks	38%
Insufficient training or human resources capability	23%	Challenges in analysis of data	53%
Down time centrally (system failure)	78%	Availability of computers	56%
Availability of computers	23%	Data quality or data entry errors	16%
Insufficient training or human resources capability	53%	Insufficient training or human resources capability	2%
Insufficient human resource	56%	Insufficient human resource	46%
Data quality or data entry errors	23%	Data quality or data entry errors`	15%

HR for LMIS. While the HR module has its own section of the report, the authors felt it important to highlight some of the HR dynamics related to LMIS, as the system's success or failure is largely driven by the people who input, analyze, and use the information from the system. Two of the most important considerations for supportive capabilities for the workforce are the staff's understanding of their job responsibilities and the opportunities for those staff to grow and refresh their skills as they relate to their job duties. Exhibit 91 details the prevalence of LMIS as a formal component of job descriptions and the proportion of staff receiving capacity-building opportunities in LMIS across various service delivery points.

Exhibit 91. LMIS Prevalence in Job Descriptions and Capacity Training Opportunities

	Percentage of facilities reporting						
	Health posts	Health centers	Level1 hospitals	Level 2 and 3 hospitals	Hubs	CHAZ warehouse	ZAMMSA
n =	61	93	28	10	7	1	1
LMIS in formal job descriptions of at least one staff member	13%	32%	60%	70%	100%	✓	✓
Capacity training on LMIS in past year	37%	53%	70%	70%	71%	x	✓

It is encouraging to see that at the hospital and warehouse levels, LMIS is more present in job descriptions and capacity-building opportunities. This indicates a 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 last mile decreases sharply. Less than half of health posts and health facilities reported having LMIS as a formal component of at least one staff member's job description (see Exhibit 93). Capacity building on this topic at the health-post level was also scarce. Putting all of this into the context detailed in the eLMIS subsection, a clear picture emerges about the need to review and update the quality of the training and capacity building around eLMIS with health facilities.

Data quality assessments. Any well-functioning LMIS requires the regular use and review of data to ensure the validity of the information stored in the system. Only 12 percent of health posts, 17 percent of health centers, 33 percent of level 1 hospitals, and 10 percent of level 2 and 3 hospitals report conducting DQAs. This observation, coupled with the variances in data accuracy when LMIS records are compared with physical inventory on the day of assessment, reduces the confidence level in the LMIS data.

Exhibit 92. DQAs							
	Percentage of facilities reporting						
	Health posts	Health centers	Level 1 hospitals	Level 2 and 3 hospitals	Hubs	CHAZ warehouse	ZAMMSA
n =	61	93	28	10	7	I	I
Internal DQAs	12%	17%	33%	10%	29%	✓	X
Feedback on DQAs	20%	31%	36%	10%	29%	X	X
Adjusted its systems or processes based on prior DQA	34%	47%	49%	40%	57%	✓	X

✓ denotes yes, x denotes no, and -- not applicable

Recommendations

Zambia has an opportunity to leverage its robust, nationwide eLMIS system as the cornerstone of its supply chain. To do so, a countrywide commitment to systems and data quality is needed. The following recommendations have been proposed:

- Fast-track the integration of the warehouse management systems at ZAMMSA and CHAZ with the eLMIS so that there is visibility of data among the multiple systems in the eLMIS.

- Ensure the MOH prioritizes the functioning of the control tower as a robust entity with the required resources to oversee the eLMIS and act as the M&E headquarters of the supply chain in Zambia.

- Make a census of all KPIs required for the supply chain, develop a data map, and ensure eLMIS is capturing the required data for performance tracking and reporting.

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

- Reinvigorate the processes for internal and external data quality assessments. A renewed focus on eLMIS accuracy is needed, as the intervening years between the last NSCA and this one have not yielded any substantive gains in data accuracy in the eLMIS.

Module	Basic (50%)		Intermediate (30%)		Advanced (15%)		SOA (5%)	
Exhibit 93. LMIS: Distribution of Questions and Assignation of Weight Across Capability and Facility Levels								
	# of Qs	Weight	# of Qs	Weight	# of Qs	Weight	# of Qs	Weight
Health posts (61)	12	4.1%	11	2.7%	5	3%	2	2.5%
Health centers (93)	12	4.1%	11	2.7%	5	3%	2	2.5%
Level 1 hospitals (28)	12	4.1%	11	2.7%	5	3%	2	2.5%
Level 2 and 3 hospitals (10)	11	4.5%	14	2.1%	6	2.5%	2	2.5%
Hubs (30)	11	4.5%	14	2.1%	6	2.5%	2	2.5%
CHAZ (1)	20	2.5%	21	1.4%	11	1.4%	2	2.5%
ZAMMSA (1)	20	2.5%	21	1.4%	11	1.4%	2	2.5%

Quality Assurance and Pharmacovigilance

Ensuring that the health commodities consumed by patients are safe, effective, and remain in sound 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 to ensure drug quality and that facilities at all levels understand and can act on their role in pharmacovigilance for medicines. Exhibit 94 outlines key capabilities of an effective quality assurance and pharmacovigilance strategy, including the existence of formal guidelines and SOPs, regular quality testing, and availability of data collection tools and processes for pharmacovigilance.

Exhibit 94. Examples of Scored QA and PV 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, refer to the NSCA toolbox, available at www.ghsupplychain.org.

ZAMRA has the regulatory mandate to ensure access to quality-assured, safe and efficacious medicines, and allied substances. To promote access to quality-assured medicines, the GRZ has made significant investments in strengthening quality assurance and quality control systems and infrastructure in the country. One such investment is the establishment of National Drug Quality Control Laboratory

(NDQCL). However, there is a need to further strengthen reliance on the NDQCL results through ISO accreditation and WHO pre-qualification.

ZAMRA is also responsible for minimizing the risk associated with the use of medicines to enhance patient safety. The National Pharmacovigilance Unit (NPVU) has been established to identify, evaluate, and minimize risks associated with the use of medicines. However, there are still gaps in coordination and HR capacity for pharmacovigilance that must be filled.

To improve product quality assurance and pharmacovigilance, HSCCS 2019–2021 prioritized the training of personnel to improve reporting of product quality defects and adverse drug events. It also emphasized the need to improve product sampling for post-market surveillance and screening of products at the ports of entry. The next country supply chain strategy will focus on achieving ISO accreditation and WHO prequalification for NDQCL, strengthen post-market surveillance, and promote good manufacturing practice. To promote pharmacovigilance, human resource capacity will be developed and awareness will be created

2024 NSCA Findings and Analysis

Exhibits 97 and 98 display the capability scores by facility type for quality assurance and pharmacovigilance. Results show ZAMRA as the entity with the strongest capability in quality assurance and pharmacovigilance. ZAMRA obtained a capability maturity score of 74 percent with 87 percent of the basic elements in place. ZAMRA is closely followed by ZAMMSA, with capability maturity scores of 72 percent and 86 percent for basic elements. The CHAZ warehouse scored 53 percent with 57 percent of basic elements in place. Among the service delivery points, the capability maturity scores ranged from 13 percent to 32 percent, indicating the need for significant interventions to strengthen the capacity for pharmacovigilance and quality assurance. This dynamic of strong central capability and weak peripheral capability was largely the case during the 2017 NSCA.

