Nigeria National Supply Chain Assessment Results

A Review of the Public Health Supply Chain for Nigeria

SCMS

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

USAID | DELIVER PROJECT
FROM THE AMERICAN PEOPLE

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CDC

Abstract

In November 2014, the Federal Ministry of Health (FMOH), with technical assistance from the Supply Chain Management System and the USAID | DELIVER PROJECT, Task Orders 4 and 7, conducted an assessment of the logistics management systems for selected health commodities. This report includes assessment findings and recommendations for improving the health logistics systems.

Contents

Acronyms

AIDS	Acquired Immune Deficiency Syndrome
ARFH	Association of Reproductive and Family Health
CBD	Community-Based Distribution
CCW	Central Contraceptives Warehouse
CHAI	Clinton Health Access Initiative
CMM	Capability Maturity Model
CMS	Central Medical Store
DOTS	Directly Observed Treatment
DFDS	Department of Food and Drugs Services
FCT	Federal Capital Territory
FHI	Family Health International
FMOH	Federal Ministry of Health
FMS	Federal Medical Store
GoN	Government of Nigeria
GF	Global Fund
HIV	Human Immunodeficiency Virus
HPRS	Health Planning Research and Statistics
ICC	Inventory Control Card
IHVN	Institute of Human Virology of Nigeria
JSI	John Snow, Inc
KPI	key performance indicator
LGA	Local Government Administration/Authority
LMCU	Logistics Management Control Unit
LMIS	logistics management information system
MDGs	Millennium Development Goals
MIS	Management Information System
MNCH	Maternal, Newborn, And Child Health

NACA	National Agency for the Control of AIDS
NTD	Neglected Tropical Diseases
NSACP	National STD and AIDS Control Program
NSHDP	National Strategic Health Development Plan
NMEP	National Malaria Elimination Program
NPHCDA	National Primary Health Care Development Agency
NPSCMP	National Product and Supply Chain Management Program
NTBLCP	National Tuberculosis and Leprosy Control Program
ORS	Oral Rehydration Salt
PATH	Program for Appropriate Technology in Health
PEPFAR	President's Emergency Plan for AIDS Relief
PHD	Pharmaceutical Healthcare Distributers
RH	Reproductive Health
SCMS	Supply Chain Management System
SOPs	Standard Operating Procedures
STD	Sexually Transmitted Diseases
TB	Tuberculosis
3PL	Third-Party Logistics
TLE	Tenofovir, Lamivudine, and Efavirenz
TOs	Task Orders
TO4	Task Order 4
TO7	Task Order 7
US	United States
USAID	United States Agency for International Development
UNICEF	United Nations Children's Fund
UNPF	United Nations Population Fund
WMS	Warehouse Management System

Acknowledgements

Executive Summary

I.   Background

The Federal Ministry of Health (FMOH) developed a National Strategic Health Development Plan (NSHDP 2010–2015). Included in the NSHDP is the commitment to improve the citizenry's health status by achieving timely availability of quality health commodities and supplies at all levels. Critical to fulfilling this commitment is a holistic understanding of the supply chain systems for these commodities, the gaps that exist and the best methods to address them. To this end, the National Product and Supply Chain Management Program (NPSCMP) of the Department of Food and Drug Services (DFDS) led the planning of the National Supply Chain Assessment (NSCA) designed to include all program areas—HIV/AIDS, TB, malaria, reproductive health (RH), essential medicines, maternal, newborn, and child health (MNCH), and immunization.

Objectives for the assessment include:

- To establish base line metrics of Key Performance Indicators (KPIs) for the National Supply Chain Management Program

- To measure the maturity of the supply chain systems for health commodities in different functional areas, and bench mark this against industry standard best practices.

- To highlight strengths and weaknesses of the enabling environment of supply chain activities, and identify critical areas in the system for the government of Nigeria and donor interventions.

II.   Methodology

The National Supply Chain Assessment (NSCA) was chosen as the tool for the assessment, which included two key components toolkit, including:

1. **Capability Maturity Model (CMM):** A tool that uses interviews with key supply chain personnel and direct observation to measure supply chain capability. Capability is measured on a scale of 1 to 5. Results are displayed as percentages, as shown in Figure 1.

2. **Key performance indicators (KPIs):** Data on stock status, requisitions, procurement, and forecasting, collected throughout the supply chain to understand supply chain performance for a set of key indicators.[1]

During the assessment, data collectors visited 252 facilities covering all three levels of health care in Nigeria. These included 168 primary health centers, 72 secondary hospitals, 12 tertiary hospitals. In addition 12 state

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[1] More information on the NSCA toolkit and its implementation in Nigeria can be found on page XX. A full list of KPIs and tracer commodities used in the assessment can be found on page XX.

warehouses, and nine regional/zonal warehouses within Nigeria were also visited. The sample, calculated for a ±7 percent margin of error and 95 percent confidence interval and a response rate of 95 percent.

III.   Key Results and Recommendations

Health Supply Chain Levels

Throughout the supply chain, warehouses and health facilities are responsible for the storage, inventory management, transportation and waste management of health commodities. The table below provides an overview of the capability and performance at each level of the supply chain.

Capability Maturity Model scores[2]	FMS	ZONAL WAREHOUSE	STATE WAREHOUSE	PRIMARY HEALTH FACILITY	SECONDARY HEALTH FACILITY	TERTIARY HEALTH FACILITY
Warehousing & Inventory Management	34%	59%	42%	33%	36%	49%
Transportation	Not Assessed	60%	40%	NA[3]	NA	NA
Waste Management	Not Assessed	47%	37%	27%	29%	41%
Key Performance Indicator scores	FMS	ZONAL WAREHOUSE	STATE WAREHOUSE	PRIMARY HEALTH FACILITY	SECONDARY HEALTH FACILITY	TERTIARY HEALTH FACILITY
Stock card availability	93%	100%	79%	32%	47%	61%
Stockout rates (day of visit)	14%	17%	15%	30%	25%	25%
Stock accuracy	79%	72%	60%	65%	69%	73%

FMS Oshodi

At the central level (FMS Oshodi), warehousing capability is low at 34 percent. The FDS department of the FMOH to invest or solicit investments for the following:

1. In collaboration with donors implement warehouse management system application to better facilitate inventory management with guidelines for the operation
2. Increase storage capacity for both usable commodities and expiries

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[2] Scores in this table are a subset of the scores provided throughout the report. The sample size for each type of facility and program will vary. Details can be found throughout the report.
[3] NA= Not Applicable

Zonal and State Warehouses

Warehousing capability is between the marginal and satisfactory levels at both the state and zonal warehouse levels.[4] Donor supported zonal warehouses have a higher level of capability than the state ware houses that are supported by the SMOH. At the state warehouse level, distribution systems are not readily available, with 90 percent of sampled orders collected by health facilities.

Interventions at this level should include:
1. Support state warehouses to improve ICC use for essential medicines and non-program commodities. This should include the development of job aids for inventory management processes and follow-up supervision visits
2. Support state warehouses to improve monitoring and planning of commodity distribution including implementing a transportation system.

Health Facilities

Warehousing capability at the health facility level ranges from ad hoc to marginal, indicating basic processes are not used consistently and are manual. Capability increases moving from primary to tertiary facilities (Primary: 33 percent, Secondary: 36 percent, Tertiary: 49 percent). Although capability was assessed for the facility overall, it is important to highlight that inventory management processes varied significantly depending on the program area. Of note, Inventory control cards (ICCs) had limited availability at this level of the supply chain. HIV/AIDS and malaria, which receive donor support, had respective ICC availability of 52 percent and 61 percent.

Interventions at this level should include:
1. The FMOH should work closely with donors to improve warehousing and inventory management practices at this level including routine use of ICCs for all program areas.
2. FMOH should work with partners to establish routine monitoring and supportive visits to ensure staff are trained to use ICC correctly.
3. An integrated removal and disposal of waste should be implemented, leveraging on donor supported programs (such as HIV/AIDS) that have a waste management program with an agreement on cost sharing.

Health Programs
The health supply chain in Nigeria is composed of multiple vertical supply chains focused around the flow of commodities and information by specific health programs. Health programs typically have an oversight role within the supply chain, including forecasting and procurement. They are also responsible for program specific LMIS.
The table below provides an overview of the capability and performance for each health program assessed, as well as KPI scores specific to the tracer commodities for each program.

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[4] Capability levels associated with the NSCA capability maturity scale of 1-5. Details on this scale can be found on page 7.

Capability Maturity Model scores	RH	HIV/AIDS	MALARIA	TB	VACCINES	ESSENTIAL MEDS/NTDS	MNCH
Forecasting & Supply Planning[5]	68%	62%	69%	56%	70%	NA	NA
Procurement	81%	66%	62%	49%	81%	NA	NA
KeyPerformance Indicator scores	RH	HIV/AIDS	MALARIA	TB	VACCINES	ESSENTIAL MEDS/NTDS	MNCH
Stockout rates	14%	12%	29%	43%	37%	38%	44%
Stock accuracy	82%	63%	57%	88%	69%	57%	74%

Capability of the health programs varies by disease area, but a common challenge is the availability and quality of LMIS data. Where LMIS systems are in place, programs have on-time reporting rates above 75 percent. However, the quality of the data from these reports needs improvement. These challenges have significant impact on the forecasting and supply planning process with several programs highlighting they cannot use consumption data to inform multiple methodologies due to data quality issues.

Interventions should focus on improving the quality of LMIS data through regular monitoring, bi-annual data quality assessments should be strongly implemented by the FMOH and partners. These data quality improvement activities should be conducted in an integrated approach (across multiple programs), this will allow for leveraging the strengths that some programs may already have in conducting similar activities.

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[5]CMM scores reflect the stakeholders who were interviewed during the assessment. The number of stakeholders varies by program areas and should not always be considered a complete picture of the functional area for the specific program.

Background

I. Statement of Work

To address Nigeria's declining health indicators, and strengthen the national health system based on the principle of primary health care, the Federal Ministry of Health (FMOH) took a participatory approach to developing a National Strategic Health Development Plan (NSHDP 2010–2015). The plan's overarching goal is to significantly improve the health status of Nigerians by creating a strengthened and sustainable health care delivery system.

Included in the NSHDP is the commitment to improve the citizenry's health status by achieving timely availability of quality health commodities and supplies at all levels. Critical to fulfilling this commitment is a holistic understanding of the supply chain systems for these commodities, the environment in which these systems operate, the gaps that exist, and the best methods to address them.

The National Product and Supply Chain Management Program (NPSCMP) of the Department of Food and Drug Services (DFDS) in collaboration with stakeholders sought to assess the national supply chain. In doing so, NPSCMP led the planning of the National Supply Chain Assessment (NSCA) designed to include all program areas—HIV/AIDS, TB, malaria, reproductive health (RH), essential medicines, maternal, newborn, and child health (MNCH), and immunization—using the NSCA toolkit. The goal of the assessment was to provide information on where to focus efforts to strengthen and integrate supply chain systems. Specific assessment objectives were to:

- To establish base line metrics of Key Performance Indicators (KPIs) for the National Supply Chain Management Program
- To measure the maturity of the supply chain systems for health commodities in different functional areas, and bench mark this against industry standard best practices.
- To highlight strengths and weaknesses of the enabling environment of supply chain activities, and identify critical areas in the system for the government of Nigeria and donor interventions.
- To provide a platform for the integrated coordination of supply chain activities, in line with the strategy of the government of Nigeria and key international partners

II. Country Context

With a population of about 170 million, Nigeria is the most populous country in Africa. It has six geopolitical regions—North Central, North East, North West, South East, South, and South West—and a total of 36 states.

In the last decade, Nigeria has made concerted efforts to improve its citizens' health status, as demonstrated by developing strategic plans to fast-track meeting the Millennium Development Goals (MDGs) and by reviewing the 2014 National Health Policy to incorporate recommendations

that reflect new realities and trends in the country's health sector. As of 2012, Nigeria had achieved some MDG targets, including reversing the trend of HIV/AIDS and malaria prevalence; however, the degree of annual decline in maternal and infant mortality rates is not sufficient to meet MDG targets. A strengthened health system, and by extension, a robust, efficient supply chain system, will be pivotal in sustaining the modest success gained so far in improving the citizenry's overall health status.

III. Report Overview

This report outlines the results of the NSCA in Nigeria. The format mirrors the vertical nature of the country's supply chains. Results are divided into sections, including:

1. **Federal Medical Store (FMS) Oshodi:** The capability and performance of this primary storage point for most products entering the health supply chain in Nigeria.

2. **Zonal and state warehouses:** Overview of the warehousing and transportation capability and stock status of the intermediate warehousing points within Nigeria's health supply chains.

3. **Health facilities (tertiary, secondary, and primary):** Results from the assessment of the patient-facing health facilities' warehousing, waste management, and laboratory capabilities as well as stock status data.

4. **Health programs:** Results from the health programs, including the centrally managed functions of forecasting and supply planning, procurement, and logistics management information systems (LMIS). Program-specific results for stock status and order data are discussed where relevant.

Methodology

I. Tool Overview

The National Supply Chain Assessment is a comprehensive toolkit developed by the Supply Chain Management System (SCMS), the USAID|DELIVER PROJECT, and Systems for Improved Access to Pharmaceuticals and Services (SIAPS) projects for the USAID. The toolkit measures a supply chain's capability and performance across functional areas at all supply chain levels and provides key stakeholders, such as donors, implementing partners, and supply chain managers, with a detailed quantitative account of a supply chain's performance and maturity. Results can facilitate several activities: making decisions, tracking performance, analyzing root causes, and prioritizing system strengthening activities.

The toolkit includes three components:

3. **Supply Chain Mapping Workshop:** A stakeholder workshop that maps the supply chain(s), including the flow of commodities and information, in addition to a Strengths, Weaknesses, Opportunities, and Threats analysis.

4. **Capability Maturity Model (CMM):** A tool that uses interviews with key supply chain personnel and direct observation to measure supply chain capability. Capability is measured on a scale of 1 to 5. Results are displayed as percentages, as shown in Figure 1.

Figure 1. Five levels of capability maturity
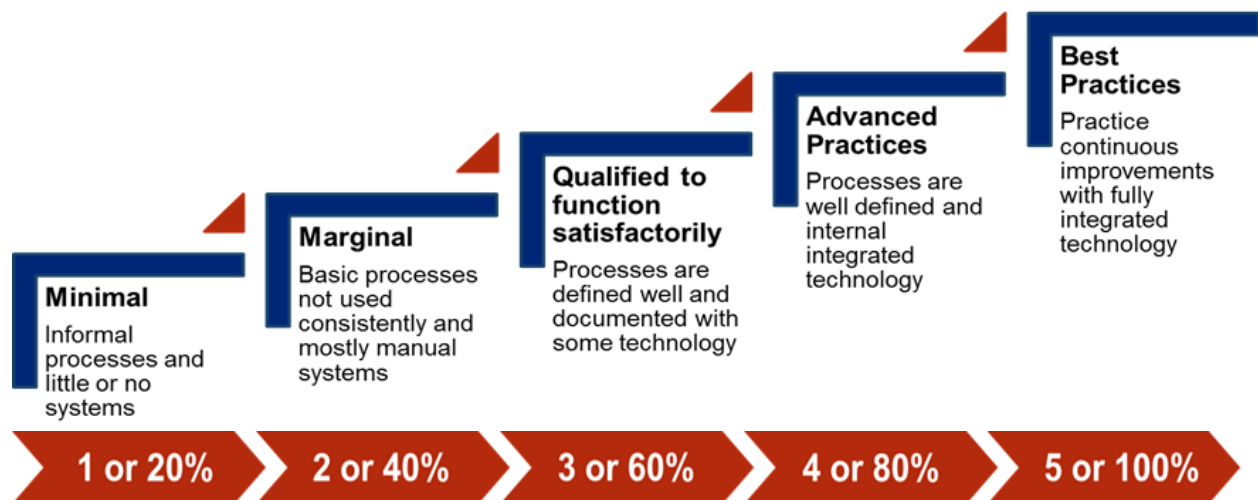
5. **Key performance indicators (KPIs):** Data on stock status, requisitions, procurement, and forecasting, collected throughout the supply chain to understand supply chain performance for a set of key indicators. Key performance indicators in the Nigeria NSCA include:

	KPI	Formula
Stock Status	**Percentage of facilities or tracer commodity observations with stock cards available**	$$\frac{Number\ of\ facilities\ (or\ tracer\ observations)\ with\ stock\ cards\ available\ for\ the tracer}{Number\ of\ facilities\ (or\ tracer\ observations)\ where\ the\ tracer\ is\ managed}\ X\ 100$$ **NOTE**: This indicator can be disaggregated by tracer or can be aggregated into an overall stock card availability score by facility type, SC level, program area or the overall supply chain
	Percentage of facilities or tracer commodity observations with up to date stock cards	$$\frac{Number\ of\ facilities\ (or\ tracer\ observations)\ with\ up\ to\ date\ stock\ cards\ available\ for\ the\ tracer}{Number\ of\ facilities\ with\ available\ stock\ cards\ for\ the\ tracer}\ X\ 100$$ **NOTE**: This indicator can be disaggregated by tracer or can be aggregated into an overall up to date stock card score by facility type, SC level, program area or the overall supply chain
	Percentage of facilities or tracer commodity observations with stock out on day of visit	$$\frac{Number\ of\ facilities\ (or\ tracer\ observations)\ with\ a\ stock\ out\ for\ the\ tracer}{Number\ of\ facilities\ (or\ tracer\ observations)\ where\ the\ tracer\ is\ managed}\ X\ 100$$ **NOTE**: This indicator can be disaggregated by tracer or can be aggregated into an overall stock out rate score by facility type, SC level, program area or the overall supply chain
	Stock Accuracy	$$\frac{Number\ of\ facilities\ (or\ tracer\ observations)\ where\ physical\ inventory\ matches\ ICC}{Number\ of\ facilities\ (or\ tracer\ observations)\ with\ up\ to\ date\ ICC}\ X\ 100$$ **NOTE**: This indicator can be disaggregated by tracer or can be aggregated into an overall stock out rate score by facility type, SC level, program area or the overall supply chain
Order Data	**Order Fill Rate**	$$\frac{Total\ quantity\ delivered}{Total\ quantity\ ordered}\ X\ 100$$ **NOTE**: This indicator can be disaggregated by program area and supply chain level. Order fill rate can also be measured for the individual order and overall.
	On-Time Delivery	$$\frac{Number\ of\ orders\ arriving\ on\ or\ before\ agreed\ delivery\ date}{Total\ number\ of\ orders}\ X\ 100$$ **NOTE**: This indicator can be disaggregated by program area and supply chain level. On-time delivery can also be measured for the individual order and overall.
LMIS	**Facility On-Time Reporting Rates**	$$\frac{Number\ of\ reports\ submitted\ on\ or\ before\ agreed\ date}{Number\ of\ reports\ expected\ that\ have\ agreed\ submission\ dates}\ X\ 100$$ **NOTE**: This indicator can be disaggregated by program area, facility level or individual facility.

