EVALUATION OF THE PUBLIC SECTOR SUPPLY CHAIN FOR ESSENTIAL MEDICINES IN IVORY COAST

FEBRUARY 23 TO MARCH 13, 2015

This report is made possible by the generous support of the American people through the US Agency for International Development (USAID), under the terms of cooperative agreement number AID-OAA-A-11-00021. The contents are the responsibility of Management Sciences for Health and do not necessarily reflect the views of USAID or the United States Government.

Recommended Citation

2016. *Evaluation of the Public Sector Supply Chain for Essential Medicines in Ivory Coast : February 23 to March 13, 2015*. Submitted to the US Agency for International Development by the Systems for Improved Access to Pharmaceuticals and Services (SIAPS) Program. Arlington, VA: Management Sciences for Health.

Key Words

Blood Transfusions, Capacity Building, Capacity Maturity, Essential Medicines, Forecasting and Supply Planning, Ivory Coast, Laboratory Function, Logistics Management Information System, National Supply Chain Assessment, Performance Management, Product Selection, Strategic Planning and Monitoring, Strategy Development, Warehousing and Inventory Management, Waste Management.

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ACKNOWLEDGMENTS

The evaluation of the supply chain for essential medicines, vaccines, and blood transfusion-related commodities is the result of a fruitful collaboration among the different agencies of the Ministry of Health and the Fight against AIDS (Ministère de la Santé et de la Lutte contre le sida) (MSLS), other public sector services, and technical and financial partners. This document will focus on the supply chain for essential medicines, but the full version can be read in French.

The Government of the Ivory Coast, through the MSLS, would like to thank all the development partners, national and international experts, and health personnel who have contributed greatly to the completion of this evaluation.

The MSLS expresses its particular gratitude to:

- The different directorates at the central level as well as to regional and departmental directorates and health institutions.
- The US Agency for International Development/President's Emergency Plan for AIDS Relief (USAID/PEPFAR) for financial support.
- Experts from the Supply Chain Management System (SCMS) program for their technical support.

The MSLS invites all concerned institutions to use the results of this evaluation in their next planning to improve the availability of medicines in all health service delivery institutions.

ACRONYMS

AIDS	acquired immunodeficiency syndrome
AO	appel d'offre (tender offer)
ARV	antiretroviral
ASBL	association sans but lucratif (nonprofit organization)
ATS	antenne de transfusion sanguine (blood transfusion site)
CD4	cluster of differentiation 4
CEPREF	Centre de Prise en charge de Recherche et de Formation (Center for Research and Training)
CHR	Centre Hospitalier Régional (Regional Hospital Center)
CHS	Centre Hospitalier Spécialisé (Specialized Hospital Center)
CHU	Centre Hospitalier Universitaire (University Hospital Center)
CIAPOL	Centre Ivoirien Antipollution (Ivory Coast Antipollution Center)
CMM	Capability Maturity Model
CMS	Centre Médical Spécialisé (Specialized Medical Center)
CNCAM-CI	Commission Nationale pour la Coordination des Approvisionnements en Médicaments essentiels et produits stratégiques en Côte d'Ivoire (National Committee for the Coordination of Essential Medicines and Strategic Commodities in Ivory Coast)
CNTS	Centre National de Transfusion Sanguine (National Center for Blood Transfusion)
CSR	Centre de Santé Rural (Rural Health Center)
CSU	Centre de Santé Urbain (Urban Health Center)
CSUS	Centre de Santé Urbain Spécialisé (Specialized Urban Health Center)
CTS	Centre de Transfusion Sanguine (Blood Transfusion Center)
DAP	delivered at place
DC-PEV	Direction de Coordination du Programme élargi de vaccination (Coordinating Office of the Expanded Programme on Immunization)
DCS	dépense courante de santé (healthcare running costs)
DDP	delivered duty paid
DDS	Direction Départementale de la Santé (Departmental Directorate for Health)
DIEM	Direction des Infrastructures, de l'Equipement et de la Maintenance (Directorate for Infrastructure, Equipment and Maintenance)
DNS	dépense nationale de santé (national health expenditure)
DPM	Direction de la Pharmacie et du Médicament (Directorate for Pharmaceuticals and Medicines)
DPML	Direction de la Pharmacie, du Médicament, et des Laboratoires (Directorate of Pharmacy, Medicine, and Laboratories)
DPPEIS	Direction de la Planification, de la Prospection, de l'Evaluation et de l'Information Sanitaire (Directorate for Planning, Prospecting, Evaluation and Health Information)
EIA	etude d'impact environnementale (environmental impact study)
ENV	Enquête sur le Niveau de Vie (Standard of Living Survey)
EPI	equipement de protection individuelle (individual protective equipment)
EPI	Expanded Programme on Immunization
EPIC	établissement public industriel et commercial (commercial and industrial public agency)
EPN	établissement public national (national public facility)