Exhibit 95. QA and PV Capability Maturity Scores
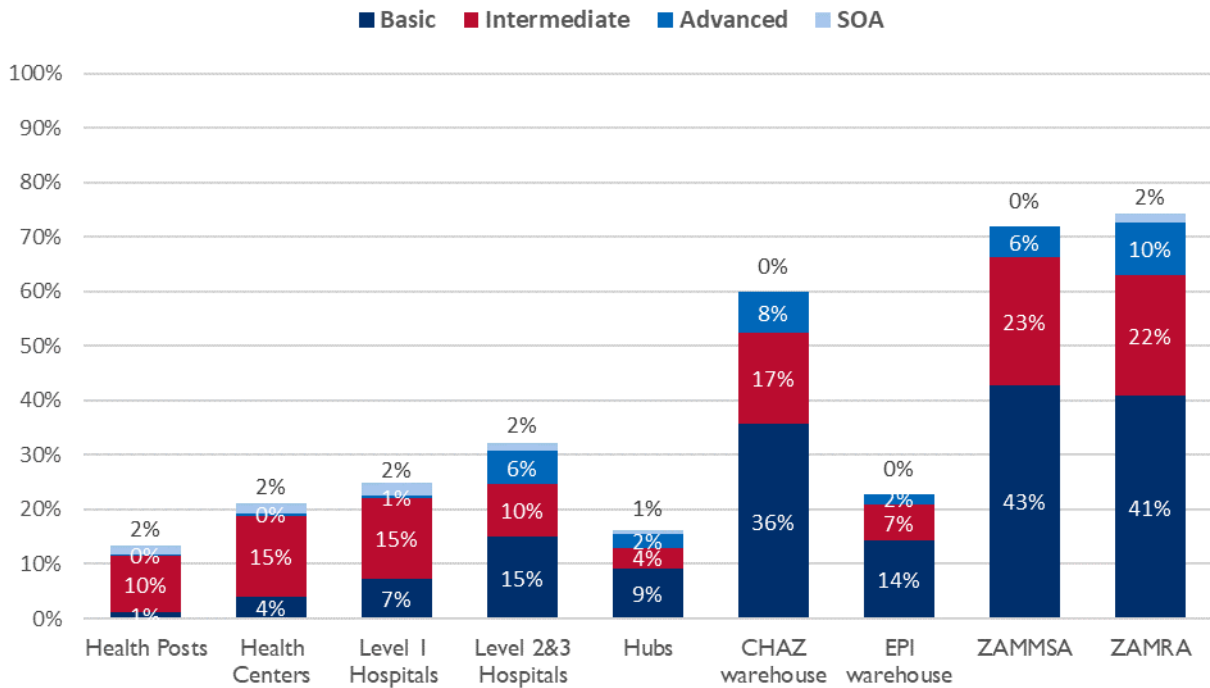
■ Basic ■ Intermediate ■ Advanced ■ SOA

	Basic	Intermediate	Advanced	SOA
Health Posts	1%	10%	0%	2%
Health Centers	4%	15%	0%	2%
Level 1 Hospitals	7%	15%	1%	2%
Level 2&3 Hospitals	15%	10%	6%	2%
Hubs	9%	4%	2%	1%
CHAZ warehouse	36%	17%	8%	0%
EPI warehouse	14%	7%	2%	0%
ZAMMSA	43%	23%	6%	0%
ZAMRA	41%	22%	10%	2%

Note on interpreting results: Remember 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, refer to the Understanding the CMM Results section above.

Exhibit 96. QA and PV Maturity Score and Basic Capabilities in Place

	Health posts	Health centers	Level 1 hospitals	Level 2 and 3 hospitals	Hubs	CHAZ warehouse	EPI warehouse	ZAMMSA	ZAMRA
n =	61	93	28	10	7	1	1	1	1
Overall maturity score (range)	13% (0–20%)	21% (0–50%)	25% (10–76%)	32% (8–38%)	16% (8–68%)	60%	30%	72%	74%
Percent of basic items in place	2%	8%	15%	30%	18%	71%	43%	86%	82%
Availability of SOPs for pharmaco-vigilance	5%	14%	36%	50%	--	--	--	--	X
Availability of reporting forms for pharmaco-vigilance	63%	76%	71%	80%	--	--	--		✓
Availability of SOPs for product quality control/ quality assurance	2%	8%	14%	20%	29%	--	✓	--	✓

✓ denotes yes, x denotes no, and -- not applicable

ZAMRA and central-level entities

ZAMRA, the statutory entity for medicines quality assurance and pharmacovigilance promotion, obtained the highest capability maturity score (74 percent) among the entities assessed. ZAMRA has established legislation, regulations, and guidelines to oversee medicines quality assurance and pharmacovigilance. ZAMRA has the NDQCL, which undertakes quality control and testing for medicines and allied substances and provides certificates of analysis and conformance. While the NDQCL is currently undergoing processes to achieve ISO certification and WHO pre-qualification, the ZAMRA must collaborate with the MOH to provide SOPs for medicine quality assurance throughout the supply chain.

In pharmacovigilance, ZAMRA, through the NPVU, has deployed systems and tools for pharmacovigilance throughout the health system. These include tools for data collection and reporting, mobile applications for data collection and reporting, and training of human resources to report adverse drug reaction (ADR) events. However, SOPs for pharmacovigilance are yet to be developed.

ZAMMSA obtained a score of 72 percent due to the presence of in-house procedures for quarantine and recall of defective products, regular sampling of products for quality testing, and a certificate of analysis and conformance for products tested. However, a modern in-house QA laboratory is needed to facilitate internal quality assurance, improve process documentation, and digitize QA information to promote performance tracking.

Most of the expected QA procedures are in place at the CHAZ warehouse. However, the main gap noted is the absence of an in-house laboratory for internal quality assurance, and the complete reliance on donor funding raises the question of long-term sustainability. The low score of 30 percent obtained by the EPI warehouse indicates minimal capabilities for vaccine quality assurance.

The hubs: As the last point in the distribution system before products reach service delivery points, the hubs should be positioned to play a pivotal role in ensuring the quality of products that reach patients. However, the capability maturity score of 16 percent obtained by the hubs implies that these facilities cannot fulfill this function. The presence and awareness of SOPs for processes are generally scarce at this level in the health system. More focus and attention need to be given to bolster the capacity of the hubs to participate in the quality assurance and pharmacovigilance system.

Exhibit 97. Key QA and PV Capabilities in Place at Service Delivery Points								
	Health posts	Health centers	Level 1 hospitals	Level 2 and 3 hospitals	Hubs	CHAZ warehouse	EPI warehouse	ZAMMSA
n =	61	93	28	10	7	1	1	1
Facilities reporting samples of products taken for testing	2%	3%	8%	0%	0%	✓	0%	✓
Facilities reporting SOPs for quarantine/recall of suspected products	1%	1%	0%	0%	0%	✓	0%	✓
Facilities reporting presence of action protocols based on PV results	34%	35%	14%	0%	-	--	--	✓
Facilities reporting sharing collected PV data with central-level authorities	34%	68%	69%	80%				71%

Service delivery points. Generally, SDPs do not have in place the necessary foundational elements of QA and pharmacovigilance systems. The SDPs—health posts, health centers, level 1 hospitals, and level 2 and 3 hospitals—obtained relatively low capability maturity scores of 13 percent, 21 percent, 25 percent, and 32 percent, respectively. Exhibit 97 highlights the minimal availability of SOPs quality assurance manuals among the SDPs, ranging from 2 percent to 20 percent. Additionally, virtually none of the SDPs reported that samples of pharmaceutical products were taken for quality control testing in the past year. Most facilities are unaware of the procedures to adopt if product quality is compromised.