II. Sampling

The assessment was conducted in 252 facilities covering all three levels of health care in Nigeria. These included 168 primary health centers, 72 secondary hospitals, 12 tertiary hospitals, 12 state warehouses, and nine regional/zonal warehouses within 12 states of Nigeria's six regions. The sample, calculated for a ±7 percent margin of error and 95 percent confidence interval and a response rate of 95 percent, included randomly selected states, then local government areas, and health facilities within selected states.. A purposive selection of regional warehouses and two states in the North East zone due to insecurity. Also, all state warehouses, where available, were included. Figure 2 shows the selected states for the assessment study in each geopolitical zone.

Figure 2. Selected states for the assessment study in each geopolitical zone
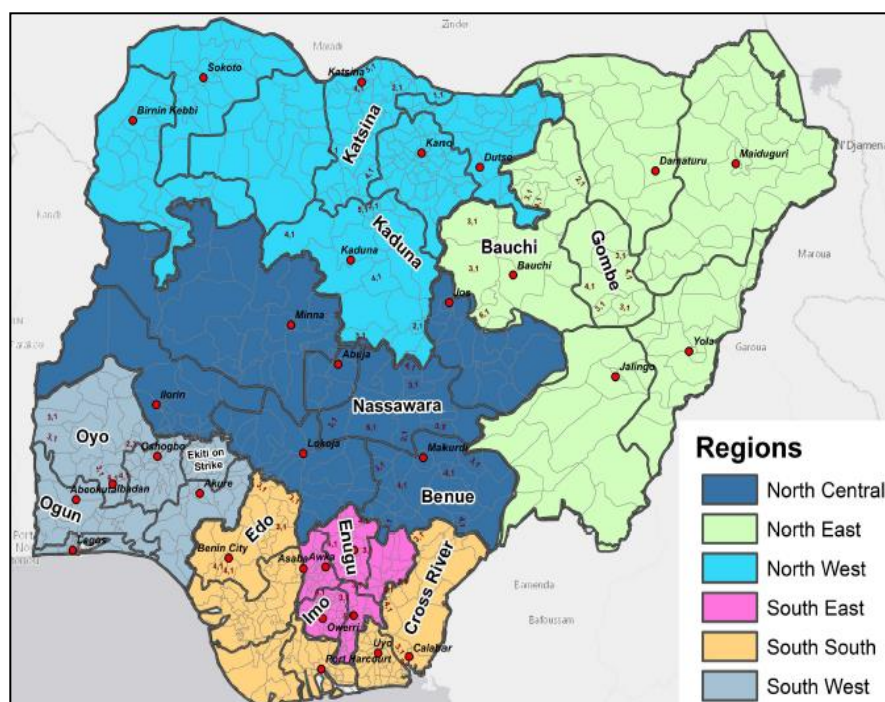
III. Scope and Tracer Commodities

A key activity in the NSCA assessment was tracing 19 selected tracer commodities throughout the supply chain for each program area in line with the national program (see Table 1). The project management team selected these commodities to gain insight into commodity management performance on the day of visit and from July-September 2014. Data from the selected tracer commodities were used to calculate the KPIs.

Table 1. Tracer commodities

	Tracer commodity	Program area
1	TDF3TCEFV (300 300 600mg)	HIV/AIDS
2	AZT3TCNVP (30 60 50mg)	
3	HIV 1 and 2 Determine test	
4	Patient kit (Cat 1), adults	TB
5	Pediatric kit, children	
6	Depo-Provera, vials	RH
7	Nonristerat, vials	
8	Microlut Exluton, cycles	
9	Microgynon, cycles	
10	AL 1 (Artemeter/Lumefantrine, 20mg 120mg), 1*6, sachets	Malaria
11	AL 4 (Artemeter/Lumefantrine, 20mg 120mg), 1*24, sachets	

12	Malaria rapid diagnostic test	
13	Misoprostol 200ug, tablets	MNCH
14	Oral rehydration salts (ORS), sachets	
15	Zinc 20 mg, tablets	
16	Amoxicillin 500mg, tablets/capsule	Essential medicine/neglected tropical diseases (NTDs)
17	Albendazole 400mg, tablets	
18	Trivalent oral polio vaccine	Vaccines
19	Bacillus Calmette–Guérin (BCG) TB vaccine	

IV. Data Collection/Analysis

A total 34 data collectors were dispatched to different states in teams of two to three for a three-week period, October 27 through November 14, 2014, to collect data from the selected health facilities, state warehouses, regional warehouses, and the central medical store in Oshodi. As part of the process of on-site data quality assurance, independent monitors (mostly FMOH staff) also visited selected sites. Data collectors used smart phones and Microsoft Excel tools to collect data, along with Magpi, a DataDyne-designed mobile application that facilitates transmission of data from phones directly to an Internet-based server.

Before implementing the assessment, field data collectors participated in a five-day training course on using the NSCA toolkit and Magpi. They received data collection guidelines and data collection methodology to identify the types of information to be gathered, to standardize the data collection process, and to discuss data quality assurance, confidentiality, security, and safety issues.

Records were uploaded and exported directly from smart phones to a Microsoft Excel database, where available project management team members, with SCMS and USAID|DELIVER staff, inventoried, cleaned, and validated the records throughout the data collection period. Analysis of the data was conducted using Access and Microsoft Excel.

V. Limitations

Some limitations were encountered with the assessment:
- Since the sample size was calculated for the national level based on total number of facilities, individual program-level analysis may not be representative, since not all facilities offer all programs. Caution is needed, then, when interpreting individual program-level results.

- Some KPIs that were originally selected were not measured during the assessment, and for others, only limited data was collected. The primary reason for these issues was data availability. In some instances, data was not shared with the data collectors, while in others it was not available due to a lack of record keeping.

- At times, staff from SCMS/USAID|DELIVER PROJECT interviewed other SCMS/USAID|DELIVER PROJECT respondents who were responsible for implementing some of the assessed programs and for procuring selected tracer commodities. This method may have introduced bias.

- The Capability Maturity Model was applied once at each site at the health facility level, although when data collectors arrived at sites, they discovered that even at this level of the supply chain, products for different programs were being managed differently. Some program products had up-to-date stock cards and shelving while others were stored in bags with little to no inventory management. In determining capability scores, data collectors considered all programs, so these results cannot be disaggregated by program area.

Health Supply Chain

I. Overview of Nigeria's Public Health Supply Chain

At the federal level, different disease programs coordinate health interventions nationwide. Each program is largely responsible for managing its health commodities supply chain, resulting in parallel supply chain systems across health areas, although in some instances, facilities such as warehouses are co-located.

Federal Medical Store (FMS) Oshodi by design is the national central warehouse that should serve as the major point of entry of public health commodities into the country. However, due to limited capacity, some disease programs have adopted regional stores to provide needed storage capacity and ensure commodities are closer to intended recipients. Some of these stores are co-located in state government medical stores while others are not. Commodities are distributed from regional stores to other states in respective geopolitical regions.

For commodity distribution, some disease programs are using third-party logistics providers (3PLs) to distribute commodities from the central warehouse to the last mile, while others use a combination of 3PL, facility vehicles, and local couriers, depending on the level of the supply chain system. The logistics management information systems, which are essential to ensure an uninterrupted flow of commodities and to optimize commodity distribution, are being managed independently by various disease programs in the country.

Nigeria operates a three-tier public health facility system of primary, secondary, and tertiary care, managed by the three tiers of government. The local government manages primary health care facilities, the main part of Nigeria's health care delivery system. State governments manage the secondary facilities and the federal government manages the tertiary facilities.

To leverage and maximize the use of scarce resources, streamline processes, and integrate systems in an effort to strengthen the supply chain system, the need is apparent to coordinate Nigeria's public health supply chain system. The FMOH established the National Product and Supply Chain Management Program (NPSCMP), which has the core mandate of coordinating all supply chain management activities for medicines and other health commodities to ensure visibility and collaboration across health program supply chain systems.

Federal Medical Store Oshodi

I. Overview of the FEDERAL MEDICAL STORE

Federal Medical Store Oshodi is located in Lagos State, the former capital of Nigeria. Lagos State's proximity to the port of entry and airports makes it a suitable location for the country's central warehouse, where health commodities coming into the country could be first received. Federal government and donor-procured commodities are stored in the facility. While various donors and government agencies manage different aspects of the supply chain for different disease areas, commodities are frequently in the shared location of the FMS.

II. High-level Results

Table 2. FMS high-level scores

CMM scores (by enabler)[6]	
Overall warehousing capability	34%
• Processes and tools	40%
• Management information system	25%
• Infrastructure	35%
• Oversight	31%
KPI scores	
Stock card availability	93%
Minimum/maximum rates exist	0%
Stockout rates (day of visit)	14%
Stock accuracy	79%
Storage conditions	93%

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[6] This "overall" score is arrived at by averaging each of the capabilities with the four cross-cutting enabler categories observed at the FMS: 1) processes and tools; 2) management information; 3) infrastructure; and 4) oversight

Overall warehousing capability at the FMS in Oshodi is 34 percent. CMM interviews revealed that although some processes were strong, significant limitations hindered efficient inventory management, including limited technology and storage space constraints. Specific highlights include the following:

Table 3. FMS warehousing capabilities

Capability[7]	Score	Comments
Checking	80%	Orders leaving the FMS are checked for accuracy twice, at the time of picking and at dispatch.
Picking and put-away	40%	The use of technology to support these processes is limited, including the lack of a consistently used electronic warehousing or inventory management system. HIV and malaria commodities use mSupply; however, due to power shortages, stock cards are often used as secondary inventory management tools. These two tools are not always reconciled. Stock cards are the primary inventory management tool available for other commodities, and no pick tickets are used.
Storage capacity	20%	FMS does not have enough capacity to store the required throughput of commodities. These constraints could affect material handling at warehouses.
Expiry	20%	The infrastructure capacity of on-site expiries was largely constricted due to the limited storage capacity for usable commodities. This situation has led to expired commodities being stored in dilapidated buildings outside the FMS, which is not secured.
SOP	20%	FMS lacks procedures for basic warehousing operations.

Although FMS faces technology and storage space challenges, manual inventory management system appears to be performing relatively well. On the day-of-visit, 93 percent of FMS tracer commodities had an available stock card, and 79 percent of the quantities on those stock cards matched the quantity from the physical inventory conducted within 10 units.

Stockouts were encountered for two tracer commodities on the day of visit, including Misoprostol 200mg tab and patient kit (Cat 1). All 11 other commodities managed at the warehouse were available. Information available on historic stockout (July–September 2014) shows only one tracer commodity (Albendazole 400mg tab) stockout in August 2014. It was observed that inventory control cards (ICCs) were available for all tracer commodities.

For storage conditions standards, the central warehouse Oshodi was observed to meet all except adequate space, which has the potential to affect warehouse operations in picking, sorting, put-away, etc. It therefore falls into the category of good storage condition, with 13 of the 14 criteria met.

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[7] The CMM interviews assess a set of capabilities that are each scored on a maturity scale of 1-5 (20%-100%).

III. Challenges and Recommendations

Table 4. FMS challenges and recommendations

Supply chain functional area	Key issues/challenges	Recommendations
Warehouse and inventory management	Adequate warehousing/inventory management technology is lacking.	Although paper-based systems are functional, the large volume of commodity throughput at the FMS could be more efficiently managed by using an electronic warehouse management software.
	Storage space is insufficient to accommodate throughput of commodities.	Assess potential options for expansion of storage space at the FMS.
	Standard operating procedures (SOPs) are lacking.	More detailed SOPs for most warehousing processes will be required to optimize warehouse operations, which includes a detailed implementation mechanism.
	The infrastructure capacity of on-site expiries was largely constricted due to the limited storage capacity for usable commodities. This situation has led to expired commodities being stored in dilapidated buildings outside the FMS, which is not secured.	Increase storage capacity with designated space for expires and damaged commodities and improve on the process of expires and waste disposal management.

Zonal and State Warehouses

I. Overview of Zonal and State Warehouses in Nigeria

Inbound commodities into the country for health programs are received most times in federal medical stores Oshodi, which serves as central storage for public health commodities. To ensure good lead times to health facilities, the logistic system design for most health programs also includes an intermediate storage point, including zonal warehouses (managed by implementing partners) and/or state warehouses (managed by state governments) that ensures health commodities are close to health facilities that serve patients.

By design, health programs such as HIV/AIDS, TB and vaccines have zonal warehouses, while malaria, reproductive health, MNCH, NTDs and other essential medicines maintain state warehouses and are managed by state governments.

Zonal warehouses

The HIV/AIDS, TB, and vaccines programs all use zonal warehouses to store their products.

- HIV/AIDS program currently store commodities in six regional warehouses in addition to FMS Oshodi., The regional warehouses are part of the unification strategy for warehousing and distribution supported by USAID and Global Fund. The strategy was aimed at unifying the multiple HIV/AIDS supply chain in all states of the country so as to reduce stock outs, increase efficiency and minimize waste through donor collaboration.

- There are 6 TB zonal warehouses which are strategically located such that there is one zonal warehouse in each of the geographical regions in the country

- Vaccines have 6 regional stores that are also spread across the country, these stores provide resupplies to the state warehouses.[8]

State warehouses

Each of Nigeria's 36 states, along with the Federal Capital Territory (FCT), has a central warehouse for storing commodities procured by state governments through the drug revolving fund or other mechanisms. Donated commodities and health program commodities such as malaria and family planning programs are also kept in the state warehouses.[9]

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[8] Data collection teams visited three zonal warehouses for each of these program areas.
[9] Data collection teams visited 12 state warehouses, one for each of the 12 states included in the sample.

II. High-level Results

State warehouses

Table 6. State warehouse high-level scores

CMM scores	
Forecast and supply planning	**41%**
Procurement	**45%**
Warehousing and inventory management	**42%**
Transportation	**40%**
Waste management	**37%**
KPI scores	
Stockout rates	**17%**
Stock accuracy	**72%**

Zonal warehouses

Table 5. Zonal warehouse high-level scores[10]

CMM scores	
Warehousing and inventory management	**59%**
Transportation	**60%**
Waste management	**47%**
KPI scores	
Stockout rates	**15%**
Stock accuracy	**60%**

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[10] Scores in this table for reflect the aggregated score for all three program areas zonal warehouses (HIV/AIDS, TB and Vaccines).

Forecasting and supply planning[11]

State warehouses or Logistic Management Control Units (LMCUs) are responsible for the forecasting and supply planning function for commodities that are not included in the health program. Of the 12 state warehouses assessed, only eight reported conducting any forecasting and supply planning activities. Capability for these eight state warehouses is limited at 41 percent. Key capability challenges are shown in Table 7.

Table 7. Forecasting and supply planning capabilities

Capability	Score	Comments
Forecasting methodologies and assumptions	38%	Forecasting methodologies are limited to single, often undocumented methodologies that are chosen based on data availability. With the limited LMIS reporting, data availability creates significant constraints on multiple methodology forecasting.
Forecasting data quality	30%	Data availability for forecasting is limited, and the quality of available data is poor.
Developing and monitoring the supply plan	33%	Supply planning is limited at the state warehouse, with ad hoc development and little to no monitoring in place.