ESPC	établissement sanitaire de premier contact (primary care health facility)
FCFA	Franc de la Communauté Financière Africaine (African Financial Community Franc)
FEFO	first expiry, first out
GAVI	Global Alliance for Vaccines and Immunization
GDP	gross domestic product
GMP	Good Manufacturing Practices
HG	hôpital général (general hospital)
HGS	hôpital général spécialisé (specialized general hospital)
HIPC	Heavily Indebted Poor Country [Initiative]
HIV	human immunodeficiency virus
IC	Ivory Coast
ICA	Institut de Cardiologie d'Abidjan (Cardiology Institute of Abidjan)
INHP	Institut National de l'Hygiène Publique (National Institute for Public Hygiene)
INSP	Institut National de Santé Publique (National Public Health Institute)
IPR	Institut Pierre Richet (Pierre Richet Institute)
IRF	Institut Raoul Follereau (Raoul Follereau Institute)
KPI	key performance indicator
LMIS	Logistics Management Information System
LNME	liste nationale des médicaments essentiels (national list of essential medicines)
LNSP	Laboratoire National de la Santé Publique (National Public Health Laboratory)
MACS®	Système de Gestion d'Entrepôt (warehouse management system)
Max	maximum
MEG	medicaments essentiels generiques (generic essential medicines)
Min	minimum
MIS	management information system
MSLS	Ministère de la Santé et de la Lutte contre le SIDA (Ministry of Health and the Fight against AIDS)
N/A	not applicable
NPSP	Nouvelle Pharmacie de la Santé Publique (New Public Health Pharmacy)
ONUCI	Opération des Nations Unies en Côte d'Ivoire (United Nations Operations in Ivory Coast)
ORS	oral rehydration solution
PEPFAR	President's Emergency Plan for AIDS Relief
PNDAP	Programme National de Développement de l'Activité Pharmaceutique (National Program for the Development of Pharmaceutical Activity)
PNDS	Plan National de Développement Sanitaire (National Plan for Health Development)
PNLP	Programme National de Lutte contre le Paludisme (National Program to Combat Malaria)
PNLS	Programme National de Lutte contre le SIDA (National Program for the Fight against AIDS)
PNLT	Programme National de Lutte contre la Tuberculose (National Program for the Fight against Tuberculosis)
PNMNT	Programme National des Maladies Non Transmissibles (National Program for Non Communicable Diseases)
PNN	Programme National de Nutrition (National Program for Nutrition)
PNSCA	Plan National Stratégique de la Chaîne d'Approvisionnement (National Supply Chain Strategic Plan)
PNSME	Programme National de Santé de la Mère et de l'Enfant (National Program for

	Maternal and Child Health)
PNSR	Programme National de la Santé et de la Reproduction (National Program for Reproductive Health)
PPI	produit pharmaceutique inutilisable (non-usable pharmaceutical product)
PPN	Politique Pharmaceutique Nationale (National Pharmaceutical Policy)
QA	quality assurance
RCAM-D	Renforcement de la Chaîne d'Approvisionnement en Médicaments au niveau Décentralisé (Strenghtening of Supply Chain for Medicines at the Decentralized Level)
RH	Rifampicin-Isoniazid
RHZE	Rifampicin-Isoniazid-Pyrazinamide-Ethambutol
RPTN	Répertoire des Protocoles Thérapeutiques Nationaux (National Directory of Treatment Protocols)
RTC	rapid tests and consumables
SAGE®	Système de Gestion d'Entrepôt de l'Agence et Entrepôt Central (Agency Warehouse and Central Warehouse Management System)
SAMU	Service d'Aide Médicale d'Urgence (Emergency Care Assistance Service)
SC	supply chain
SCMS	Supply Chain Management System
SDP	service delivery point
SEV-CI	Santé Espoir Vie Côte d'Ivoire (Health Hope Life Ivory Coast)
SOP	standard operating procedure
SP	site de prélèvement (blood donation center)
STG	standard treatment guideline
UGS	unité de gestion de stock (stock management unit)
UNDP	United Nations Development Programme
UNICEF	United Nations International Children's Emergency Fund
USAID	US Agency for International Development
VMI	vendor managed inventory
WHO	World Health Organization
WMS	warehouse management system