On a more positive note, awareness of the PV process is stronger among the SDPs, although gaps must be addressed. Between 63 and 80 percent of the SDPs have data collection tools for pharmacovigilance, and 41 to 80 percent share the collected data with the central level. Awareness of action protocols in the case of adverse drug events ranged from 34 to 90 percent among the SDPs, but the availability of SOPs for pharmacovigilance ranged from 5 to 50 percent, indicating a need for improvement in these areas.

Recommendations

- For the MOH and partners, prioritize supporting ZAMRA to accelerate processes toward attaining WHO prequalification.
- For the MOH, prioritize implementing a product security and serialization strategy as a comprehensive approach for product quality assurance.
- Make SOPs and reporting tools widely available and prepare staff to complete these reports, without which the PV system cannot function. The MOH should print and distribute all necessary pharmacovigilance tools to nationwide facilities, particularly last-mile ones.
- Pair material distribution with a cascading training program to ensure staff understand when and how to respond to ADRs and other PV-related events.
- Strengthen QA and PV practices at the hubs. This supply chain level can strengthen the linkage between the FDA's central-level leadership and the nascent PV system at the service delivery level.
- Prioritize post-market surveillance in public-sector facilities to ensure a comprehensive medicine QA system in the country.

Exhibit 98. QA and PV: Distribution of Questions and Assignation of Weight Across Capability and Facility Levels

Module	Basic (50%)		Intermediate (30%)		Advanced (15%)		SOA (5%)	
	# of Qs	Weight	# of Qs	Weight	# of Qs	Weight	# of Qs	Weight
Health posts (61)	4	12.5%	3	10.0%	4	3.8%	1	5.0%
Health centers (93)	4	12.5%	3	10.0%	4	3.8%	1	5.0%
Level 1 hospitals (28)	4	12.5%	3	10.0%	4	3.8%	1	5.0%
Level 2 and 3 hospitals (4)	5	10.0%	8	3.8%	4	3.8%	1	5.0%
Hubs (1)	7	7.1%	9	3.3%	8	1.9%	3	1.7%
CHAZ warehouse (1)	7	7.1%	9	3.3%	8	1.9%	3	1.7%
EPI warehouse (1)	7	7.1%	9	3.3%	8	1.9%	3	1.7%
ZAMMSA (1)	7	7.1%	9	3.3%	8	1.9%	3	1.7%
ZAMRA (1)	11	4.5%	15	2.0%	14	1.1%	3	1.7%

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

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

Waste Management

Medical waste management is a core operation of effective public health supply chains, ensuring that used, unsafe, or unusable pharmaceutical products are efficiently removed from the supply chain and properly disposed of. Major areas that were factored into scoring the capabilities and performance of waste management included the existence of an approved national waste management plan, 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 99).

Exhibit 99. 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, refer to the NSCA toolbox, available at www.ghsupplychain.org.*

The disposal of obsolete, expired, or unwanted medicines or allied substances is undertaken by ZAMRA in consultation with the Zambia Environmental Management Agency. So ZAMRA, instead of the MOH, was assessed as a central entity for pharmaceutical waste management. In addition, waste management was assessed at ZAMMSA, the CHAZ warehouse, the hubs, level 2 and 3 hospitals, level 1 hospitals, health centers, and health posts. In the HSSCS 2019–2021 and the draft 2023–2026, pharmaceutical waste management is recognized as one of the areas in need of further prioritization and investments. .

2024 NSCA Findings and Analysis

Exhibit 100. Waste Management Capability Maturity Model Scores
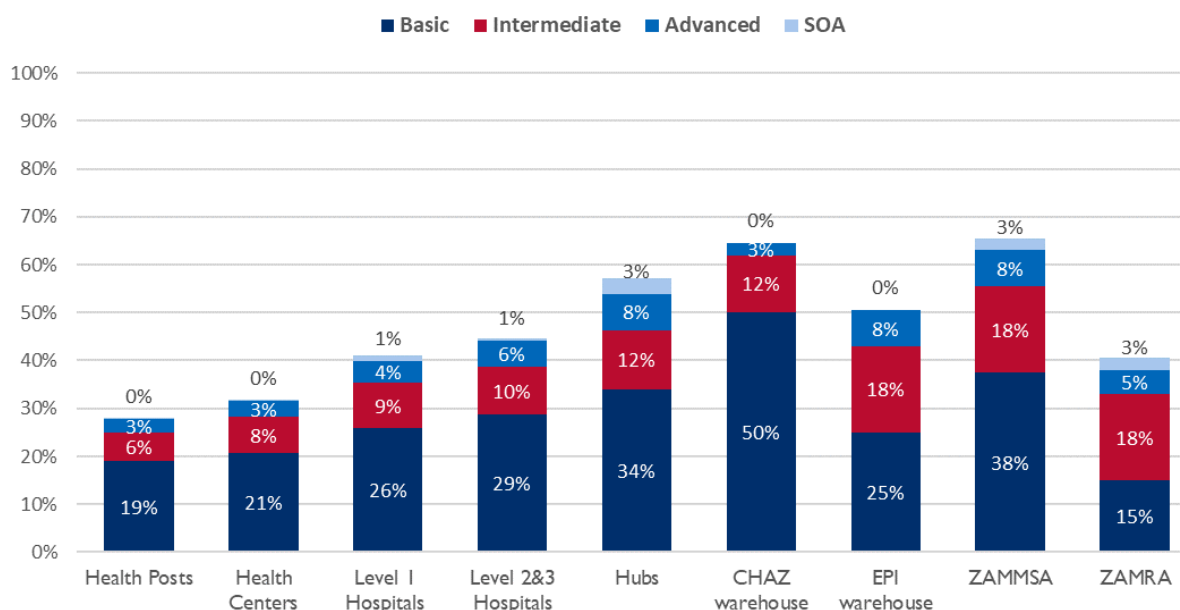
Note on interpreting results: Remember that CMM scores are a composite of assessed basic (max 50 percent), intermediate (30 percent), advanced (15 percent), and SOA (5 percent) capabilities. Reported percentages are the scored results averaged across all assessed sites, for each capability level and facility type. For more information, refer to the Understanding the CMM Results section above.

Central-level entities

At the central level of the supply chain, pharmaceutical waste was assessed at ZAMRA, ZAMMSA, the CHAZ central warehouse, and the EPI warehouse for the storage of vaccines.

ZAMRA, the central-level body responsible for the disposal of obsolete, expired, or unwanted medicines or allied substances, obtained a capability maturity score of 38 percent with 30 percent of the expected basic elements required in place. ZAMRA obtained these scores because of the absence of updated pharmaceutical waste disposal guidelines for the health sector at the national level. Although a statutory Act provides the regulatory framework for waste management, a comprehensive operation manual is needed that provides detailed guidance for the actors in the value chain. The organization has processes in place to track waste disposal events, but they need to be upgraded and integrated on the LMIS for easy access and data retrieval,

The ZAMMSA and CHAZ central warehouses obtained capability maturity scores of 66 percent and 65 percent, respectively. Both entities have internal SOPs that guide waste management and waste disposal events that are supervised by authorized personnel. In the case of ZAMMSA, waste disposal is a component of the WMS and is tracked with KPIs although reports on performance tracking were not available for verification during the NSCA. At the assessment team noted, unusable pharmaceutical products were stored together with usable stocks although the WMS was sophisticated enough to distinguish between them and prevent the issuing of such products to customers.