Procurement[12]

Typically, state warehouses are also responsible for procuring essential medicines through the use of drug revolving funds. Seven state warehouses reported that they procured commodities, and capability for this functional area is low at 45 percent. Key capability challenges include:

Table 8. Procurement capabilities

Capability	Score	Comments
Order and delivery management	26%	Most state warehouses do not have a system for tracking and managing orders after purchase. Any communication with suppliers is ad hoc.
Product quality control	34%	Quality testing for products is limited.

Warehousing and inventory management

Warehousing and inventory management capabilities are higher at the zonal warehouses than at state warehouses. Differences in capability can be seen in key warehousing processes. The key processes of receiving, put-away, and picking are at least 15 percent higher at zonal warehouses.

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[11] Zonal warehouses do not support forecasting and supply planning, as these activities are conducted by the health programs for which the warehouses stock product.

[12] Zonal warehouses do not procure commodities, as this is done by the health programs for which the warehouses stock product.

Table 9. Warehousing capabilities

Supply chain level	Receiving	Put-away	Picking	Checking
State warehouse	53%	33%	68%	44%
Zonal warehouse	67%	55%	73%	65%

Storage conditions at both zonal and state warehouses were good, with all but two state warehouses meeting at least 70 percent of storage conditions and vaccine and HIV/AIDS zonal warehouses meeting 90 percent or higher.[13] One TB zonal warehouse had challenges leading to the low overall percentage of 60 percent for this program area.[14]

Figure 3. Zonal warehouse storage conditions
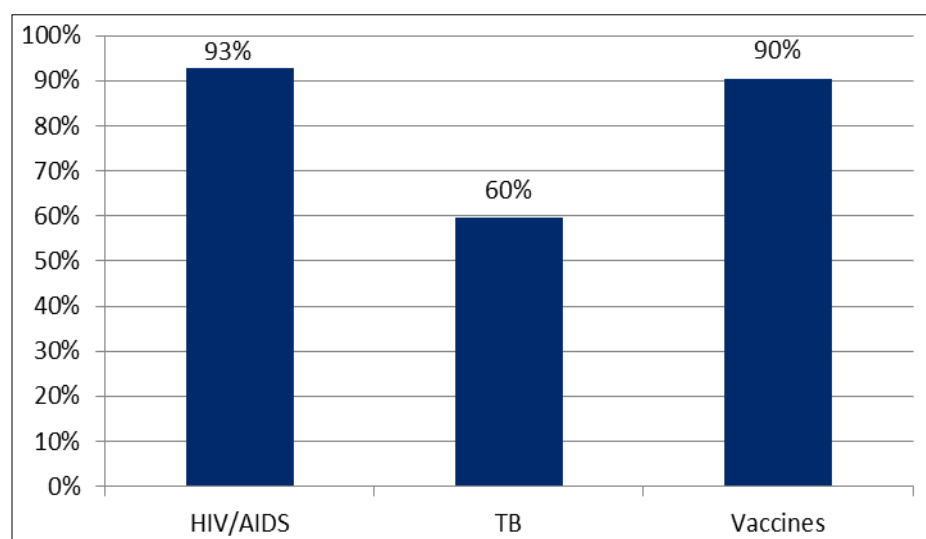
Use of inventory management tools was widespread at the state and zonal warehouse levels for all program areas. HIV/AIDS, vaccines, malaria, and TB commodities were observed to use inventory management tools in more than 90 percent of the observations at both state and zonal warehouses. Zonal warehouses had inventory management tools in use for 100 percent of tracer commodities observed, and state warehouses had them in place for 79 percent. HIV/AIDS and vaccine zonal warehouses all used sophisticated, electronic warehouse management systems (WMS) for inventory management. Two product categories had limited ICC availability: essential medicines (44 percent) and MNCH (56 percent).

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[13] Storage conditions were assessed using 14 criteria on the day of visit. Three categories were established to understand the results Good=11-14 criteria met, Acceptable=6-10 storage conditions met, Poor=0-5 storage conditions met.

[14] This percentage reflects one particular zonal warehouse that was underperforming.

Figure 4. Zonal and state warehouse inventory management tool availability
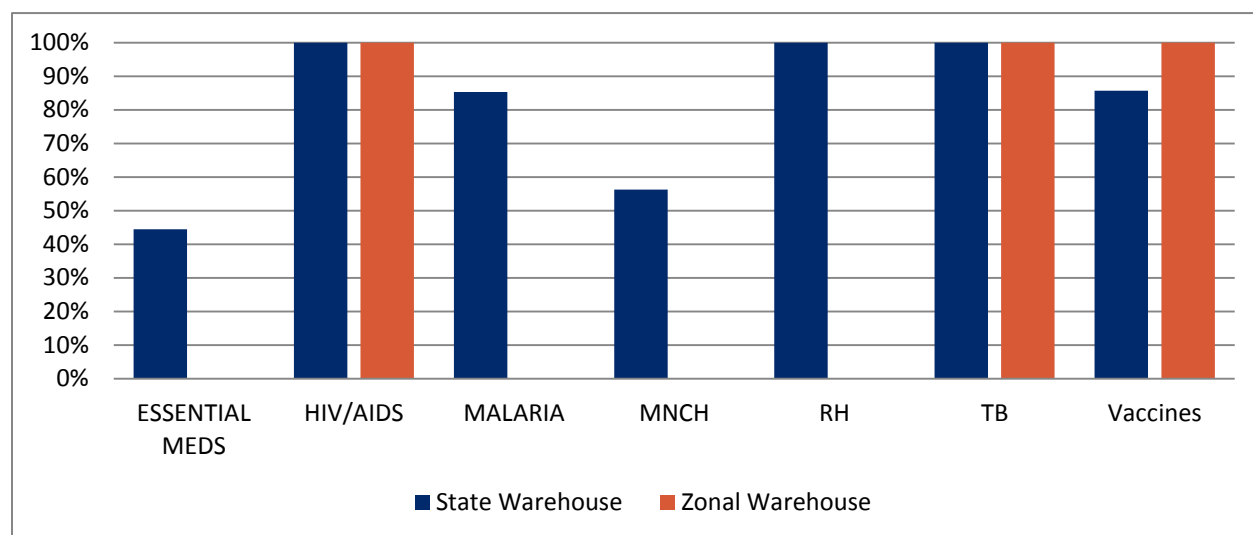
Stock accuracy varied across the zonal and state warehouses. Vaccine zonal warehouses had low stock accuracy, while HIV/AIDS warehouses had 100 percent accuracy. This indicates that vaccine zonal warehouses, although they have inventory management tools, have challenges maintaining accurate records of inventory quantities.

Figure 5. Zonal warehouse stock accuracy
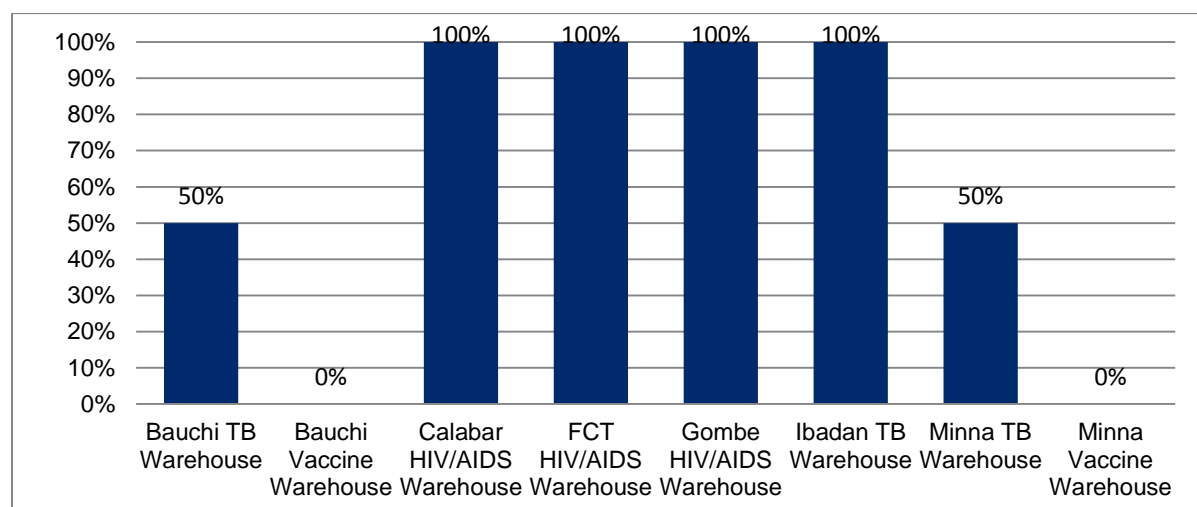
Stockout rates at zonal warehouses on the day of visit are 0 percent for two HIV/AIDS tracer commodities and both vaccines tracers. One zonal warehouse was stocked out of the triple-fixed dose Tenofovir, Lamivudine, and Efavirenz (TLE) ARV, leading to a 33 percent stockout rate (n=3). TB adult and pediatric kits also experienced stockouts in 33 percent of observations.

Stockout rates at state warehouses were concentrated in essential medicines and MNCH commodities with Amoxicillin 500mg and Albendazole 400mg at 50 percent, Misoprostol 200ug at 40 percent, and ORS at 38 percent.

Fill rate and on-time delivery

Data on supplier fill rate, order fill rate, and on-time delivery was collected for a limited sample of orders at the state warehouse level.[15]

Although planning for some product groups is not well executed for essential medicines, the supplier fill rate, once orders are placed, is high, with 99 percent of essential medicines orders (including essential medicines/NTDs, MNCH) delivered on or before the agreed-to delivery date.

Figure 6. Supplier fill rate, inbound to state warehouses[16]
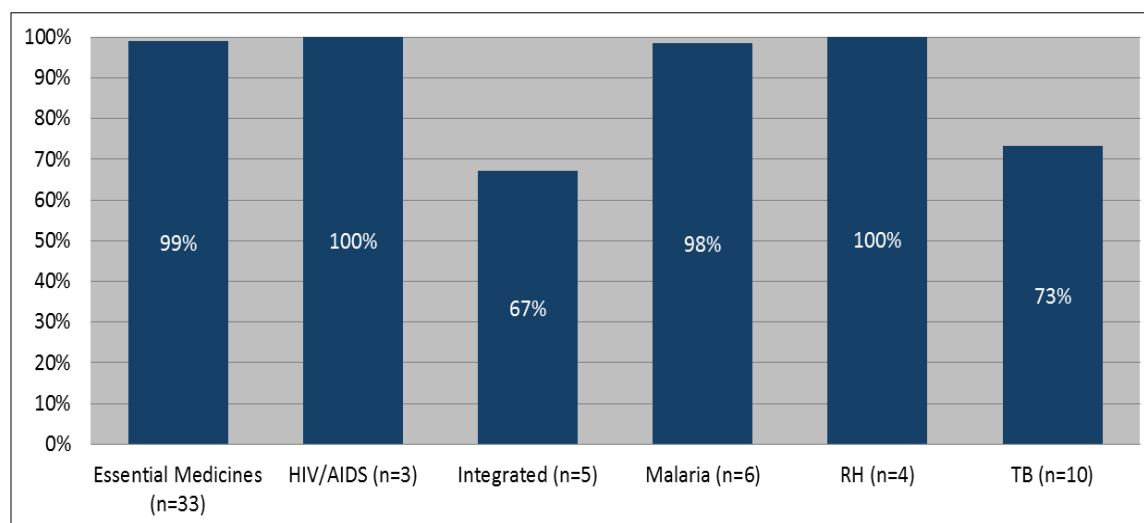
Overall order fill rate varied by program area. Three areas—MNCH, RH, and vaccines—were above 50 percent order fill rate. Of note, RH and vaccines, which had 0 percent stockout rates on the day of visit, have low order fill rate. Essential medicines, which experienced high stockout rates of tracer commodities, also have challenges fulfilling the quantities requested by client health facilities with an order fill rate at 42 percent.

Figure 7. Order fill: state warehouses/lower-level facilities

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[15] Sample of orders collected is not statistically significant. At each state and zonal warehouse teams were instructed to collect 10 orders that are inbound from suppliers (upstream) and 10 orders that are outbound to the clients that they serve (downstream). Teams were instructed to randomly choose 3 orders for each month between July and September 2014 for both upstream and downstream data. These orders were also to reflect the different program products that were being stocked at the warehouses. The final number of orders collected was dependent on the information source availability at the warehouse which includes order/requisition forms and delivery notes/proof of delivery.

[16] For all order related graphs, "N" refers to the number of orders represented in the data. There are more essential medicines orders at the state warehouse level because these are the products they manage the most.
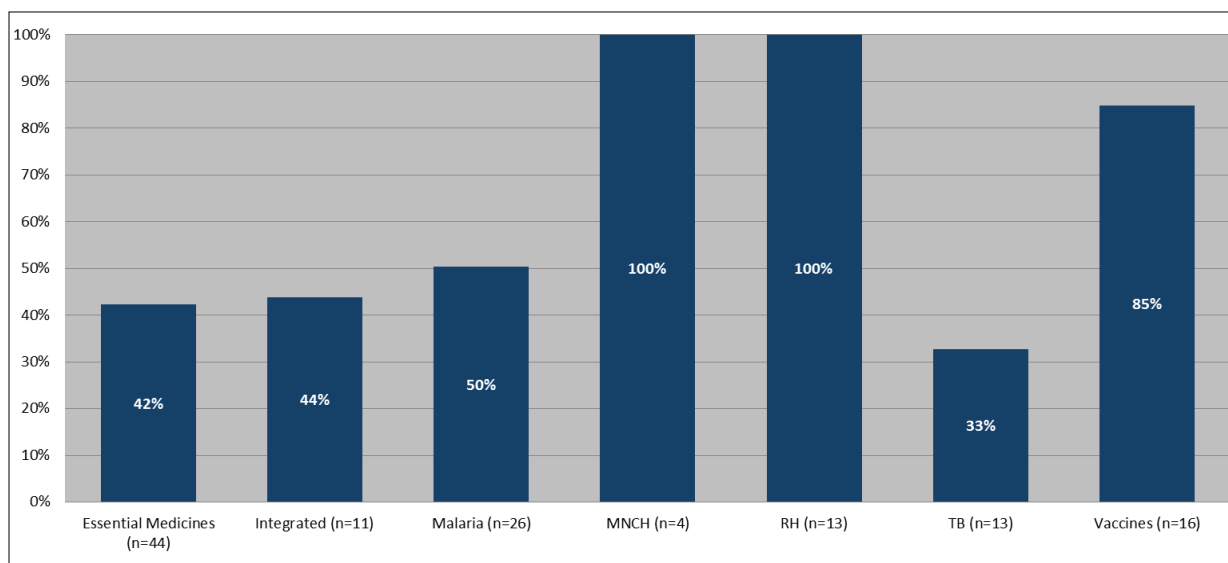
For each order where quantity ordered varied from quantity delivered, data collection teams indicated the reason for the discrepancy. Figure 8 shows that insufficient stock at the state warehouse accounted for most of the order fill rate challenges in completing orders between the state warehouse and health facilities.

Figure 9. Reasons for differences in quantity ordered and quantity received
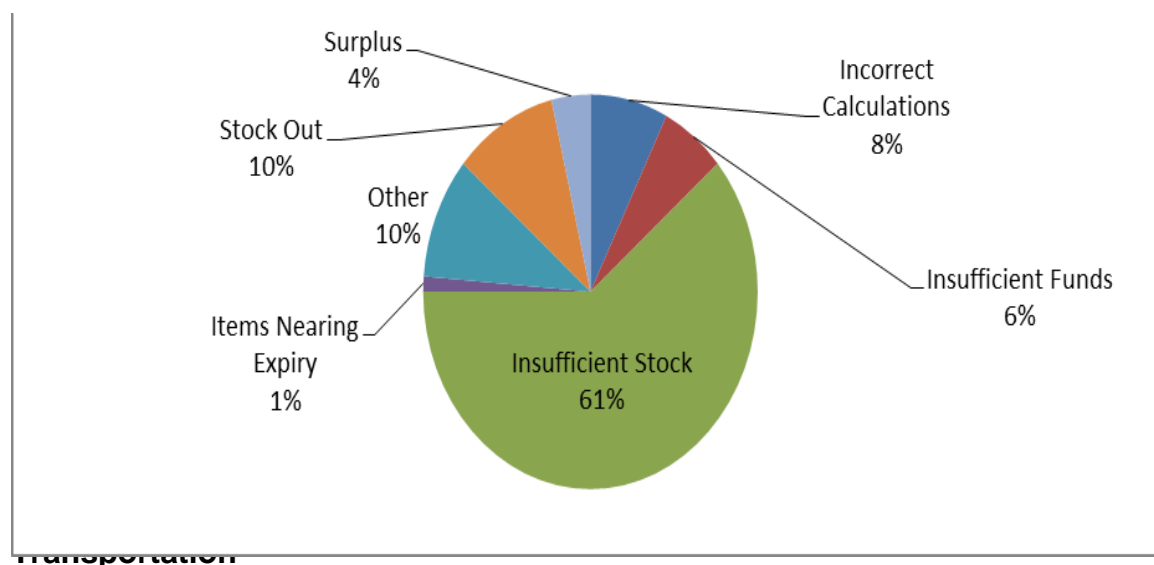
Transportation

The supply chains often lack a robust transportation system. Most facilities collect their orders from the supplying warehouse (both zonal and state). At zonal warehouses, 68 percent of orders are collected, increasing to 90 percent at the state warehouse level (Figure 10).