EXECUTIVE SUMMARY

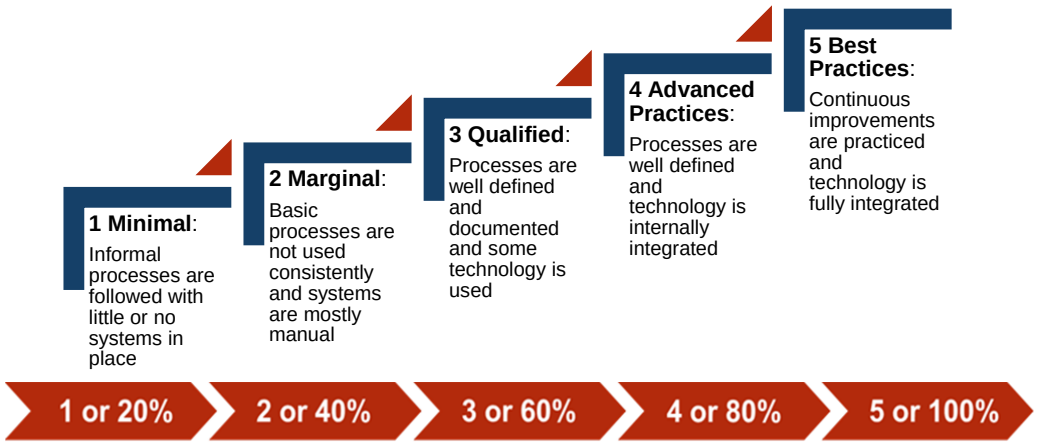
The Ministry of Health and the Fight Against AIDS (MSLS) of Cote d'Ivoire, with the financial and technical support of its partners, has developped a National Supply Chain Strategic Plan (PNSCA) for the period 2012-2015. This plan has identified, for each link in the supply chain, a certain number of multi-year activities whose achievement would ensure a continued availability of medicines and high quality health commodities at all levels of the country's healthcare pyramid. At the start of the last year of the PNSCA implementation, MSLS planned a situational analysis of the supply chain of pharmaceutical products to inform the following strategic plan (PNSCA 2016 – 2020). This situational analysis took place between February 26 and March 13, 2015 and was jointly carried out by Cote d'Ivoire's National Program for the Development of Pharmaceutical Activities (PNDAP) and USAID's Supply Chain Management System project (SCMS). The objective was to have a 2012-2015 PNSCA evaluation report to inform the PNSCA 2016-2020, which will serve as a decision-making tool for key actors managing the supply chain of medicines, vaccines, and blood transfusion-related commodities in Cote d'Ivoire.

Methodology

The evaluation was conducted using a national supply chain assessment (NSCA) tool developed by SCMS, the USAID | DELIVER project and the Systems for Improved Access to Pharmaceuticals and Services (SIAPS) project. The tool has two components – one quantitative and one qualitative - which allows the maturity and the performance of the supply chain to be assessed separately and then compared to each other.

The two components of the tool are described here and illustrated in Figure 5:

- **Capability Maturity Model (CMM) :** Assesses the maturity of each link in the supply chain (e.g. quantification, procurement, warehousing, distribution, etc.) at multiple levels, from the central level to service delivery points (SDPs). It also assesses the maturity of cross-cutting components (known as catalysts) within each link in the supply chain, such as processes and tools, human resources, and infrastructure. This is the qualitative piece of the NSCA tool.Each link in the supply chain is scored based on its maturity level (level 5 representing the highest level of maturity, and level 1 the lowest). The scores are modeled after private sector best practices and adapted to the public health context. The maturity levels are further described in the "Methodology" section below, but can be represented as follows.



- **Supply chain Key Performance Indicators (KPIs):** Assesses the performance of the supply chain, and allows that performance to be compared against the maturity level of each supply chain technical area. This is the quantitative piece of the NSCA tool.

For the purposes of this assessment, data collection at the central level was done using an Excel form. At the peripheral level, a mobile data collection tool named "Survey CTO" was installed on tablets and used to export data in Excel format for analysis. Data was collected on **50 tracer products**, of which 32 were related to essential medicines, 4 related to vaccines and 15 related to blood transfusiton products. Sixteen data collection teams visited 253 health facilities throughout Cote d'Ivoire, including 11 from the National Institute for Public Hygiene (INHP) and 19 from the National Center for Blood Transfusion (CNTS). Once the evaluation was complete, a workshop brought together all relevant stakeholders managing each supply chain for validation of the recommendations.