For the ZAMMSA and CHAZ warehouses, no evidence was found of waste segregation by method of disposal. Indeed, ZAMMSA outsources waste disposal while the CHAZ warehouses use the landfill when required. At the EPI warehouse for the storage of vaccines, no evidence was found of SOPs to guide waste disposal events, and processes were largely manual. Although unusable products were stored separately, they were not sorted according to the method of disposal.

Exhibit 101. Waste Management Maturity Scores and Select Capabilities and Performance Indicators									
Percent of facilities reporting:									
	Health posts	Health centers	Level 1 hospitals	Level 2 and 3 hospitals	Hubs	CHAZ ware-house	EPI ware-house	ZAMMSA	ZAMRA
n =	**61**	**93**	**28**	**10**	**7**	**1**	**1**	**1**	**1**
Overall maturity score (range)	28% (4–77%)	32% (0–83%)	41% (35–88%)	45% (36–54%)	57% (35–75%)	65%	51%	66%	41%
Percent of basic items in place (range)	38% (0–100%)	41% (0–100%)	52% (25–100%)	58% (25–75%)	68% (25–100%)	100%	50%	75%	30%
Percentage of facilities demonstrating presence of SOPs for waste management and disposal at site	15%	22%	30%	40%	71%	✓	X	✓	X
Percentage of facilities reporting that waste disposal events are authorized and documented	23%	34%	55%	80%	57%	✓	✓	✓	N/A
Percentage of facilities demonstrating that unusable pharmaceutical products are stored separately	60%	72%	89%	80%	86%	100%	100%	0%	N/A
Percentage of facilities reporting disposal is supervised or certified by a regulatory authority	43%	51%	59%	90%	86%	✓	✓	✓	N/A

Service delivery points: Waste management capabilities among service delivery points, including health posts, health centers, level 1 hospitals, and level 2 and 3 hospitals, follow an expected trend where capabilities increase from the lowest to the highest level of care. Health posts have a capability maturity score of 28 percent, followed by health centers with a score of 32 percent, level 1 hospitals with a score of 41 percent, and level 2 and 3 facilities with a score of 57 percent. These scores are influenced by the limited availability of SOPs among the facilities, insufficient knowledge of pharmaceutical waste disposal processes, limited segregation of waste, and weak internal capacity for proper waste disposal.

For instance, SOP availability for waste disposal is 15 percent among health posts, 22 percent among health centers, and 30 percent among level 1 hospitals. Regarding the separation of usable pharmaceutical products from unusable ones, the scores are 60 percent for health posts, 72 percent for health centers, 89 percent for level 1 hospitals, and 86 percent for level 2 and 3 hospitals.

Indeed, the NSCA scores indicate capacity gaps among SDPs and highlight areas where stakeholders must concentrate interventions to improve outcomes.

Recommendations

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

- For MOH and ZAMRA, take the lead in developing sector-specific SOPs to fully operationalize laws and regulations for waste disposal within the health sector.

- For the government, make incremental investments or engage in partnerships with the private sector to enhance and modernize waste disposal capacity. This includes implementing waste segregation before disposal and promoting recycling where feasible.

- Place priority on disseminating SOPs, providing training, and offering supervision at lower levels of service delivery in waste management and disposal.

- Fully integrate waste disposal and reverse logistics into logistics management information systems to facilitate KPI monitoring for pharmaceutical waste management.

Supplemental exhibit

Exhibit 102. Waste Management, Distribution of Questions, and Assignation of Weight Capability and Facility Levels								
Module	Basic (50%)		Intermediate (30%)		Advanced (15%)		SOA (5%)	
	# of Qs	Weight	# of Qs	Weight	# of Qs	Weight	# of Qs	Weight
Health posts (n=61)	4	12.5%	7	4.3%	5	3.0%	1	5.0%
Health centers (71)	4	12.5%	7	4.3%	5	3.0%	1	5.0%
Level 1 hospitals (17)	4	12.5%	7	4.3%	5	3.0%	1	5.0%
Level 2 and 3 hospitals (10)	4	12.5%	10	3.0%	6	2.5%	2	2.5%
Hubs (30)	4	12.5%	10	3.0%	6	2.5%	2	2.5%
CHAZ warehouse (1)	4	12.5%	10	3.0%	6	2.5%	2	2.5%
EPI warehouse (1)	4	12.5%	10	3.0%	6	2.5%	2	2.5%
ZAMMSA (1)	4	12.5%	10	3.0%	6	2.5%	2	2.5%
ZAMRA (1)	10	5.0%	5	6.0%	3	5.0%	2	2.5%

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

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

Cross-cutting Analysis

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

Performance monitoring: Effective performance monitoring and benchmarking are essential for evaluating the impact and utility of supply chain investments. The Zambian supply chain includes many indicators for tracking performance at various levels, yet their ownership and application are insufficient. However, this situation must give way to a process led by the MOH with specialized support from the partners when required. The assessment team strongly supports the MOH's pursuit of establishing and operating a supply chain control tower to take ownership of data, lead performance monitoring, and generate decision-making reports. The national control tower must become the reference point for accessing data-driven decision making.

Strengthening governance: Governance gaps at the central level are a significant issue that must be resolved to position supply chain management in the MOH properly. Elevating supply chain management to a separate technical domain from other functions is essential for maximizing its potential and addressing profession-specific operational issues. Keeping supply chain management as a function of pharmaceutical management may limit its evolution, considering the trajectory of modern technology and its impact on supply chain management.

Strategic planning: Since 2017, the regular development of health sector supply chain strategic plans has provided a strong governance framework and direction. However, the 2023–2026 strategic plan is pending approval despite the 2019–2021 plan having lapsed. The assessment team recommends immediate approval of the 2023–2026 HSSCS plan to address the current vacuum. If adjustments based on the 2024 NSCA findings are needed, they should be added as an addendum to avoid further delays. Also, extending the tenure of the strategic plans to five years instead of three will provide sufficient time for implementing proposed interventions and allow other entities to align their strategic plans with the MOH's long-term directions.

Decentralization: The GRZ and MOH have created seven regional hubs to increase warehousing capacity and improve health commodity distribution. However, much of the supply chain operations depend on ZAMMSA in Lusaka. While this approach streamlines coordination, it risks overdependence on the central level. For a large country like Zambia, replicating ZAMMSA's capacity in one or two regional hubs is crucial for creating redundancy and spreading inherent risk.

Strengthening quality assurance: Pharmaceutical regulation is crucial in ensuring the quality and safety of medicines and medical supplies throughout the supply chain. Therefore, a strong regulatory entity like ZAMRA is an imperative for fulfilling this vital role in the country. Thus, achieving WHO prequalification will bolster ZAMRA's capacity to regulate the pharmaceutical sector effectively and ensure the quality of health care supplies within the supply chain. Beyond existing legal and regulatory frameworks, WHO prequalification will affirm the international recognition, credibility, and reliability of ZAMRA's

operations. This ensures the quality of medicines and medical supplies and establishes ZAMRA as a leading regulatory authority capable of self-regulation and contributing to global health standards.