Figure 10. Zonal and state warehouses: percentage of orders fulfilled by distribution to or collection from receiving facilities

Zonal warehouse	State warehouse
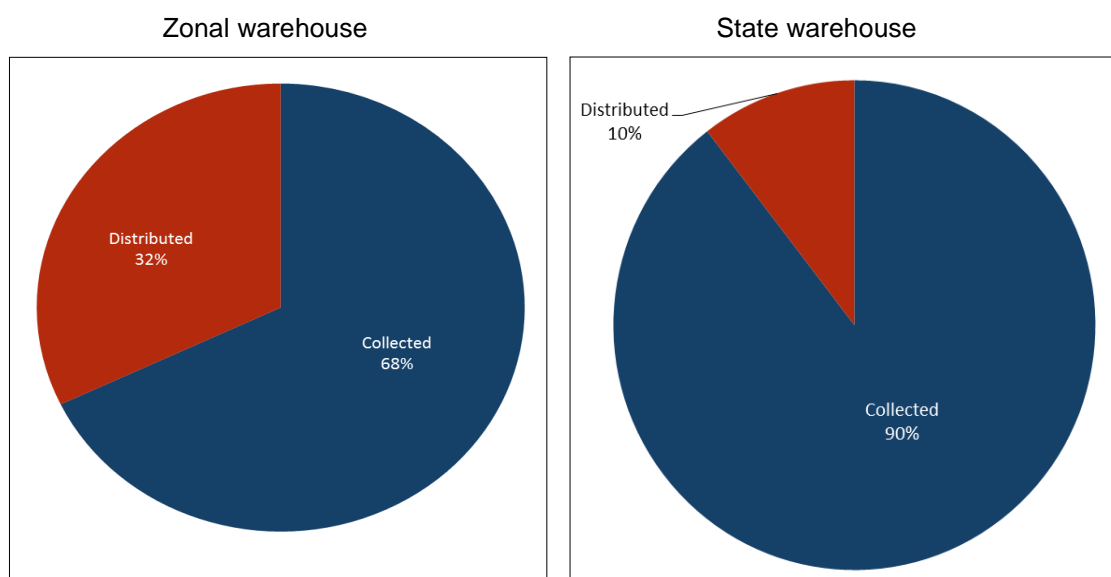
Transportation capability is high at the zonal warehouse level, with a score of nearly 70 percent, and relatively low at the state warehouse level, with a score of near 36 percent. Capability was measured based on the functions fulfilled directly by the warehouse itself and not that of any third-party logistics providers (in the case of HIV/AIDS zonal warehouses). Some specific capabilities to highlight are shown in Table 10.

Table 10. Transportation capabilities

Supply chain level	Capacity to meet demand	Vehicle management	Outbound chain of custody	Outbound transportation
State warehouse	24%	34%	52%	35%
Zonal warehouse	35%	53%	57%	50%

Waste management

Several capabilities in waste management are the responsibility of state and zonal warehouses, including those shown in Table 11. Waste is transferred from these facilities to the national level for disposal so the capabilities reflect the components of the waste management process managed at these levels of the system, including storage and transport. At state warehouses, these capabilities fall short of the satisfactory threshold (60 percent) but zonal warehouses have processes in place for segregation of unusable products at the warehouse and during transportation upstream.

Table 11. Waste management capabilities

Capability	State warehouse	Zonal warehouse
Identification and segregation	58%	60%
Handling and internal transport	42%	65%
Reverse logistics of unusable product	50%	20%

I. Challenges and Recommendations

Table 12. Zonal and state warehouse challenges and recommendations

Supply chain functional area	Key issues/challenges	Recommendations
State Warehouses		
Quantification and procurement	Capacity to manage quantification and procurement is inadequate.	Build the capacity of state warehouses on quantification and procurement processes (order tracking and quality checks).
Warehouse and inventory management	Use of ICC for essential commodities in state warehouses is low. Warehousing processes need to be strengthened.	Support state warehouses with ICCs and monitor use. Develop job aids for warehouse management processes and ensure compliance through supervisory visits.
Transportation	Planning and monitoring of the distribution system in state warehouses are inadequate.	Build the capacity of state warehouses to plan and monitor distribution regardless of the mode of supplies (either facility collects or receives). Develop a standard operating system that will facilitate improvement in transport operations and information system.
State and Zonal Warehouses		
Waste management	Carrying out waste management and disposal functions is delayed.	Provide appropriate pharmaceutical waste disposal facilities in each geographical region in the country. Ensure government bodies responsible for disposal are functional and comprised of skilled staff who are proactive in performing this function.

Health Facilities

I. Overview of Health Facilities

The health facilities are the actual point of contact with clients. Health services are provided based on client needs and availability of service providers. Supply chain staff at health facilities is responsible for managing storage and inventory of these health programs' commodities and for ensuring adequate supplies. Methodology of commodity distribution is often dependent on supply chain system design for the health program.

II. High-level Results

Table 13. Health facility high-level scores

CMM scores	PRIMARY	SECONDARY	TERTIARY
Warehousing and inventory management	33%	36%	49%
Waste management	27%	29%	41%
Lab issuing	NA	39%	51%
KPI scores			
Stockout rates	30%	25%	25%
Stock card availability	32%	47%	61%
Stock accuracy	65%	69%	73%

Warehousing and inventory management

Warehousing and inventory management capability is low at the primary level, with capability increasing at the secondary and again at the tertiary levels. The CMM tool was applied once for each health facility, although data collectors observed the vertical nature of the supply chains in Nigeria carried through to the primary level, with different program products being managed with different policies and processes within a single health facility. Some capabilities to highlight are shown in Table 14.

Table 14. Warehousing and inventory management capabilities

Capability	Score	Comments
Supervision	**42%**	Facilities indicated receiving at least one supply chain-centric supervision visit within the 12 months before their site visit. These included programmatic and local government administration/authority (LGA)-provided supervision.
Inventory counts and inventory counting tools	**40%**	As reflected in the KPI data, limited inventory counting tools (such as stock cards) and limited shelf counts are used at the health facility level.
Expiration management	**37%**	Expiration dates were often not recorded or recorded ad hoc at the health facility level.
Cold chain infrastructure	**28%**	Cold chain infrastructure at the health facility is limited to nonexistent. The lack of refrigerators (and reliable power) at these levels of the supply chain impacts supply chain design with cold chain products, such as vaccines, primary storage points remaining at the LGAs.
Receiving	**37%**	Products' receiving capabilities at the health facility level fell within the 20 to 40 percent range. This indicates that facilities check the received product quantities against the intended quantities listed on the packing slip. In some cases these quantities were also entered onto a paper-based tracking tool such as a stock card.

Overall, health facilities (primary, secondary, and tertiary) generally had acceptable -storage conditions, with conditions significantly improved at tertiary facilities. While only 48 percent of primary facilities achieved good storage conditions, 94 percent of tertiary facilities met these criteria.

Figure 11. Storage condition at health facilities by facility type
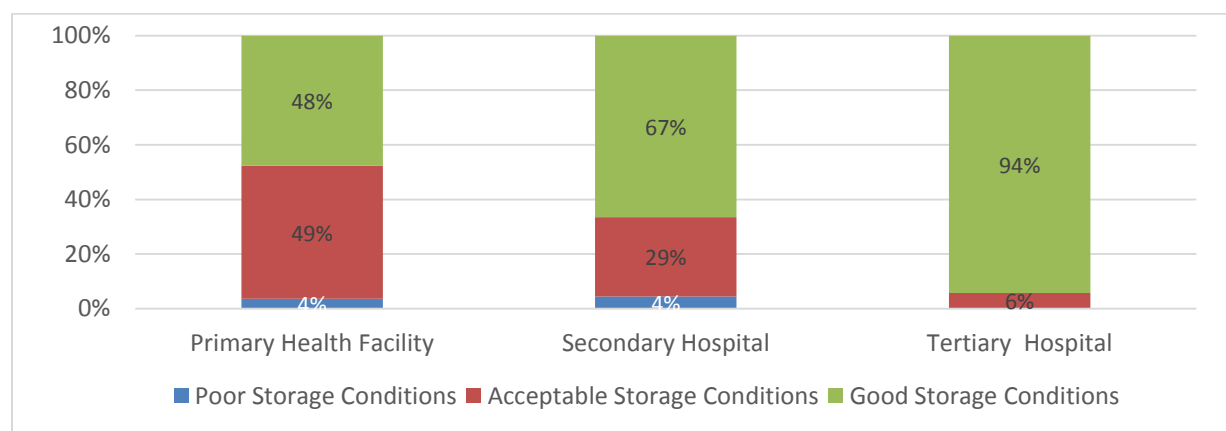
Use of inventory management tools is limited at lower levels of the supply chain. Only 31 percent of tracer commodities observed at the primary level of the supply chain had stock cards available.

Availability of stock cards varied by program area, ranging from 23 percent for RH to more than 50 percent for HIV/AIDS (52 percent) and malaria (61 percent).[17]

Figure 12. Percentage of facilities tracer commodities with available ICCs
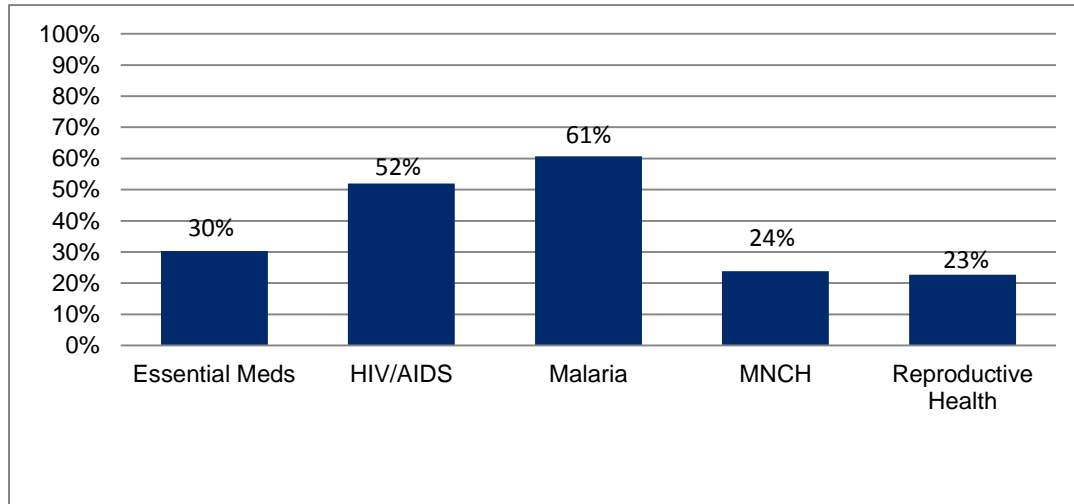
Stockout rates varied by program area and by tracer commodities within each program area. HIV/AIDS and RH have the lowest stockout rates, while MNCH, essential medicines/NTDs, and malaria had stockout rates close to or above 20 percent of the facilities visited.

Figure 13. Health facility stockout rates on day of visit

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[17] Tuberculosis (TB) and vaccine program design leads to stock management for these program commodities at the LGA rather than primary health facilities. These program areas have been excluded, as stock cards would not be expected at most facilities.
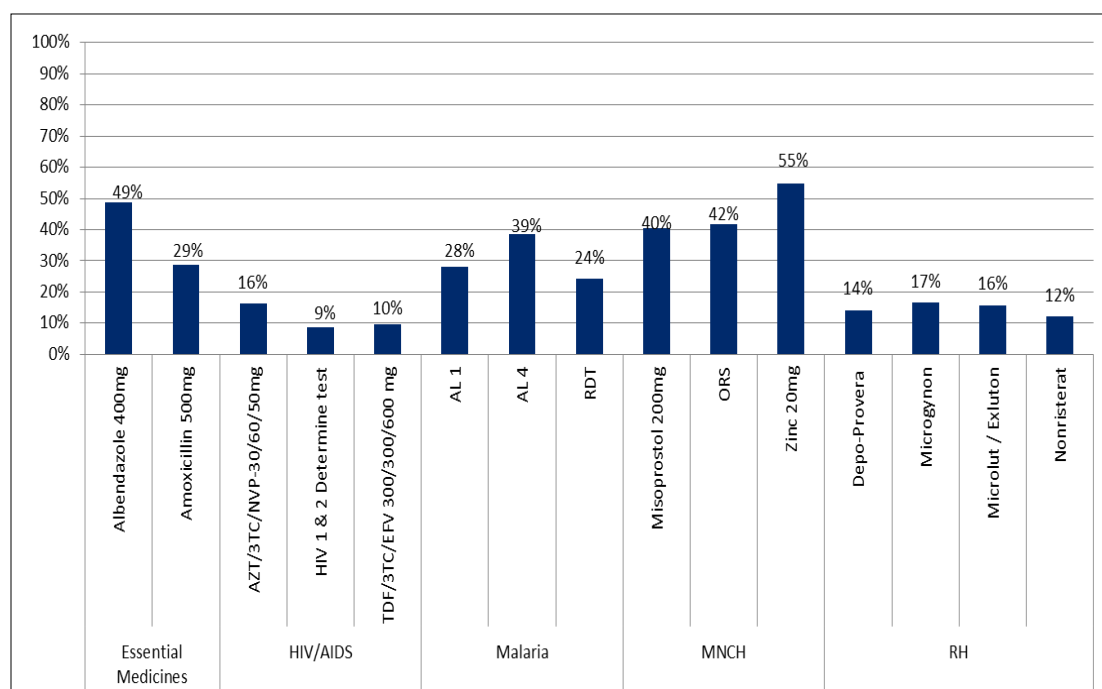
Note: AL 1 includes Artemeter Lumefantrine tabs 20mg120mg; AL 4 includes Artemeter Lumefantrine tabs 20mg120mg
RDT = malaria rapid diagnostic test; ORS = oral rehydration salts; BCG = Bacillus Calmette–Guérin

Waste management

Waste management capability is low at the health facility level, as these functions, such as treatment and disposal, are typically not carried out at the system's primary and secondary levels. Capability at both of these facility types is similar and in the 20–30 percent range, indicating minimal or ad hoc capabilities. Capability at the tertiary level increases between 36 percent and 43 percent for the respective processes within waste management, due to the fact that several tertiary facilities have incinerators and conduct some level of on-site waste management.

Lab issuing

Lab issuing was measured at the secondary and tertiary facilities within the supply chain, including 72 secondary hospitals (general, district, and central) and 11 tertiary hospitals. Primary health facilities do not have laboratories on-site. Key highlights and challenges are shown in Table 15.

Table 15. Lab issuing capabilities

Capability	Score	Comments
LMIS	44%	In 61 percent of hospitals visited, issuing of lab commodities is recorded in a paper-based format or did not have inventory management tools for commodities. This indicates that most secondary facilities have an established system to monitor lab commodity inventory. Although the system is paper-based, there is still more routine tracking of lab reagents than consumables.
Support and maintenance	41%	Support and maintenance are done ad hoc at the secondary facility level, with service-level agreements in place for some equipment at the laboratories. Although this capability has room for improvement, it shows that some level of maintenance and support is available to laboratories.
Storage of commodities	38%	Storage for lab commodities is limited at secondary facilities, and adequate shelving is lacking.
Cold chain	46%	Similar to pharma storage, cold chain infrastructure is limited for laboratory commodities at secondary facilities. If equipment is available, it is often not a dedicated laboratory refrigerator, indicating that all cold chain products are stored together, and thermometers are not available. Existing cold chain equipment is not reliable due to the lack of reliable power source.
Disposal of reagents	41%	Reagent disposal does not adhere to waste management best practices. Facilities report that reagents are poured into an open pit or buried in an untreated landfill. This improper disposal has potential negative impacts on the environment. The use of these methods may be linked to the lack of waste management infrastructure at the health facility level of the supply chain.

III. Challenges and recommendations

Table 16. Health facility challenges and recommendations

Supply chain functional area	Key Issues/challenges	Recommendations
Warehouse and inventory management	Use of ICCs at the health facility level is inadequate, and use of inventory management practices is suboptimal.	Ensure provision of adequate ICCs and encourage the practice of promptly documenting transactions and regularly documenting physical count.
	Tools to document expired and damaged commodities at facilities are lacking.	Develop expiry and damaged log book to support facilities in managing pharmaceutical wastes.
	An adequate infrastructure (refrigerator and electricity) for cold chain items is lacking.	Ensure that procurement and logistic system design is mindful of this shortcoming. Either procure non-cold-chain-dependent

	Storage facilities at laboratory service delivery points are inadequate.	commodities where applicable or provide solar-powered refrigerators. Provide adequate storage space with shelves and pallets where needed.
Waste management	Waste management practices are inadequate.	Build the capability and capacity at health facilities to manage waste. Remove waste from health facilities promptly through a well-designed reverse logistics system. Review potential options for integrating distribution and reverse logistics transportation functions across program areas.