Leveraging the private sector: The private sector is crucial to the pharmaceutical supply chain in Zambia, particularly 3PLs' role in the distribution of medicine and medical supplies to the last mile. However, the private sector can be leveraged to partner with the public health supply chain beyond distribution. Doing so reduces the need for upfront public investments and ensures the burden and benefits are shared between the public and private sectors.

Standardization: Given the sophistication of operations at ZAMMSA and CHAZ warehouses, traditional supervision and intermittent assessment will be insufficient to improve operations and resolve recurring challenges. Consequently, ZAMMSA should accelerate ongoing actions to achieve ISO certification, and CHAZ should strive toward this level of standardization soon.

Financial Management and Sustainability: Donors are heavily relied on for supply chain operations, despite the GRZ being the largest contributor to health commodity procurement. Key areas like distribution and LMIS development are mainly donor funded. Encouraging incremental government investments across the supply chain is important to ensure donor support remains complementary in the long term.

Professionalization: The assessment found a lack of dedicated supply chain professionals in the MOH. Instead, other professionals perform supply chain roles as part of their job functions. Creating a professional cadre within the MOH to manage supply chain functions and develop the necessary skills is crucial.

Service delivery issues: The capability maturity scores across the various technical domains indicate that SDPs are the weakest link in supply chain maturity and capability. Future capacity enhancements should focus on this level of the supply chain.

Exhibit 103. Ministry of Health and ZAMRA, CMM Scores for All Relevant Technical Areas

■ Basic ■ Intermediate ■ Advanced ■ SOA

	Strategic Planning and Management	Policy and Governance	Human Resources	Financial Sustainability	Forecasting and Supply Planning	Quality and Pharmacovigilance (ZAMRA)	Waste Management(ZAMRA)
SOA	0%	0%	1%	0%	0%	2%	3%
Advanced	6%	3%	9%	9%	9%	8%	5%
Intermediate	22%	23%	19%	13%	13%	14%	18%
Basic	40%	39%	29%	43%	43%	23%	15%
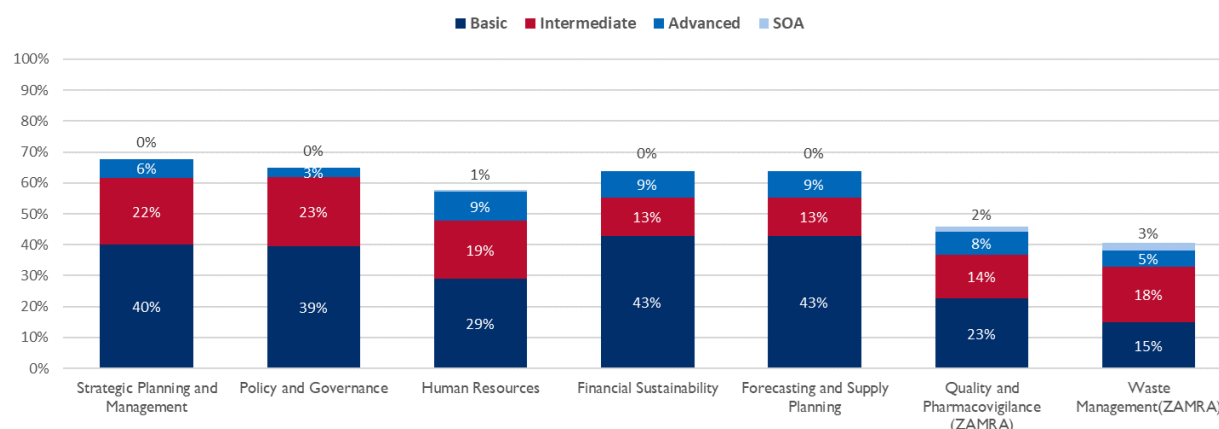
Exhibit 104. ZAMMSA, CMM Scores for All Relevant Technical Areas

Legend: ■ Basic ■ Intermediate ■ Advanced ■ SOA

Technical Area	Basic	Intermediate	Advanced	SOA
Strategic Planning and Management	40%	17%	2%	0%
Policy and Governance	50%	23%	15%	5%
Financial Sustainability	46%	16%	6%	0%
Human Resources	21%	8%	7%	1%
Forecasting and Supply Planning	48%	19%	12%	2%
Logistics Management Information System	9%	14%	4%	0%
Procurement and Customs Clearance	41%	24%	11%	2%
Warehousing and Storage	44%	23%	9%	2%
Distribution	21%	14%	8%	4%
Quality and Pharmacovigilance	29%	13%	2%	0%
Waste Managment	25%	15%	8%	3%

Exhibit 105. CHAZ, CMM Scores for All Relevant Technical Areas

Legend: ■ Basic ■ Intermediate ■ Advanced ■ SOA

Technical Area	Basic	Intermediate	Advanced	SOA
Strategic Planning and Management	17%	8%	2%	0%
Policy and Governance	50%	8%	8%	0%
Human Resources	15%	14%	5%	1%
Financial Sustainability	39%	0%	6%	0%
Forecasting and Supply Planning	23%	15%	3%	0%
Procurement and Customs Clearance	37%	26%	9%	3%
Warehousing and Storage	38%	16%	6%	2%
Logistics Management Information System	48%	20%	5%	0%
Distribution	38%	14%	3%	0%
Quality and Pharmacovigilance	7%	10%	6%	0%
Waste Managment	50%	12%	3%	0%

Exhibit 106. EPI (Central Vaccine Warehouse), CMM Scores for All Relevant Technical Areas

Legend: ■ Basic ■ Intermediate ■ Advanced ■ SOA

Technical Area	Basic	Intermediate	Advanced	SOA
Forecasting and Supply Planning	48%	15%	8%	0%
Warehousing and Storage	33%	13%	5%	2%
Distribution	33%	17%	3%	0%
Quality and Pharmacovigilance	14%	7%	2%	0%
Waste Managment	25%	18%	8%	0%

Exhibit 107. Hubs, CMM Scores for All Relevant Technical Areas

Legend: ■ Basic ■ Intermediate ■ Advanced ■ SOA

Technical Area	Basic	Intermediate	Advanced	SOA
Strategic Planning and Management	24%	14%	5%	1%
Policy and Governance	24%	11%	6%	0%
Financial Sustainability	28%	12%	7%	1%
Human Resources	26%	21%	8%	1%
Forecasting and Supply Planning	4%	1%	1%	0%
Logistics Management Information System	40%	17%	7%	0%
Warehousing and Storage	37%	17%	9%	2%
Distribution	44%	21%	6%	1%
Quality and Pharmacovigilance	9%	4%	2%	1%
Waste Managment	34%	12%	8%	3%

Exhibit 108. Level 2 and 3, CMM Scores for All Relevant Technical Areas

Legend: ■ Basic ■ Intermediate ■ Advanced ■ SOA

Technical Area	Basic	Intermediate	Advanced	SOA
Strategic Planning and Management	10%	5%	2%	0%
Policy and Governance	29%	15%	9%	3%
Human Resources	29%	23%	9%	1%
Financial Sustainability	41%	23%	8%	1%
Forecasting and Supply Planning	27%	10%	3%	1%
Procurement and Customs Clearance	29%	15%	5%	1%
Warehousing and Storage	32%	13%	4%	1%
Logistics Management Information System	41%	14%	5%	1%
Quality and Pharmacovigilance	15%	10%	6%	2%
Waste Managment	29%	10%	6%	1%

Exhibit 109. Level 1 Hospitals, CMM Scores for All Relevant Technical Areas

Legend: ■ Basic ■ Intermediate ■ Advanced ■ SOA

Technical Area	Basic	Intermediate	Advanced	SOA
Human Resources	34%	18%	7%	1%
Financial Sustainability	40%	19%	10%	1%
Warehousing and Storage	32%	13%	4%	1%
Logistics Management Information System	34%	17%	4%	0%
Quality and Pharmacovigilance	7%	15%	1%	2%
Waste Managment	26%	9%	4%	1%

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

Legend: ■ Basic ■ Intermediate ■ Advanced ■ SOA

Technical Area	Basic	Intermediate	Advanced	SOA
Human Resources	29%	14%	7%	2%
Financial Sustainability	34%	15%	8%	2%
Warehousing and Storage	26%	10%	4%	1%
Logistics Management Information System	33%	17%	4%	0%
Quality and Pharmacovigilance	4%	15%	0%	2%
Waste Managment	21%	8%	3%	0%

Exhibit 111. Health Posts, CMM Scores for All Relevant Technical Area

Legend: ■ Basic ■ Intermediate ■ Advanced ■ SOA

Technical Area	Basic	Intermediate	Advanced	SOA
Human Resources	24%	11%	6%	2%
Financial Sustainability	33%	15%	8%	2%
Warehousing and Storage	22%	9%	3%	1%
Logistics Management Information System	34%	16%	7%	1%
Quality and Pharmacovigilance	1%	10%	0%	2%
Waste Managment	19%	6%	3%	0%

2017 NSCA versus 2024 NSCA

In 2017, the MOH, with the support of USAID and Axios International, conducted the first NSCA in Zambia. At the time, the NSCA 2.0 methodology was being finalized and codified for dissemination as a toolkit for use in other contexts and settings. Findings from the implementation experience in Zambia were used as inputs for finalizing the toolkit. As a result, changes were made to the NSCA 2.0 methodology after the 2017 implementation. Thus, variations are found across the CMM and KPI questionnaires from 2017, and the final version was used during this 2024 implementation. Consequently, a direct comparison of CMM module scores from the 2017 and 2024 assessments is not strictly appropriate, as the methodologies (number of questions, nature of questions, etc.) varied.

Still, some parallels can be drawn between the findings and recommendations of the previous and current assessments to understand the evolution of the country's supply chain during this period. Exhibit 106 compares key findings and recommendations in the 2017 assessment to those from 2024. assessment to understand the progress made and address persistent gaps

Exhibit 106. Comparison of 2017 to 2024 NSCA			
Technical area	**NSCA 2017 findings/ recommendations**	**NSCA 2024 findings**	**Way forward**
Strategic Planning	MOH should support Medical Stores Limited (MSL), now ZAMMSA, and government hospitals to ensure that appropriate strategic plans reflect the MOH strategic plan and are implemented to guide operations at those levels.	Strategic planning is robust at MoH and ZAMMSA but needs to be further prioritized at CHAZ, Regional Hubs, and large Hospitals	The MoH should support and prioritize the development of strategic plans or operational plans that link the priorities of the sub-national entities in the supply chain to the national supply chain strategy.
Policy & Governance	The MOH should ensure that policy documentation and guidelines are disseminated to the requisite staff and entities at national and subnational levels, and these entities maintain the documents in an easily accessible location so they can be quickly referenced.	Downstream dissemination of policies and guidelines is not optimal and must be prioritized, particularly amongst the sub-national entities.	The MoH and partners should identify innovative and effective ways of disseminating key supply chain policies and guidelines to the intended users.
Human resource management	HR management should be strengthened through training and capacity building, along with implementing robust policies and procedures to address staffing, training, and performance management gaps.	Supply chain HR gaps persist and present opportunities for key decisions around HR for supply chain prioritization.	The MoH should strongly consider developing a human resource workforce plan specific to supply chain management in the health sector. Such a plan should project the sector's HR needs, including the types of staff required at each level and the approach for filling such roles. The government should also prioritize the

			creation of a supply chain cadre within the MOH.
Financial Management and Sustainability	To improve financial management and sustainability, strategies should be developed to increase government funding and reduce reliance on donors, alongside implementing cost-recovery mechanisms where feasible.	Government financial support for SC has improved significantly (51% procurement), but reliance on donor support is pervasive.	The GRZ, through the MOH, should prioritize implementing the HSF 2017–2027, with an emphasis on providing incremental funding to ZAMMSA through the MMSF for the procurement, storage, and distribution of health commodities to reduce reliance on donors.
FASP	To prevent supply disruptions, the MSL should track supply planning accuracy, while the MOH should enhance capacity building and data quality in forecasting, supply planning and develop guidelines for sustainable processes through collaboration and training	Although government capacity for FASP has improved, ownership tools and tracking of KPIs are not consistent.	Incrementally improve government ownership, funding, and technical leadership for FASP. The MOH leadership for FASP should be reinforced by strengthening the control tower to own the tools for the process, manage data, monitor performance, and enforce corrective actions.
Procurement	The MOH should enhance procurement controls through internal audits, develop and enforce standard operating procedures, and strengthen value-for-money analysis and price negotiations to ensure transparency, accountability, and cost savings.	Procurement has been fully transitioned to ZAMMSA, and audits are regularly conducted. Transparency is limited by gaps in process documentation and the tracking of KPI breaks. No evidence of value for money analysis	Improve procurement transparency through enhanced process documentation, centralization, and the application of key performance indicators to track performance. This should include process digitalization to reduce manual processes and facilitate access to documents and data for performance tracking.
Warehousing & Storage	Inventory management and control need to be strengthened through training, supportive supervision, mentoring, and data quality reviews. MOH should conduct an equipment and records assessment to determine the requirements for cold chain	Inventory management and control have been enhanced through the eLIMS, but practitioners often misunderstand max-min levels, which may affect stocking decisions. Central and Regional level infrastructure has been	Invest in infrastructure and capabilities at last-mile facilities to enhance storage conditions and physical security of health commodities. This should include increased access to critical utilities such as electricity and backup power systems to provide optimal

	backup monitoring and tracking and raise funds to equip HCs with inverters and solar equipment. This should include a regular supply of monitoring and tracking tools.	enhanced, but the challenge remains downstream.	conditions for the storage and security of commodities. Also, parallel logistics management SOPs for the various health areas should be reviewed and consolidated into a single SOP for the logistics management of health commodities to facilitate easy access and use by SDPs.
Distribution	Once the RHBs are fully operational, a distribution optimization analysis should be conducted, and MSL should share approved distribution plans with all hubs in advance to improve efficiency and ensure proper preparation.	Regional hubs have been created. However, there is a need to deepen the decentralized distribution of supplies.	Prioritize the decentralization of supply chain operations, including the phased transformation of ZAMMSA from fine-picking to bulk supply-only so that the hubs assume this responsibility.
LMIS	The MOH and MSL should ensure full implementation of the eLMIS system with consistent internet access and provide regular training and supervision to maintain accurate and timely data entry across all facilities.	Significant improvements have been made in spite of internet penetration challenges, and supervision should be leveraged to enhance training and data quality.	Efforts should focus on integrating ZAMMSA and CHAZ warehouse systems with eLMIS, strengthening the MOH control tower for robust supply chain oversight, and standardizing capacity-building methods to ensure consistent competency among health facility staff.
QA & Pharmacovigilance	The MOH, MSL, and ZAMRA should collaborate with development partners to develop and implement SOPs for pharmacovigilance, train staff, and establish a robust QPV system with adequate tools, infrastructure, and human resources.	SOPs for pharmacovigilance are in place, although dissemination can be enhanced. QA must be extended to the peripheral levels of the supply chain.	The MOH prioritizes implementing a product security and serialization strategy for quality assurance, ensuring widespread availability and staff training on SOPs and reporting tools for effective pharmacovigilance, and focusing on post-market surveillance in public-sector facilities to strengthen the country's medicine QA system.
Waste Mgt	Enhance waste management practices across the supply chain by providing training and resources and enforcing SOPs to ensure compliance with national and international standards.	Limited access to waste management SOPs if they exist.	The MOH and ZAMRA should take the lead in developing sector-specific SOPs to fully operationalize laws and regulations for waste disposal within the health sector.