Health Programs

Reproductive Health

I. Overview of the Vertical Supply Chain

Nigeria's RH supply chain involves several stakeholders. The Department of Family Health plays a leadership and coordination role in **product selection**, USAID|DELIVER PROJECT leads **forecasting and supply planning**, and United Nations Population Fund (UNFPA) manages **procurement and supports distribution**. The main partners, UNFPA and USAID|DELIVER PROJECT, share information and have aligned processes.

The country's logistics system for RH commodities has evolved over time through continuous effort to ensure equitable access to contraceptives by Nigerians of reproductive age. Most clients obtain these commodities from service delivery points or community-based distribution (CBD) agents. Figure 14 shows the flow of commodities from point of entry to clients. About one third of Nigeria's reproductive health commodities flow through the public health sector supported by FMOH and donors; however, the system also permits other nongovernmental organizations to procure commodities from the public health channel.

Figure 14. Map of the RH supply chain (Flow of commodities)
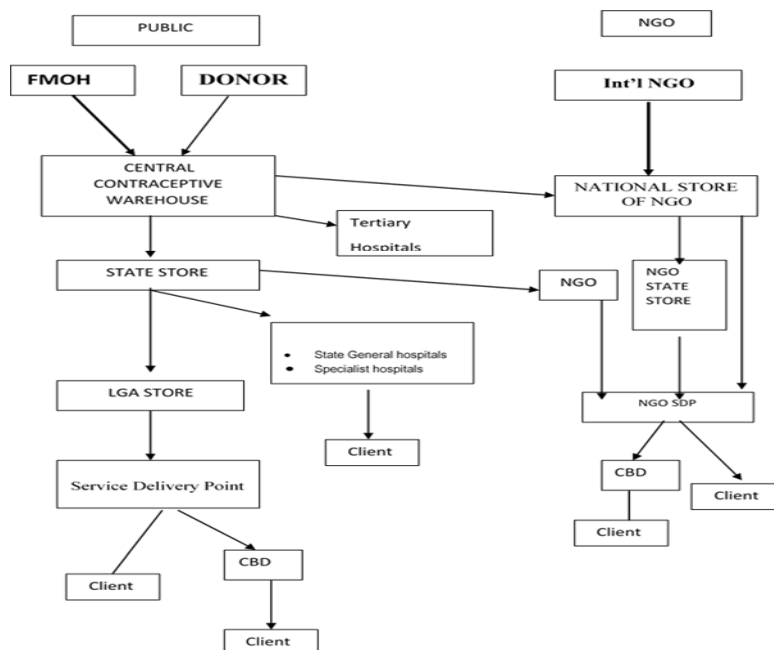
II.   High-level Results

Table 17. RH high-level results

CMM scores (by functional area)	
Forecasting and supply planning (USAID | DELIVER PROJECT and UNFPA)	**68%**
Procurement (UNFPA)	**81%**
KPI scores	
Stockout rates (all supply chain levels)	**14%**
Stock accuracy (all supply chain levels)	**82%**
Supplier fill rate (Inbound to state warehouses)[18]	**100%**
Order fill rate (state warehouses to health facilities)	**100%**
On-time delivery (inbound to state warehouses)	**100%**
Facility reporting rates (on-time)	**78%**

Forecasting

Overall capability of the supply chain functions managed by the RH program and its implementing partners, forecasting and supply planning and procurement, is high at 68 percent and 81 percent, respectively.

Forecasting and supply planning are conducted by the FMOH and USAID|DELIVER PROJECT. The forecasting processes either meet or exceed a score of 60 percent in most cases but continue to face challenges in the areas shown in Table 18.

Table 18. RH forecasting capabilities

Capability	Score	Comments
Forecasting data collection processes	**50%**	The data collection process for both of these elements of quantification is constrained by the lack of availability of timely and accurate data as well as a complex paper-based process.
Supply plan data collection processes	**50%**	
Level of country ownership	**50%**	The FMOH takes an administrative role in the forecasting process, but technical tasks are managed by the USAID | DELIVER PROJECT.

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[18] Includes three types of suppliers: donors, FMS, and private suppliers.

Procurement

UNFPA is responsible for managing reproductive health procurement. A local UNFPA office in Abuja manages funds and requisitions sent from downstream, while the process of procurement including supplier identification, tendering and contracting, is handled by a dedicated procurement unit in Copenhagen.

Due to resource constraints, UNFPA only conducts pre-shipment inspections for reproductive health commodities. Only in certain circumstances, such as a shipment being held at the port for a lengthy period of time, will post-market testing be conducted. However, UNFPA is making efforts to build the capacity of the FMOH to do post-market surveillance.

Warehousing and inventory management

Within the FMS Oshodi compound, the RH program maintains a Central Contraceptives Warehouse (CCW). This warehouse met 86 percent of the good storage conditions and had bin cards available for each tracer commodity. Stock accuracy was 100 percent, indicating that inventory management, although manual, was performing well at the central level for RH commodities. Although it is well performing, the CCW, like other parts of the FMS, is challenged by inadequate space to store commodities.

At the CCW, bin cards were available for all RH tracer commodities. Similarly, at the state warehouse level, RH inventory management tools were available 100 percent of the time. Stock accuracy ranged from 40 percent to 80 percent across state warehouses. . Stockout rates at this level were 0 percent.

Compared to the CCW and state warehouses, health facilities had limited availability of inventory management tools. On the day of visit, 20 percent of tracer commodities had available inventory control cards (ICCs). Although ICC availability was limited, those tracers where ICCs existed had relatively high stock accuracy, ranging from 74 percent to 97 percent. Each reproductive health tracer was stocked out with day-of-visit stockout rates ranged from 12 percent (Nonristerate) to 16 percent (Microgynon).

Figure 15. RH Day of Visit Stock Out Rates
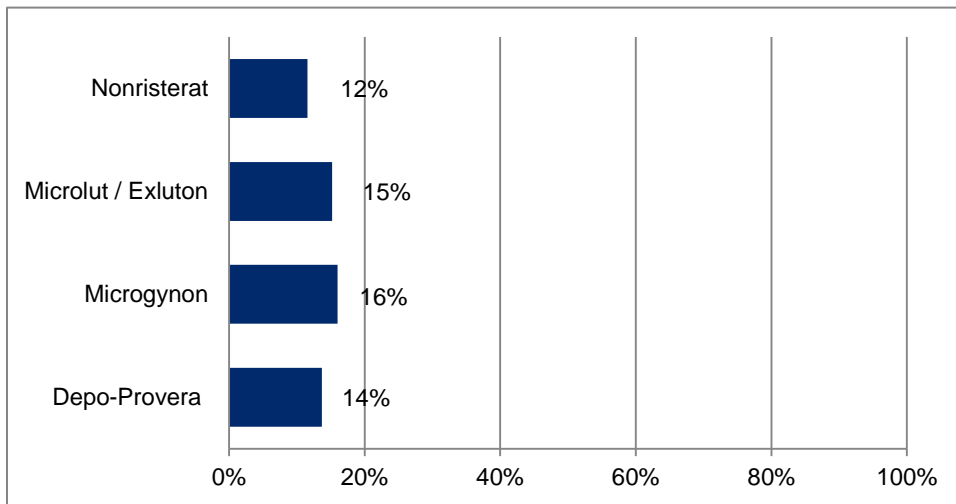
rder fill rate between
nd state warehouses

Facility reporting rates (on-time) for the last submission before site visits was high for reproductive health at 78 percent. Despite this high number, the system for reporting is not well integrated. Facilities reported submitting reports at different intervals; 24 percent reported that they have never submitted reports for RH products.

Figure 14. RH facility reporting frequencies
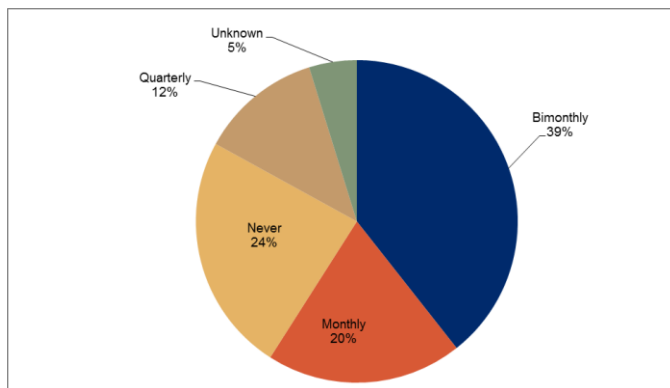
III. Challenges and Recommendations

Table 19. RH challenges and recommendations

| Supply chain functional area	Key issues/challenges	Recommendations
Forecasting and supply planning	The quality of forecasting and supply planning data is challenged.	Improve data collection mechanisms in the states and health facilities to ensure quality data is collected to inform forecasting and supply planning. Implement a structured data quality assurance process to improve data quality.
	Country ownership of the RH forecasting process is limited.	Involve government staff more in forecasting and supply planning; designated staff should play lead roles and have the needed technical skills.
Warehouse and inventory management	Space is inadequate to expand the CCW.	Family Health Department to coordinate with FDS and discuss plans for the future expansion needed to support the CCW.
	ICC availability at the primary, secondary, and tertiary supply chain levels is lacking.	Provide adequate ICC at all levels.
Report submission	RH LMIS reports are submitted at varying frequencies.	FMOH to discuss harmonizing RH reporting and compliance with bimonthly reporting frequency.

HIV/AIDS

I. Overview of the Vertical Supply Chain

The HIV/AIDS supply chain involves multiple donors, including PEPFAR and the Global Fund, private logistics providers, and the GoN. The National Agency for the Control of AIDS (NACA) is the federal agency that oversees the country's HIV/AIDS policies and systems to provide multi sectoral response while National AIDS and STI Control Program (NASCAP) a unit under the Federal Ministry of Health work in collaboration with NACA on HIV/AIDS intervention. The national HIV/AIDS PSM Technical Working Group under the auspices of NACA and NACA coordinates supply chain related activities in collaboration with donors and implementing partners. Through the SCMS project, PEPFAR supports forecasting and supply planning, procurement, and last-mile distribution activities.

The national logistics system design for HIV/AIDS commodities earlier developed but approved by government in 2011 indicates that commodities are to be centrally stored in FMS Oshodi and distributed directly to health facilities (see Figure 15). This design was effective initially with few facilities and implementing partners. However, with rapid scale-up of facilities and numerous implementing partners, more efficiency was needed in distribution. Consequently, PEPFAR initiated HIV/AIDS unification project in 2012 and completed it in 2014 to integrate the warehousing and distribution of ARVs and related commodities for facilities supported by its implementing partners(Family Health International 360,Management Sciences for Health,Institute of Human Virology Nigeria ,Center for Integrated Health Programs) , . The Global Fund bought in, and the project was scaled up to cover all the thirty six states and Federal Capital Territory. This has modified the flow of ARVs and related commodities, including six regional warehouses , These warehouses are distinct physical location but managed centrally as a single warehouse .

Figure 15. Map of the HIV/AIDS supply chain
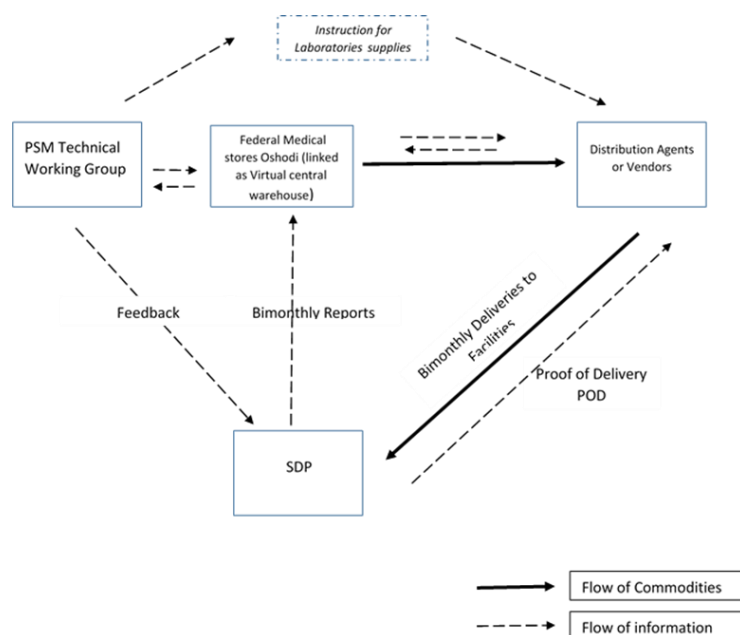
II. High-level Results

Table 20. HIV/AIDS high-level results

CMM scores (by functional area)	
Forecasting and supply planning (SCMS)	62%
Procurement (SCMS FOMP only)[19]	66%
Warehousing (zonal warehouses only)	77%
KPI scores	
Stockout rate	12%
Stock accuracy	63%
Supplier fill rate[20]	100%
On-time delivery	100%
Facility reporting rates (on-time)	84%

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[19] Procurement scores for SCMS reflect the Field Office Managed Procurement perspective.

[20] Order fill rate data was not collected because products bypass the state warehouses, where this data was collected for other program areas.

Forecasting and supply planning

Forecasting for HIV products is a collaborative effort between NACA and SCMS. It includes ARVs, RTKs, CD4 reagents, and early infant diagnosis (EID) and viral load reagents.   Specific capability results to highlight are shown in Table 21.

With the exception of laboratory commodities, five-year forecasts are developed and revised every two years. A national HIV lab commodity quantification was last conducted in 2014. Every two months SCMS updates Pipeline using consumption and stock-on-hand data and every six months the PSM technical working group (TWG) meets to review and validate the supply plan.

While SCMS plays a significant role in the forecasting process, the GoN has taken increasing responsibility organizing meetings and bringing stakeholders together, as well as driving policy agendas once consensus is reached amongst partners.

Table 21. HIV/AIDS forecasting and supply planning capabilities

Capability	Score	Comments
Forecasting methodology and assumptions	**60%**	The forecasting exercise begins with an assumption building workshop, where key stakeholders, including IPs, donors, government and facility-level staff, come together to document and agree upon forecast assumptions.
Forecasting data collection processes	**40%**	NACA and SCMS initiate the process of collecting forecasting data. The technical working group aggregates consumption, regimen, and morbidity data, and works with SCMS's M&E team to obtain patient numbers for ARVs and testing numbers for RTKs. Collecting data in a variety of formats (Excel, monitoring and evaluation, supervision meetings, paper) does not facilitate easy data aggregation.
Forecasting and supply planning software	**80%**	Quantimed and Pipeline are used for forecasting and supply planning.

Procurement

USAID/PEPFAR and the Global Fund support HIV/AIDS procurement commodities in the country is supported mainly by USAID/PEPFAR and Global Fund.

- **USAID / PEPFAR**: SCMS procures ARVs and other HIV/AIDS commodities through the project management office (PMO) and the Field office staff i.e. field office managed procurement. Commodities procured takes care of the needs of PEPFAR implementing partners.**Global Fund**: Global Fund uses the pooled procurement mechanism to procure ARVs and rapid test kits (RTK) on behalf of its principal recipient NACA while medicines for opportunistic infections and laboratory consumables are procured in country through Crown Agents.

Warehousing and inventory management

HIV/AIDS commodities are stored at zonal warehouses before delivery to HIV/AIDS service sites located throughout Nigeria. HIV zonal warehouses, located in Abuja FCT, Calabar, and Gombe, met 98 percent of good storage conditions included in the Storage Conditions Checklist. Capability at these sites is also high at 77 percent overall. Several key warehousing processes scored at 80 percent or above, including receiving (86 percent), put-away (90 percent), and picking (80 percent).

Inventory management tools were available 100 percent of the time at the zonal warehouses, with all warehouses using an electronic warehouse management system. Stock accuracy was 100 percent for all tracer commodities at this level of the system. With the exception of a TLE stockout, there were no one day-of-visit stockouts found at the zonal warehouses.

Similar to other disease program areas, inventory management tools tend to be less available at lower levels of the supply chain. In the case of HIV, only 52 percent of tracer commodity ICCs were available on the day-of-visit at the health facility level. Stock accuracy for tracer commodities with ICCs available ranged from 51 to 71 percent. Day-of-visit stockout rates ranged from 9 percent (HIV 1 & 2 Determine test kits) to 16 percent (AZT/3TC/NVP 30/60/50mg).

Fill rate and on-time delivery

Supplier fill rate for inbound shipments from suppliers to state warehouses and on-time delivery between suppliers and state warehouses were high at 100 percent.