The results in Exhibit 112 show that significant progress has been made in key areas of the supply chain between the period 2017 to 2024. Key milestones achieved within the period include improvements in strategic planning at the MOH and ZAMMSA, centralized procurements of medicines and medical supplies, improvement in central-level warehousing infrastructure, the creation of the regional hubs, and the rollout of the eLMIS. Nevertheless, there are still gaps, such as limited strategic and operational planning below the central level and inadequate human resource planning specific to the supply chain. Infrastructure deficits at the last mile, inadequate dissemination of guidelines and tools developed for end-users, unstructured performance monitoring, and limited reporting of KPIs, amongst others. Consequently, the recommendations of the 2024 NSCA have been formulated to address these gaps and resolve the gaps identified.

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 deemed important to implement for pressing ethical or efficiency reasons, independent of time or ease of intervention.

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

To ensure that the supply chain in Zambia benefits from the recommendations in this NSCA, the assessment team would like GRZ to prioritize the following.

Strategic Management and Planning

- Revise the timeframe for developing and implementing subsequent national supply chain strategic plans from three to five years to enable adequate time for sub-national structures to develop and implement strategies that align with the national priority. This should include re-aligning timeframes for implementing the supply chain strategic plans with the ZAMMSA strategic plan. [Time-order priority]

- Prioritize the development of risk management and response plans for critical levels of the supply chain in the country. The MOH should lead the development of an overall supply chain risk management strategy and guide other entities such as ZAMMSA, CHAZ, and major health facilities to prioritize risk management. [Prevailing priority]

- For the MOH, a comprehensive country supply chain performance monitoring framework should be developed to provide clear guidelines for performance monitoring at each level of the supply chain. The framework should include the country supply chain results framework, definition of indicators, applicable indicators at each level of the supply chain, priority indicators, and indicator reference sheets. [Prevailing priority]

Policy and Governance

- For the GRZ and MOH, work to strengthen supply chain governance at the central level of the supply chain. Making the MOH supply chain control tower functional could be a great step in this direction. Developing a CHAZ-specific supply chain strategy or a high-level operational plan will also be a good step in strengthening supply chain governance within the entity. [Prevailing priority]
- For the MOH and ZAMRA, work together to ensure the SDPs are oriented to access and use the most updated version of the standard treatment guidelines. [Prevailing priority]
- Facilitate the dissemination of policies, guidelines, and tools that are developed centrally to end-user levels. Where specific guidelines and tools are unavailable, such as health sector-specific waste management and quality assurance guidelines, they should be prioritized for development. [Low-cost/high yield]

Human Resources

- Strongly consider developing a human resource workforce plan that is specific to supply chain management in the health sector. Such a plan should have a projection of the HR needs of the sectors, including the types of staff required at each level and the approach for filling such roles. [Time-order priority]

- For the MOH and GRZ, prioritize the recruitment and onboarding of professionals with the requisite competencies in supply chain management to fill critical roles at the central and service delivery levels with the end goal of building a supply chain cadre within the MOH. [Prevailing priority]

- To fully understand the various supply chain HR gaps in the health sector and determine the extent of resources required to achieve optimal outcomes, implement human resources for supply chain assessment for the health sector in Zambia. [Time-order priority]

- ### Financial Management and Sustainability
  For the GRZ and MoH, prioritize the implementation of the HSF with emphasis on providing incremental funding to ZAMMSA through MMSF for procuring health commodities to reduce reliance on donors. [Time-order priority]

- For the GRZ and MOH, with the increasing introduction of health insurance schemes, consider piloting the introduction of drug-revolving funds with the long-term objective of ensuring cost recovery in the health system. [Time-order priority]
- Consider implementing a costing study to understand the burden of supply chain operations so that the GRZ and MoH are equipped with accurate data in projecting the financial investment required for the long-term sustainability of the public health chain system. [Time-order priority]

Forecasting and Supply Planning

- Incrementally improve government ownership, funding, and technical leadership for FASP. The MOH leadership for FASP should be reinforced by strengthening the control tower to own the tools for the process, manage data, monitor performance, and enforce corrective actions. [Prevailing priority]

- Institutionalize the monitoring and reporting of FASP-related performance indicators such as forecast accuracy, supply plan accuracy, and others at the national and publish such reports so that they are accessible for performance tracking. [Low-cost/high yield]
- Strengthen data quality to increase confidence in the reliance on consumption data for quantification. [Low-cost/high yield]

Procurement and Customs Clearance

- Improve procurement transparency through enhanced process documentation, centralization, and application of key performance indicators to track performance. This should include process digitalization to reduce manual processes and facilitate access to documents and data for performance tracking. [Prevailing priority]
- Strengthen the dissemination and application of procurement regulation and standard operation procedures to sub-national entities that are implicated in the procurement of health commodities. [Low-cost/high yield]
- Ensure the government makes incremental investments and increases resource allocation for the procurement of medicines and medical supplies so that donor investment will be minimal in the long term. [Time-order priority]

Warehousing and Storage

- Intensify efforts to standardize operations of the central-level warehouse, particularly at ZAMMSA, by achieving ISO certification. [Prevailing priority]
- Prioritize decentralization of supply chain operations, including the phased transformation of ZAMMSA from fine-picking to bulk supply-only so that the hubs assume this responsibility. [Time-order priority]
- Invest in infrastructure and capabilities at last-mile facilities to enhance storage conditions and physical security of health commodities. Most Zambians access health services at this level, especially in rural areas. These facilities need to be properly equipped to ensure quality medicines are available when needed. [Prevailing priority]

Distribution

- Strongly consider deploying a distribution/transport management system to manage and automate the distribution system and ensure the consistent capture of transportation-related data for performance tracking. [Prevailing priority]
- Institute formal tracking of transportation and distribution-related KPIs and establish a formal structure to monitor and report these KPIs. Empower managers to use this information to further drive distribution efficiency and effectiveness. [Low-cost/high yield]
- Prioritize expanding the current 3PL distribution system to benefit all provinces. Institutions such as CHAZ, which fully relies on its fleet, should consider incrementally introducing outsourcing to the private sector to complement its internal capacity as part of its long-term sustainability strategy. [Time-order priority]

Logistics Management Information System

- Fast-track the integration of the warehouse management systems at ZAMMSA and CHAZ with the eLMIS so that data are visible among the multiple systems in the eLMIS. [Prevailing priority]

- For the MOH, prioritize the functioning of the control tower as a robust entity with the required resources to oversee the eLMIS and act as the M&E headquarters of the supply chain in Zambia. [Prevailing priority]

- Reinvigorate the processes for internal and external data quality assessments. A renewed focus on eLMIS accuracy is needed, as the intervening years between the last NSCA and this one have not yielded any substantive gains in data accuracy in the eLMIS. [Low-cost/high yield]

Quality and Pharmacovigilance

- For the MOH, prioritize implementing a product security and serialization strategy as a comprehensive approach for product quality assurance. [Prevailing priority]
- For the MOH and partners, prioritize support to ZAMRA to accelerate processes toward its attainment of WHO prequalification. [Prevailing priority]
- Ensure the widespread availability of SOPs and reporting tools and prepare staff to complete these reports, without which the pharmacovigilance system cannot function. The MOH should print and distribute all necessary pharmacovigilance tools to facilities across the country, particularly to last-mile facilities. [Low-cost/high yield]

Waste Management

- For ZAMRA, take the lead in developing sector-specific SOPs to fully operationalize laws and regulations for waste disposal within the health sector. [Prevailing priority]

- For the government, make incremental investments or engage in partnerships with the private sector to enhance and modernize waste disposal capacity. This includes implementing waste segregation before disposal and promoting recycling where feasible. [Time-order priority]

- Place priority on disseminating SOPs, providing training, and offering supervision at lower levels of service delivery in waste management and disposal [Low-cost/high yield].

Conclusions

The National Supply Chain Assessment evaluated existing capabilities and levels of performance across 11 technical areas of the supply chain to determine progress, challenges, and viable options for achieving the objectives of improved product availability and accessibility at all health system levels. Overall, the NSCA documented the presence of existing capabilities and levels of performance across all technical areas covered and at each level of the supply chain (central, intermediate, and peripheral). The presence or absence of the identified expected capabilities and performance gaps paves the way for the GRZ and MOH to prioritize supply chain investments and orient decision-making to achieve optimal outcomes.

The HSSCS 2019–2021 encapsulates the objectives and aspirations of the Zambian public supply chain system. Before the implementation of the NSCA in February 2024, the HSSCS 2019–2021 had lapsed, and the GRZ and MOH were in the process of finalizing the development of a new strategy for 2023–2026. However, the HSSCS 2023–2026 is pending approval, so the NSCA relied on the 2019–2021 strategy while referring to the draft strategy when required. This situation made it difficult to obtain clear direction on the current priorities for the health sector supply chain during the assessment period. Consequently, the assessment team strongly recommends immediate approval of the 2023–2026 strategy to establish priorities for the supply chain and guide required investments. Any specific gaps identified in the strategic landscape of the supply chain due to the NSCA 2024 and other available assessments should be considered as an addendum to the strategy to avoid delays in the approval process. Extending the tenure of the supply chain strategy to five years, specifically from 2024–2029, would also provide sufficient time to integrate any new findings and make the required adjustments. It is advisable that future supply chain strategies have a duration of five years instead of the current three-year cycles to minimize gaps between plans.

While resolving current gaps in the strategic direction of the supply chain, it is crucial to strengthen the governance framework for the supply chain, particularly at the level of the MOH. It is imperative for the MOH to prioritize the full establishment of the supply chain control tower and strengthen technical and operational leadership for the supply chain. Consideration should also be given to establishing a Supply Chain Directorate at the MOH to provide oversight for the supply chain independent of other directorates. Supply chain management should be recognized as a professional role without the need to be an appendage of any other directorate or technical unit of the MOH. Given the potential impact of modern technology and emerging dynamics such as artificial intelligence on supply chains, the need is urgent to build supply chain capacity and competencies within the MOH to respond to emerging needs. Supply chain functions should not be treated as auxiliary functions, particularly at the central level and large health institutions where workload is expected to increase. At the peripheral levels, even if supply chain functions are incorporated into the job functions of other cadres of health staff, roles and responsibilities must be clearly communicated, and sufficient resources must be provided for individuals to succeed in their roles.

While the GRZ has been making significant investments in the supply chain through funding for the purchase and distribution of medicine to Zambians through ZAMMSA, donors have played a significant role in funding and supporting key areas in the supply chain. Donors fund the purchase of health commodities, support distributions, the development of the LMIS, and many infrastructure investments. With the potential decline in donor funds, an honest conversation is needed on how the country prepares for necessary incremental investments in the supply chain. Implementation of the National Health

Insurance Scheme presents an opportunity for the GRZ to consider implementing cost recovery in the health sector, at least at referral health facilities.

The electronic LMIS is a valuable asset to the Zambian public health supply chain system, with almost 100 percent coverage for all health facilities through the central edition for facilities yet to be onboarded onto the facility edition. The eLMIS presents a great opportunity for active tracking and the use of data-driven supply chain performance. Issues related to stockouts, stocking according to plan, data accuracy, and order processing can be resolved if data from the eLMIS drive decision-making. Initially, supply chain stakeholders need to develop an M&E framework for the supply chain. The framework should determine key performance indicators to be tracked at each level of the supply chain, with reports accessible to facilities after each reporting cycle. Personnel in charge of supply chain functions at each level of the system must understand their performance parameters and be able to make decisions at their operational level to resolve identified challenges. At the central level, there is a need to accelerate the ongoing exercise of integrating the WMS and the eLMIS to enable the system to fully benefit from the automation of the supply chain data management systems.

ZAMMSA, together with its regional hubs, represents a strong nexus in the supply chain and should be leveraged to optimize outcomes such as improved product availability and increased access to quality, affordable medicine at all public health facilities. The deployment of an end-to-end WMS and the use of modern technology and logistics tools to drive operations demonstrate the high level of investment made by the government and cooperating partners. However, operations at ZAMMSA are on a large scale and involve multiple levels of complex activities that cannot be encompassed within a single assessment or ad hoc monitoring. Therefore, benchmarking the operations of ZAMMSA with international standards is necessary for continuous improvement and maintenance of standards. While the CHAZ warehouse and other central-level warehouses operate on a smaller scale, they can also work toward achieving international certification or at least maintaining internal regulatory standards.

Regional hubs are important nodes in the supply chain, and their operations should be expanded as a deliberate strategy to minimize centralization at ZAMMSA and decrease the risk of holding most of the country's stock at ZAMMSA. For a large country like Zambia, it is not inappropriate to replicate the operations of ZAMMSA at two or more locations.

At the peripheral levels, supply chain capacity and maturity decline from level 2 and 3 hospitals to health posts. Level 1 hospitals generally perform better than health centers, and health centers outperform health posts. Supply chain duties at health centers and health posts are mostly performed by untrained staff burdened with other roles. Leveraging existing opportunities with supply chain support through regular supervision can continuously improve their capacity and provide them with the skills required to perform their functions. Many of these facilities, even if transitioned to the facility edition of the eLMIS, will face challenges with Internet connectivity, necessitating ongoing support from higher levels of the supply chain to maintain performance. Therefore, sustained development of capacity and resourcing is needed to enable them to perform at optimum levels.

Given these considerations, the authors of this report are confident that with empowered leadership, strategic targeting of supply chain weaknesses, and an ongoing commitment to transform the health system, Zambia can implement appropriate reforms to further strengthen the supply chain and help realize the country's vision of high-quality health care.