Facility reporting

On-time facility reporting rates are high for HIV/AIDS at 84 percent for the last report submitted before the site visit. The frequency of LMIS reporting is varied for HIV/AIDS products. The majority of interviewees (69 percent) indicated reports are submitted bimonthly, while the remaining respondants (31 percent) reported:"quarterly" to "never."

III. Challenges and Recommendations

Table 23. HIV/AIDS challenges and recommendations

| Supply chain functional area	Key issues/challenges	Recommendations
Forecasting and supply planning	Facility LMIS reports are submitted in various formats, making it difficult to aggregate data for use in forecasting. While the governmentstrong administrative and coordination role, technical responsibilities are limited.	Integrate a data collection system for all stakeholders in HIV/AIDS to enable routine provision of consumption data that can be used in forecasting and other processes. Build the government's ability to manage the technical aspects of forecasting and supply planning so that they can manage the process independent of donors and implementing partners.
Procurement	Some procurement entities lack order-tracking tools for local procurement. Government budgeting cycle is not in line with procurement cycles. There is a lack of coordination by responsible entities with respect to procurement.	Set up a robust system for order tracking and monitoring procurement activities that are managed in-country. To promote sustainability, increase committed government funds to procure commodities and explore framework contracting to ease the effect of the budgeting cycle. Develop a unified procurement strategy to cater to the process of acquiring ARVs and other health commodities.
Warehousing and distribution	Stockout of tracer commodities was identified on the day of visit (about 10 percent), although it was relatively low compared with other programs.	Conduct a root cause analysis to better understand stockouts and create a plan for improving inventory management practices.
Reporting	Facility LMIS reports are submitted in various formats, making it difficult to aggregate data for use in forecasting. The process of obtaining data is not institutionalized, and requires significant time and effort from all parties involved. . Frequently, the reporting facilities are both NACA and PEPFAR facilities, which can lead to receipt of duplicate reports. Furthermore, because there is no standard or template, data is received in different formats.	Integrate HIV/AIDS data collection and reporting across government entities, implementing partners and donors . Since there are a large number of reporting facilities (more than 6,000), SCMS or other organizing body should continue working with NACA and PEPFAR to increase mentoring to improve reporting capacity.

Malaria

I. Overview of the Vertical Supply Chain

The malaria program is managed by the National Malaria Elimination Program (NMEP), which is the Global Fund principal recipient. Several key stakeholders are involved in implementing this program strategy, including the USAID|DELIVER PROJECT and the World Bank. Donor support for the malaria program is concentrated on the funding and procurement of commodities, to supplement products being procured by the Global Fund, through the Pooled Procurement Mechanism (PPM) program.

The program uses two main tiers of the supply chain for warehousing. Commodities are received in country at FMS Oshodi, from where they are sent to state warehouses and finally to the health facilities. The flow of information is similar to that of commodities except for the involvement of local government areas as the first level of LMIS report aggregation. Figure 15 illustrates the structure of Nigeria's malaria supply chain.

Figure 15. Map of malaria supply chain
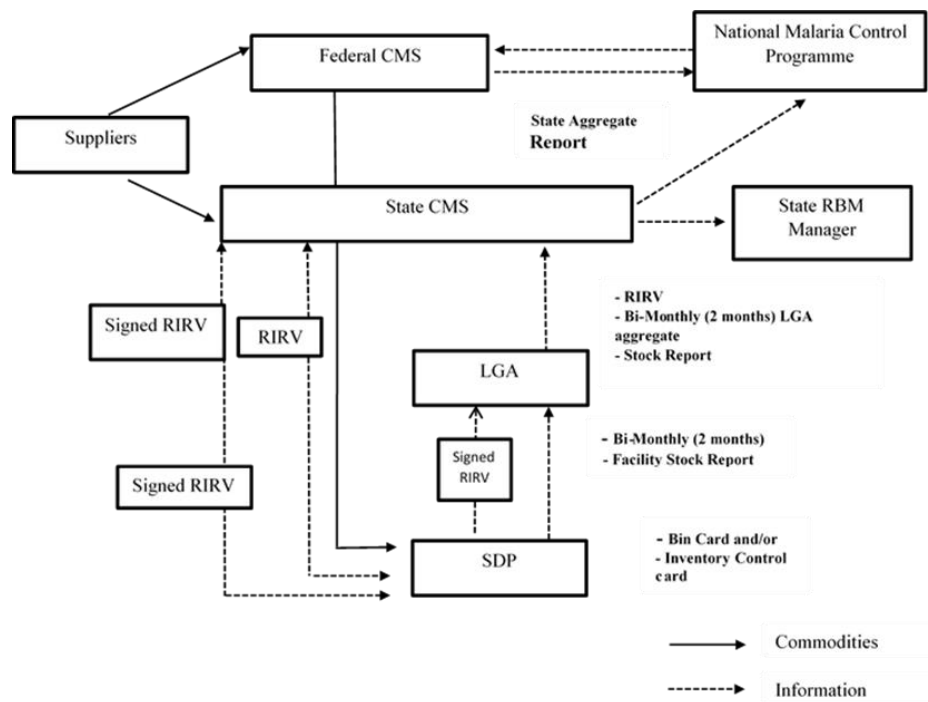
II. High-level Results

Table 24. Malaria high-level results

CMM scores	
Forecasting and supply planning	**69%**
Procurement (NMEP, World Bank, USAID|DELIVER PROJECT)	**62%**
KPI scores	
Stockout rates	**29%**
Stock accuracy	**57%**
Supplier fill rate	**98%**
Order fill rate	**50%**
Facility reporting rates (on-time)	**87%**

Forecasting and supply planning

Overall forecasting capability for the malaria program is high at 69 percent. NMEP leads the forecasting process but relies heavily on implementing partners for technical input into forecasting and supply planning. A rolling two- to three-year forecast is produced and well documented, including data sources and assumptions. NMEP coordinates this process with other stakeholders, who use the forecast to make commitments to the supply of malaria commodities.

Table 25. Malaria forecasting and supply planning capabilities

Capability	Score	Comments
Forecasting data quality	**40%**	Three types of data are collected for malaria forecasting: 1. Consumption: LMIS reports from health facilities 2. Stock on hand: central medical stores and state warehouses 3. Morbidity data: survey data and census information Data quality significantly limits the ability to complete forecasting and supply planning for the malaria program in Nigeria. The limited availability of consumption data impacts the methodologies chosen for forecasting.

Procurement

Procurement is conducted by three different stakeholders in country:

- **NMEP**: The Global Fund (GF) manages much of the procurement process for malaria commodities on behalf of NMEP through the Pooled Procurement Mechanism (PPM).

NMEP is actively involved in several components of the procurement process, including determining order quantity and tracking inbound shipments.[21]

- **World Bank:** The World Bank manages a portion of malaria program procurement. Orders are placed through a procurement services agent (PSA) and directly with suppliers.

- **USAID|DELIVER PROJECT:** The USAID|DELIVER PROJECT procures malaria products on behalf of the US President's Malaria Initiative. Procurement is managed between the field office and the head office in Washington, DC.

Overall capability for all three procurement agents is 62 percent, but capability varies by implementer (see Figure 16).

Figure 16. Procurement capability by stakeholder: malaria program
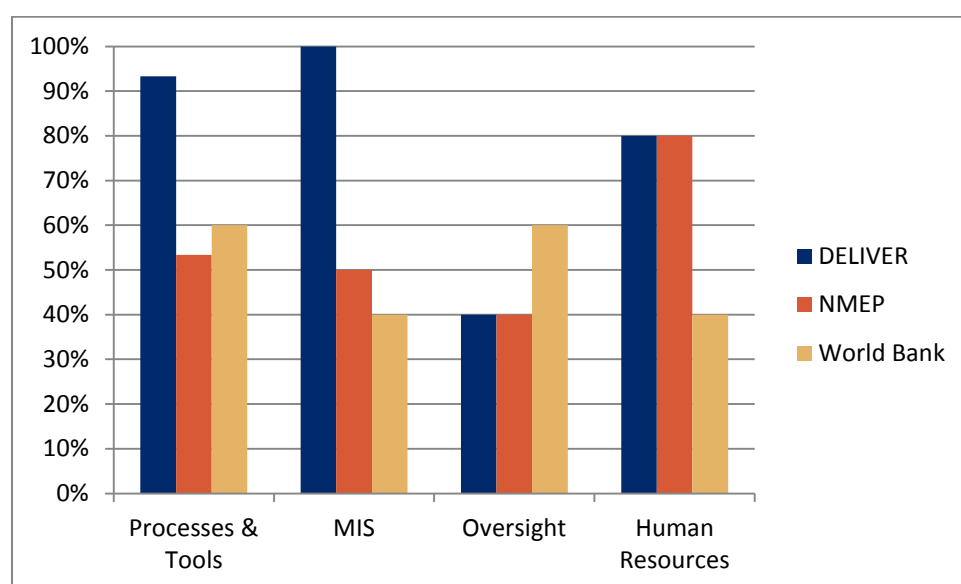
Table 26. Malaria procurement capabilities

Capability	Score	Comments
Order and delivery management	**60%**	The USAID | DELIVER PROJECT and NMEP use tools to monitor shipment milestones on incoming shipments
Product line specifications	**73%**	All three procurement agents have strong processes to identify the product lines for procurement. These product lines are aligned with national and international standards.

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[21] NMEP's capability was assessed for the functions carried out at NMEP while others that were managed by the Global Fund were not. Scores presented above and throughout this section reflect only the functions performed by NMEP.

Warehousing and inventory management

Malaria tracer commodities had the highest stock card availability of all program areas—61 percent overall. Availability varies significantly by supply chain level, ranging from 57 percent at the primary health facility level to 100 percent at the FMS (see Figure 17).

Figure 17. Malaria stock card availability by supply chain level
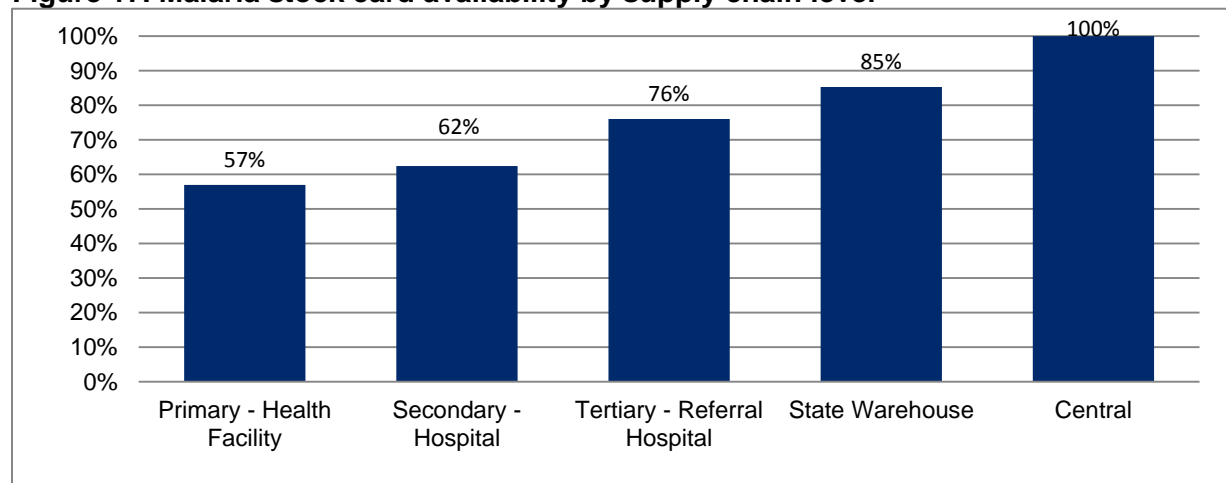
Stock accuracy at the health facility (primary, secondary, tertiary) and state warehouse levels was similar, ranging from 52 percent (malaria rapid diagnostic tests) to 62 percent (Artemeter/Lumefantrine 4) at the health facility level and 50 percent (Artemeter/Lumefantrine 4) to 75 percent (malaria rapid diagnostic tests) at the state warehouse level.

Stockout rates were low at the state warehouse level, with both regimens of Artemeter/Lumefantrine maintained at 8 percent and no stockouts of malaria rapid diagnostic tests. At the health facility level, stockout rates of malaria tracer commodities were significantly higher, with AL1 (28 percent), Artemether-Lumefantrine (39 percent), and malaria rapid diagnostic tests (24 percent).

Fill rate

Supplier fill rate for inbound shipments from suppliers to state warehouses was high at 98 percent. The order fill rate between the state warehouses and health facilities was significantly lower at 50 percent. This low order fill rate has a potential correlation to the high stockout rates at these levels of the supply chain.

Facility reporting

On-time facility reporting rates are low for malaria at 66 percent for the last report submitted before the site visit. The frequency of LMIS reporting varies for malaria products, with 39 percent reporting bimonthly, 30 percent reporting monthly, and 20 percent stating they never submit LMIS reports.

III. Challenges and Recommendations

**Table 27. Malaria challenges and recommendations**

Supply chain functional area	Key issues/challenges	Recommendations
Forecasting and supply planning	Staff skills for those completing the LMIS forms are insufficient. This leads to poor-quality data that significantly limits the ability to complete forecasting and supply planning.	NMEP to work with stakeholders to build capacity in the MCLS to improve data reliability and quality. Improved data quality will allow for more accurate forecasting and supply planning, as well as improved use of multiple forecasting methodologies.
Procurement	Procurement records are currently maintained in a paper-based format. This document management system lacks formal procedures to ensure standardization.	NMEP should standardize and automate systems to support documentation of procurement records.
Warehouse and inventory management	At the lower levels, inventory management practices are weak and stockout rates are higher.	NMEP should work with stakeholders to facilitate continuous capacity building of facility staff on appropriate storage and inventory management practices.
Report submission	Malaria LMIS reports are submitted at varying frequencies.	NMEP to coordinate with stakeholders to harmonize reporting schedules at all levels.

MNCH/Essential Medicines/NTDs

I. Overview of the Essential Medicines Supply Chain

The supply chain for essential medicines is comprised of complex networks, often with multiple funding sources, procurement agents, and warehousing and distribution plans for health commodities that are primarily managed at the state level. The MNCH and NTD programs have faced significant challenges due to limited funding and poor coordination. The support of various stakeholders for essential commodities plays out at the federal, state, and local government levels and has resulted in multiple delivery channels, as shown in Figure 18.

Figure 18. Map of MNCH supply chain
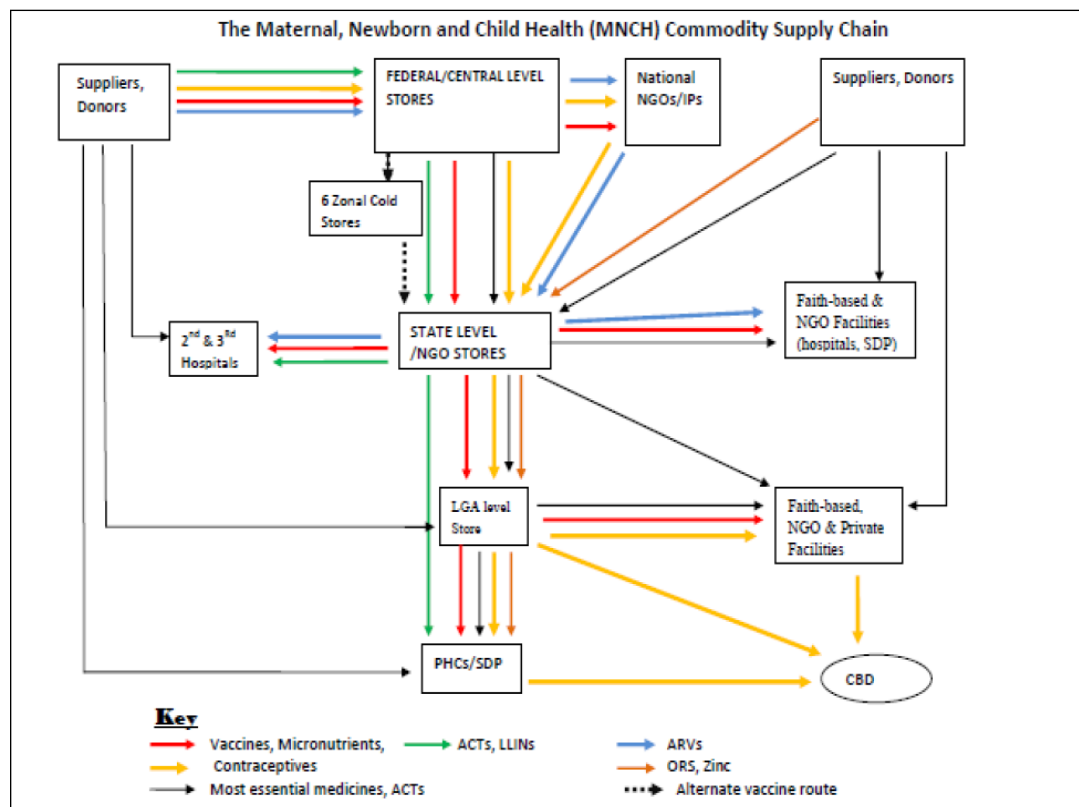
II. High-level Results

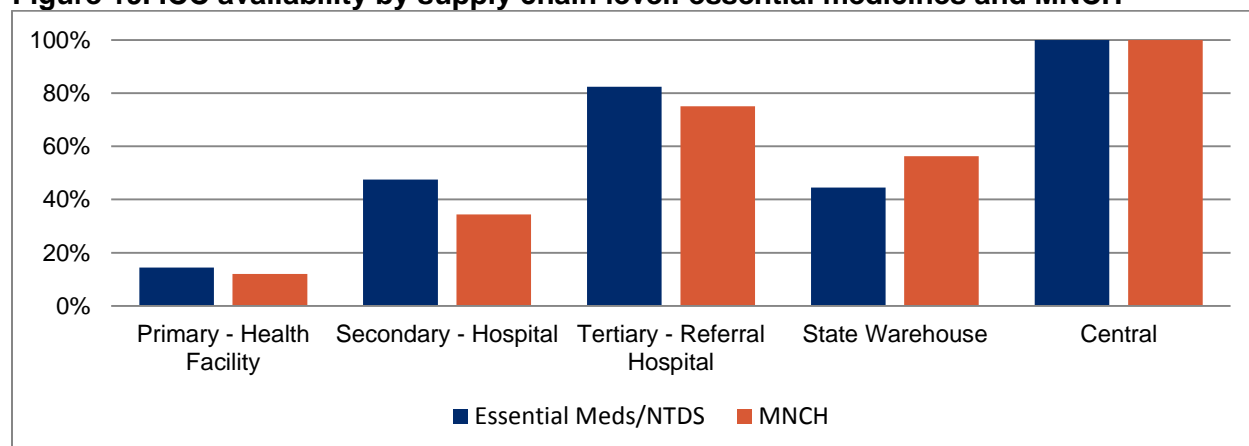**Table 28. Essential medicines/NTDs and MNCH high-level results**

KPIs	
Stockout rates • Essential medicines • MNCH	**38%** **44%**
Supplier fill rate • Essential medicines • MNCH	**99%** **NA**
Stock accuracy • Essential medicines • MNCH	**57%** **74%**
Order fill rate • Essential medicines • MNCH	**42%** **100%**
On-time delivery • Essential medicines • MNCH	**97%** **NA**
Facility reporting rates (on-time) [22] • Essential medicines • MNCH	**94%** **87%**

Warehousing and inventory management

Inventory control card availability varied widely by supply chain level for essential medicines/NTDs and MNCH tracer commodities. At the primary health facility level, ICC availability was significantly limited with availability for both commodity groups below 15 percent (see Figure 19).

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[22] Only 36 percent of facilities reported submitting LMIS reports for essential medicines or MNCH. This reporting system is fragmented and not widespread. In places where reports were submitted they were largely on-time.

Figure 19. ICC availability by supply chain level: essential medicines and MNCH

For the limited number of facilities that had ICCs available, stock accuracy for essential medicines/NTDs and MNCH commodities was relatively high, with the exception of Amoxicillin at 40 percent (see Table 29).

The central warehouse at Oshodi recorded zero stockouts for all the surveyed essential medicines/NTDs tracer commodities. Other levels of the supply chain had a high percentage of stockouts for essential medicines/NTDs tracer commodities on the day of visit (see Figure 20).

Table 29. Stock accuracy of essential medicines and MNCH

Essential medicines	66%
Amoxicillin 500mg	40%
Albendazole 400mg	74%
MNCH	73%
Zinc 20mg	75%
ORS	67%
Misoprostol 200mg	80%

Figure 20. Percentage of essential medicines/NTDs stockouts on the day of visit
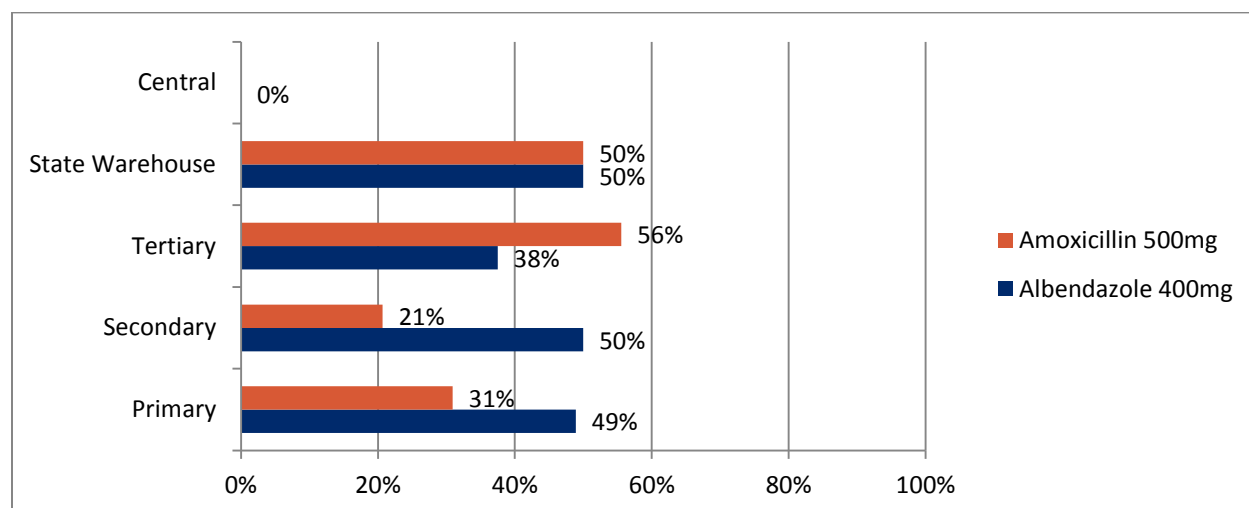
Primary health facilities had significant stockouts for zinc 20mg, while state warehouses recorded zero stockouts for zinc 20mg. The central warehouse in Oshodi recorded zero stockout for two of three surveyed MNCH tracer commodities—ORS and zinc 20mg—but it was stocked out of Misoprostol 200mg on the day of the visit. Other levels of the supply chain experienced significant stockout rate percentages for all three MNCH tracers.[23]

Figure 21. Percentage of MNCH commodity stockouts on the day of the visit by level
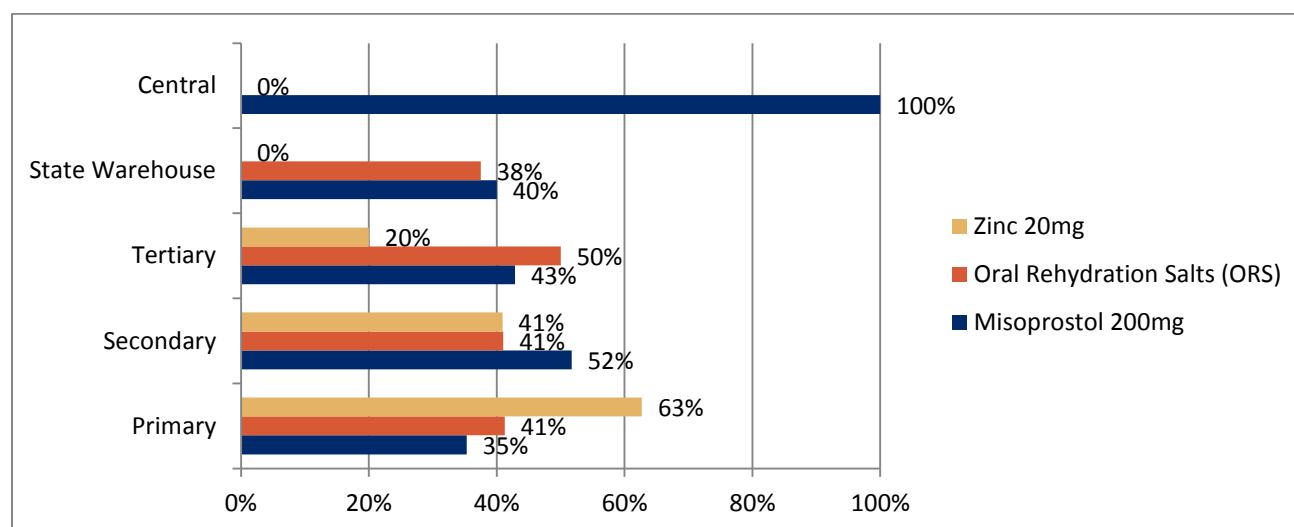
Facility reporting

For essential medicines/NTDs and MNCH commodities, 64 percent of facilities surveyed reported "never" when asked about report submission on consumption or issues and stock on hand. This

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[23] It was observed that Misoprostol 200mg and ORS commodities are not commonly requested by health facilities but that quantities are procured to target occasional awareness campaigns.

response indicates the lack of an LMIS reporting system. However, where reporting exists the reports are largely submitted on-time (94 percent for essential medicines and 87 percent for MNCH).

III. Challenges and Recommendations

Table 30. Essential medicines/NTDs and MNCH challenges and recommendations

| Supply chain functional area	Key issues/challenges	Recommendations
General	Supply chain(s) are complex networks with multiple funding sources, procurement agents, and warehousing and distribution plans for the different health commodities.	Given that most of the work in this area occurs at the state level, partners should work with state governments to assess needs, design and develop systems based on national and international standards, and implement the system.
Warehousing and distribution	Lower supply chain levels have high stockout rates.	The Director of Pharmaceutical Services (DPS) and stakeholders should continue to advocate for budget provision to ensure that states have adequate funding for a full supply of commodities.
Supervision and reporting	Most health facilities do not have an LMIS reporting system for essential medicines/NTDs and MNCH commodities. This impacts states' ability to understand product demand and procurement needs.	The DPS should work with stakeholders in strengthening the LMCU to improve the process and frequency of reporting, providing greater visibility into the supply chain.

TB

I. Overview of the Vertical Supply Chain

The National TB and Leprosy Control Program (NTBLC) manages the TB supply chain in Nigeria with the support of the Global Drug Facility (GDF) which is a procurement mechanism initiated by the STOP TB Partnership, GDF provides technical assistance in TB drug management and monitoring of TB drug use in addition to procurement of high quality TB drugs . NTBLC supply chain is overseen by the federal-level coordinating logistics technical working group TWG that provides support for policy development, forecasting, and supply planning and procurement.

NTBLC operations occur in three tiers of the supply chain, including:

- Zonal: Medical officers are in place at this level of the system to provide technical assistance and monitoring to state-level TB programs.

- State: TB programs are coordinated from the state level, which provides technical management to the Local government Areas LGAs.

- LGA: TBL supervisors supplys commodities to health facilities, Directly Observed Treatment (DOTS) centers, and work on the treatment of TB at health facilities.

Figure 22. Map of the TB supply chain
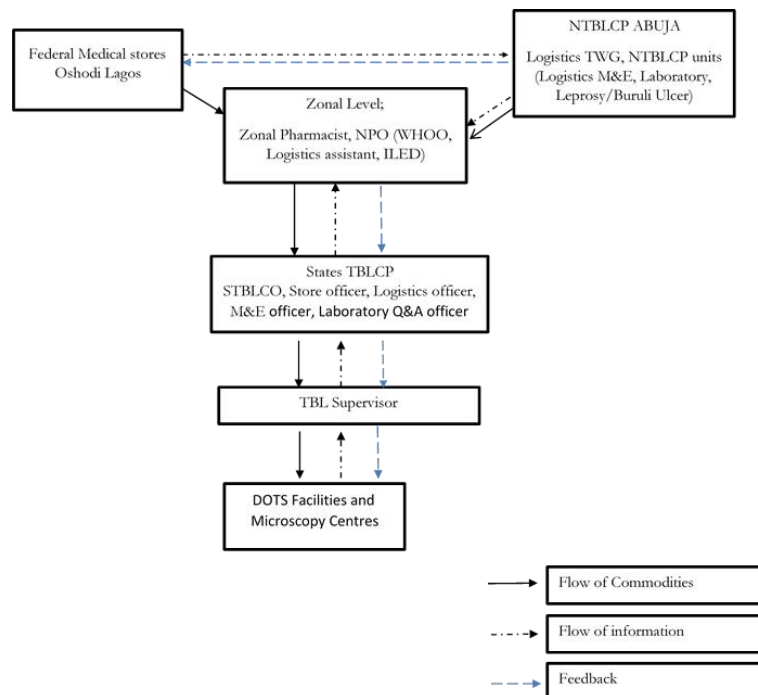
II.   High-level Results

Table 31. TB high-level results

CMM scores	
Forecasting and supply planning	56%
Procurement	49%
Warehousing (zonal warehouses only)	39%
KPI scores	
Stockout rates	43%
Supplier fill rate (inbound to state warehouses)	73%
Stock accuracy	88%
Order fill rate (warehouse to health facility)	33%
On-time delivery	100%
Facility reporting rates (on-time)	77%

Forecasting and supply planning

The TB program creates three-year, long-term forecasts that coincide with the program's grant cycles. These forecasts are used to mobilize funding, and the TB program finds it typically has enough resources available to ensure a full-supply of the forecasted quantities.

Table 32. TB forecasting and supply planning capabilities

Capability	Score	Comments
Forecasting methodologies and assumptions	80%	Because of the robust routine data collection and quality check system in place within the TB program, ample quality data is available to ensure that two methodologies can be used in forecasting.
Level of country ownership	80%	The TB program is the principal GDF recipient in-country, and GoN staff are responsible for the management and day-to-day operations of the program. Forecasting is managed by the program with some support from external consultants.
Forecasting data collection process	60%	A standardized system is in place for data collection, as the TB program uses routine data collection to facilitate forecasting. Data is collected through various mechanisms, depending on the system level.

Procurement

Procurement for the TB program is primarily managed by GDF headquarters, which identifies and prequalifies suppliers, solicits bids and evaluates tenders, and chooses the shipping methods for inbound TB shipments to Nigeria. The TB program is responsible for order tracking and product quality control. For these limited functions, overall capability is 49 percent.

Table 33. TB procurement capabilities

Capability	Score	Comments
Inbound transportation	80%	Due to the annual supply planning cycle, GDF can leverage a variety of shipment modes for inbound shipments of TB commodities. This planning allows the TB program to use longer lead times for routine orders, shipping products by ocean an estimated 80 percent of the time. Using ocean shipment methods enables greater efficiency of transportation costs without interrupting supply.
Procurement management information system (MIS)	80%	The electronic MIS system for procurement enables real-time order tracking and provides key information about the procurement process.
Product quality control	40%	Currently, although a QA system is in place for pre- and post-shipment testing, the TB program does not have access to this information.

Warehousing and inventory management

TB zonal warehouses were visited in Minna, Bauchi, and Ibadan. Overall warehousing capacity for these sites was low at 39 percent. Key challenges are shown in Table 34.

Table 34. TB warehousing and inventory management capabilities

Capability	Score	Comments
Inventory management tools	47%	Inventory management tools are either paper-based (i.e., ICC or bin card) or in a simple software such as Excel or Access.
Storage capacity	33%	The warehouses have limited storage capacity, requiring non-best-practice storage such as storing overflow boxes in hallways.
Infrastructure capacity for expired products	39%	Storage space constraints impact the ability to adequately segregate and organize expired commodities within the warehouses.

Inventory management tools at the TB zonal warehouses included stock cards and an electronic pick-and-pack tool. Although the zonal warehouses lack sophisticated WMS, inventory management tools were present for both TB tracer commodities at all the warehouses assessed. As LGAs and DOTS centers serve as the primary service points for the TB program, ICC availability was not measured at the health facility level.

Stock accuracy is high at all warehouses for the two TB tracer commodities. Accuracy is above 80 percent for both commodities at the state warehouse and central levels and only slightly lower at the zonal warehousing level.

Figure 23. TB commodity stock accuracy
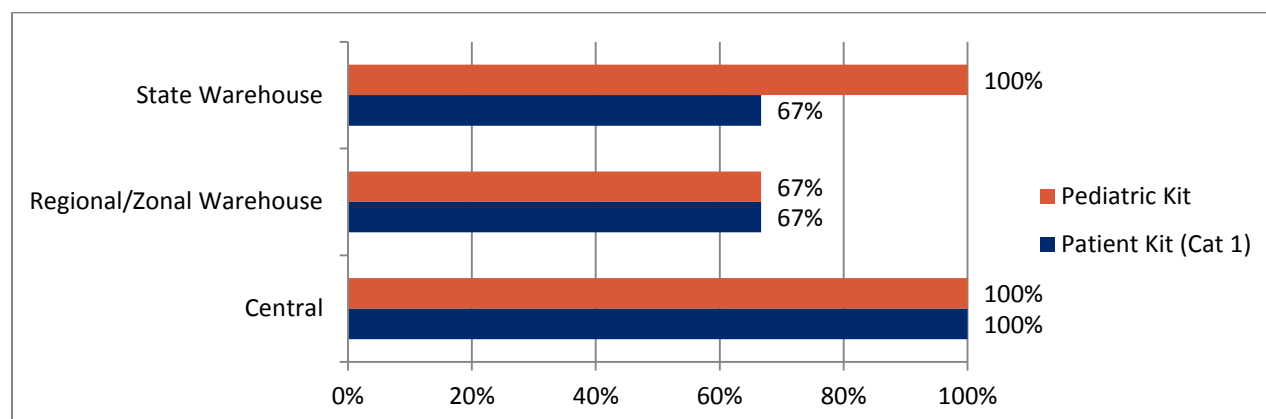
Stockout rates varied for TB commodities at different levels of the system. On the day of visit to the CMS in Oshodi, adult patient kits were stocked out. Zonal and state warehouses also experienced high stockout rates of the adult patient kit CAT 1 at 33 percent and 18 percent, respectively.

Fill rate and on-time delivery

The supplier fill rate for inbound shipments from suppliers to state warehouses was acceptable at 73 percent. Order fill rate between the state warehouses and health facilities was significantly lower at 33 percent. On-time delivery between suppliers and the warehouses was high at 100 percent.

Facility reporting

On-time reporting rates for the TB program are high at 77 percent for reports that are intended to be sent on a quarterly basis. The frequency of reporting varied at the surveyed facilities. LMIS reports were sent primarily quarterly, 50 percent with another 21 percent reporting that they send LMIS reports monthly.

Figure 24. LMIS reporting frequency TB program
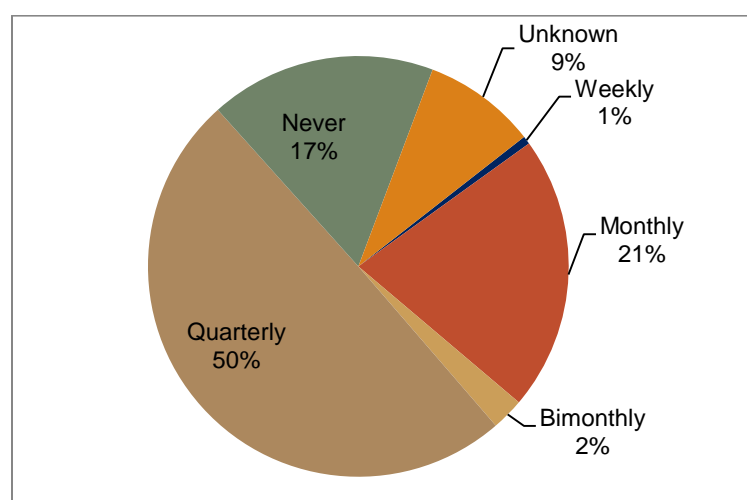
III. Challenges and Recommendations

Table 35. TB challenges and recommendations

| Supply chain functional area	Key issues/challenges	Recommendations
Procurement	The program does not have access to product quality testing for pre- and post-shipment.	Ensure quality testing results are shared with the TB program before releasing products for distribution.
Warehousing and distribution	Facilities are not adhering to best storage practices at the zonal level. The zonal warehouses have inadequate storage space.	Provide more monitoring and supervision to ensure best storage practices are observed at facilities. Provide more storage capacity at the zonal warehouses, where space is a challenge.
Supervision and reporting	About half of facilities visited could not identify the appropriate reporting cycle (quarterly) for an LMIS report.	Provide a supervision system to ensure a common understanding of reporting requirements at all facilities.

Vaccines

I. Overview of the Vertical Supply Chain

The National Primary Health Care Development Agency (NPHCDA) manages the immunization program in Nigeria with the support of UNICEF, CHAI, and the Gates Foundation.

Vaccines and supplies typically flow from the national cold chain store through the zonal, state, and local government cold chain stores. Health facilities, which do not have adequate cold chain storage, typically do not stock vaccines and retrieve stock as needed from the LGA.

Figure 25. Map of the vaccine supply chain
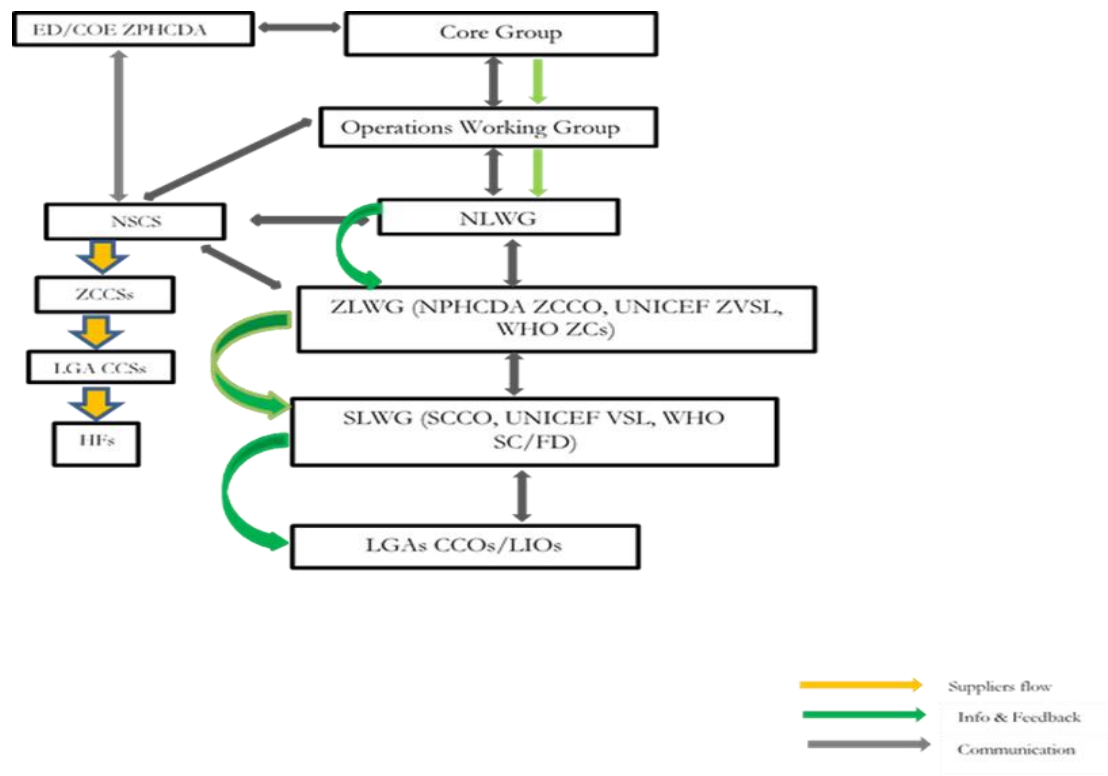
II. High-level Results

Table 36. Vaccine high-level results

CMM scores	
Forecasting and supply planning	**70%**
Procurement	**81%**
KPI scores	
Stockout rates	**37%**
Stock accuracy	**69%**
Facility reporting rates (on-time)	**86%**

Forecasting and supply planning

Vaccines forecasting and supply planning is conducted annually, bringing together key stakeholders, including UNICEF, CHAI, the Gates Foundation, and the NPHCDA.[24] The forecasting process is conducted in a three-day workshop that includes a review of the vaccine supply chain, development of forecasting parameters, and development of the forecast itself. A UNICEF tool is used for the forecasting process.

Table 37. Vaccine forecasting and supply planning capabilities

Capability	Score	Comments
Forecasting data collection process	**60%**	Forecasting data collection is conducted through routine data collection and using international sources (WHO) before the forecasting process. A technical working group validates all the data to identify any issues with data quality.
Monitoring and evaluation	**80%**	Routine supply plan monitoring and reports are instiutionalized and established. Forecasting is included in the routine quarterly reports produced by UNICEF.
Long-term planning and financing	**40%**	Although much of the forecasted demand can be met, there are sometimes challenges in ensuring long-term financing for routine immunizations.

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[24] UNICEF was the only stakeholder interviewed during the assessment. Results below illustrate the capability of UNICEF.

Procurement

Overall capability for UNICEF Nigeria's role in vaccine procurement is 81 percent. Supplier identification, tendering and contracting functions of procurement are conducted at UNICEF headquarters, while the office in Nigeria focuses order management once purchase orders have been placed.

Table 38. Vaccine procurement capabilities

Capability	Score	Comments
Procurement MIS	**80%**	Real-time data on procurements is available online for UNICEF procurements. Access to data improves planning and course corrections in the vaccine procurement (and forecasting) processes.
Expediting/order management	**80%**	Using Vision and an Excel shipment tracker, UNICEF can monitor procurement/shipment milestones and monitor vendor performance management.

Warehousing and inventory management

Data collection teams visited the Minna, Bauchi, and Southwest zonal vaccine warehouse. Overall warehousing capacity for these sites was 62 percent, slightly above the 60 percent "qualified" threshold. Key results to highlight are shown in Table 38.

Table 38. Vaccine warehousing and inventory management capabilities

Capability	Score	Comments
Inventory management tools	**67%**	A customized WMS called Stock Management Tool plays a central role in managing vaccine inventory in the facility, alongside the stock cards and ledgers at two of three zonal vaccine warehouses.
Checking	**80%**	Orders leaving the facility are checked twice for correct batch number and quantity as well as the Vaccine Vial Monitor, which monitors the integrity of the cold storage for the products.

Inventory management tools were available at all vaccine zonal warehouses and six of seven state warehouses stocking the tracer commodities. As LGAs cold stores are the primary last storage point of vaccines to maintain cold chain integrity, ICC availability was not measured at the health facility level.

Stock accuracy is low at all warehouses for the two vaccine tracer commodities with none of the three zonal warehouses having stock within 10 units of their stock card quantity, which led to 0 percent stock accuracy for both vaccines at this level of the supply chain.

Figure 26. Percentage of facilities with stock accuracy for vaccine tracer commodities
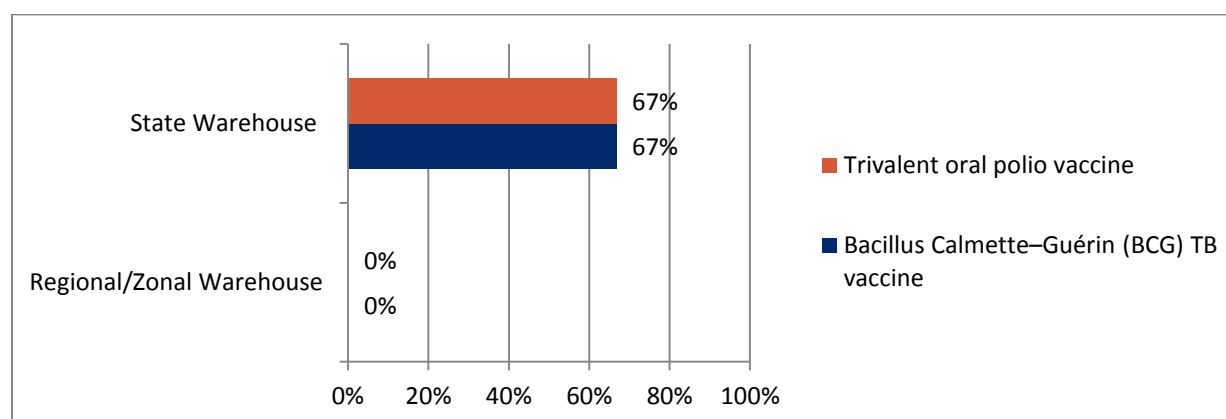
Facility reporting

Facility reporting rates for vaccines are high at 86 percent. Similar to other program areas when surveyed about the frequency of reporting, the responses varied significantly from one facility to another with 34 percent reporting never submitting reports and 41 percent reporting monthly.

III. Challenges and Recommendations

Table 39. Vaccine challenges and recommendations

Supply chain functional area	Key issues/challenges	Recommendations
Forecasting and supply planning	A single forecasting method is currently being used, which limits the degree of validation. Long-term financing for routine immunization is inadequate.	Introduce additional methods for forecasting for a basis of comparison. Devise strategy to ensure long-term financing with GoN leading the process.
Warehousing and distribution	Stock accuracy was low at zonal warehouses for tracer commodities.	Ensure adherence to inventory management practice and also increase human resource capacity with requisite skills in warehouse operations through trainings and monitoring and supportive Visits.
Reporting	Vaccine LMIS reports are submitted at varying frequencies.	Coordinate with stakeholders to harmonize the reporting schedules at all levels.

Conclusion

The current vertical nature of the supply chain systems supporting many health programs in Nigeria creates challenges, some of which are specific to the program it serves, while others cut across the different programs. Stock availability is still a concern across health programs with stock out rate of tracer commodities ranging from 12 to 44 percent on day of visit. The quality of LMIS data from health facilities was also highlighted by health programs as a challenge in forecasting and quantification process.

The vertical nature of the supply chain provided the opportunity needed by donors to focus on a program for systems strengthening efforts, however, due to the fact that the patient may have needs beyond one area of service, the quality of service received in one area, may not match with the quality in other areas. This in the long run may have a cumulative adverse effect on the general wellbeing of the patient. Though currently there are efforts to harmonize key supply chain functions within respective programs such as procurement and distribution, this could be extended across health programs to further improve efficiencies in national supply chain system and commodity availability.

FMS Oshodi

At the central level (FMS Oshodi), warehousing capability is marginal at 34 percent. Standard operating procedures, management of expires, storage capacity require improvement to reach the 60 percent satisfactorily functioning threshold. It is critical for the FDS department of the FMOH to invest or solicit investments in the following areas;
1. FDS to work with donors to implement warehouse management system application for effective inventory and warehouse management with guidelines to manage the operation .
2. Increase storage capacity for both usable commodities and expires
3. Develop standard operating procedures for the management of expires and other warehouse operations and monitor adherence

Zonal and State Warehouses

Warehousing capability is slightly higher than the central level, but still between the marginal and satisfactory levels of maturity (State warehouses: 42 percent, Zonal warehouses: 57 percent). Donor supported zonal warehouses have a higher level of capability than the state ware houses that are supported by the SMOH. For key program areas (HIV/AIDS, TB, Vaccines, RH and Malaria) inventory management tool use was above 80 percent at both the state and zonal warehouse levels. Essential medicines and MNCH products had inventory management tool availability below 50 percent at state warehouses.

Zonal warehouses for programs serve as storage and distribution points for specific commodities. In addition to these functions, state warehouses can also be responsible for forecasting and

procurement of non-health program drugs. The limited sample of state warehouses assessed illustrated low capability levels of both of these functions (Forecasting and supply planning: 41 percent, Procurement: 45 percent).

State warehouses also have capability below satisfactory levels for both transportation and waste management. Distribution systems are not readily available, with 90 percent of sampled orders collected by health facilities. Waste management, specifically destruction, is carried out at the national level. State warehouses are responsible for management of unusable products and reverse logistics but these capabilities all fall below the satisfactory threshold.

Interventions at this level should include:
1. FMOH and Donors to work with the SMOH to improve the capacity for quantification and procurement of essential medicines and other non-program commodities.
2. Support state warehouses to improve ICC use for essential medicines and non-program commodities. This should include the development of task specific job aids for inventory management processes and follow-up supervision visits and on the job training
3. Support state warehouses to improve monitoring and planning of commodity distribution,, including implementing a transportation system

Health Facilities

Warehousing capability at the health facility level ranges from ad hoc to marginal, indicating basic processes are not used consistently and are manually done. Capability increases moving from primary to tertiary facilities (Primary: 33 percent, Secondary: 36 percent, Tertiary: 49 percent). Although capability was assessed for the facility overall, it is important to highlight that inventory management processes varied significantly depending on the program area.

Inventory control cards (ICCs) had limited availability at this level of the supply chain. HIV/AIDS and malaria, which receive donor support, had respective ICC availability of 52 percent and 61 percent. Other program areas had ICC availability at or below 30 percent (Essential medicines, MNCH and reproductive health).

Waste management is ad hoc, with capabilities within the 20-30 percent range at the primary and secondary health facilities.

Interventions at this level should include:

1. The FMOH should work closely with donors to improve warehousing and inventory management practices at this level including routine use of ICCs for all program areas.
2. FMOH should work with partners to establish routine monitoring and supportive visits to ensure staff are trained to use ICC correctly.
3. An integrated removal and disposal of waste should be implemented, leveraging on donor supported programs (such as HIV/AIDS) that have a waste management program should also be considered, with an agreement on cost sharing.

Health Programs

The health supply chain in Nigeria is composed of multiple vertical supply chains focused around the flow of commodities and information by specific health programs. Health programs typically have an oversight role within the supply chain, including forecasting and procurement. They are also responsible for program specific LMIS.

Capability of the health programs varies by disease area, but a common challenge is the availability and quality of LMIS data. Where LMIS systems are in place, programs have on-time reporting rates above 75 percent. However, the quality of the data from these reports needs improvement. These challenges have significant impact on the forecasting and supply planning process with several programs highlighting they cannot use consumption data to inform multiple methodologies due to data quality issues.

Interventions at this level should include:

Improving the quality of LMIS data through regular monitoring, the FMOH, donors and implementing partners should conduct bi-annual data quality assessments. These data quality improvement activities should be conducted in an integrated approach (across multiple programs), this will allow for leveraging the strengths that some programs may already have in conducting similar activities.