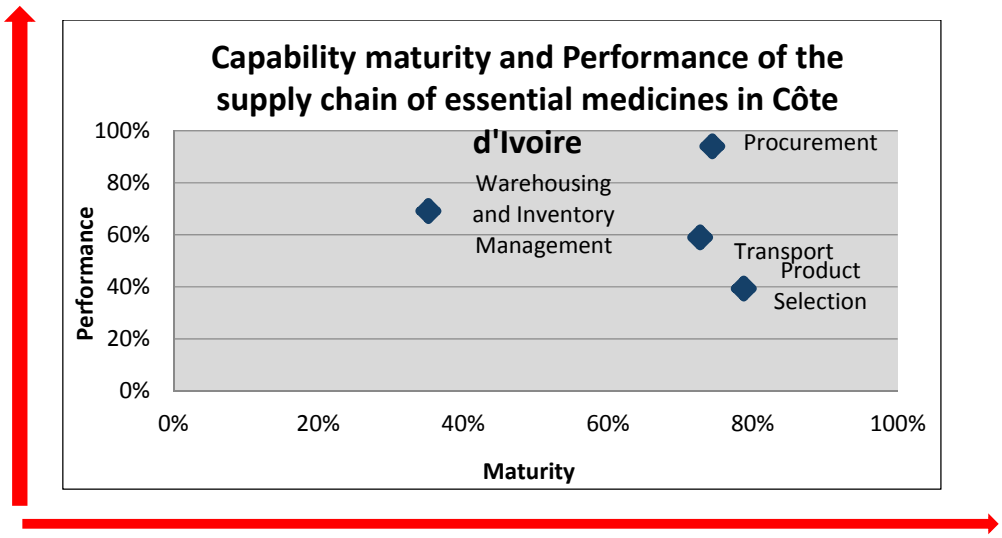
About this Report

This report was written originally in French by pharmacists of Cote d'Ivoire's National Program for the Development of Pharmaceutical Activity (PNDAP), with support from local consultants on the SCMS project. The section of the report that pertains to the supply chain for essential medicines, which encompasses HIV/AIDS medicines and related commodities, has been translated into English with support from the President's Emergency Plan for AIDS Relief (PEPFAR) to inform future PEPFAR-funded program implementation. The two remaining sections, one about the supply chain for vaccines and the other about the supply chain for blood safety products, can still be found in the original French document.

Please note that, because the original graphs were also created in French within the database owned by Cote d'Ivoire's PNDAP, several graphs below will remain in French, with a brief explanation in English to facilitate the reader's understanding.

Results

The NSCA tool revealed several strengths and also a number of areas for improvement in the supply chain for essential medicines. The aggregated Capability maturity and Performance scores are represented on the scatter plot below:

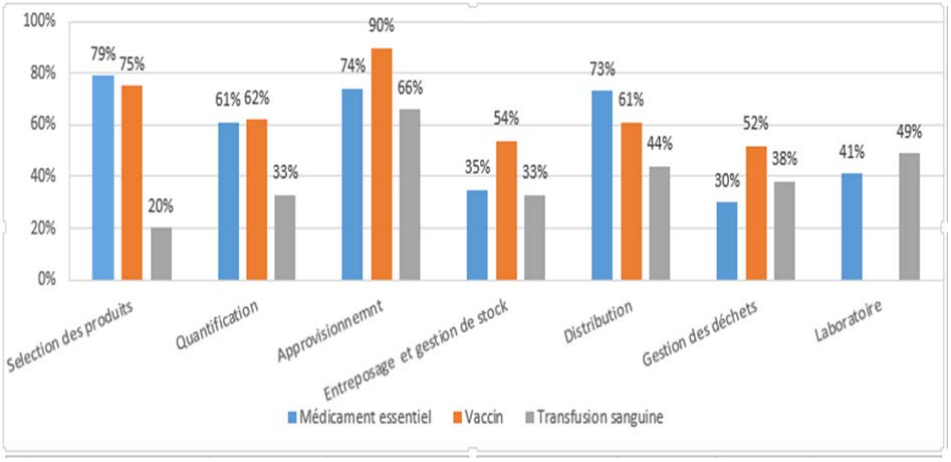


Capability

The high maturity level of most supply chain functions within the supply chain for essential medicines and the supply chain for vaccines demonstrate that these supply chains are at the level where processes are well defined and documented, some with the help of automated systems. The lower maturity scores for the supply chain of blood transfusion products, however, reveal that processes are not coherent and systems are essentially manual.

These results are depicted in the figure below. The six supply chain technical areas from left to right are: product selection, quantification, procurement, warehousing and inventory management, distribution, waste management, and laboratory. The blue bars represent the supply chain for essential medicines, the orange bars represent the supply chain for vaccines, and the gray bars represent the supply chain for blood transfusion products.

Figure 1 : Maturity of supply chain functions, by health product type.



The scores for each supply chain are shown separately in the three graphs below.

Figure 2: Maturity scores for the supply chain of essential medicines

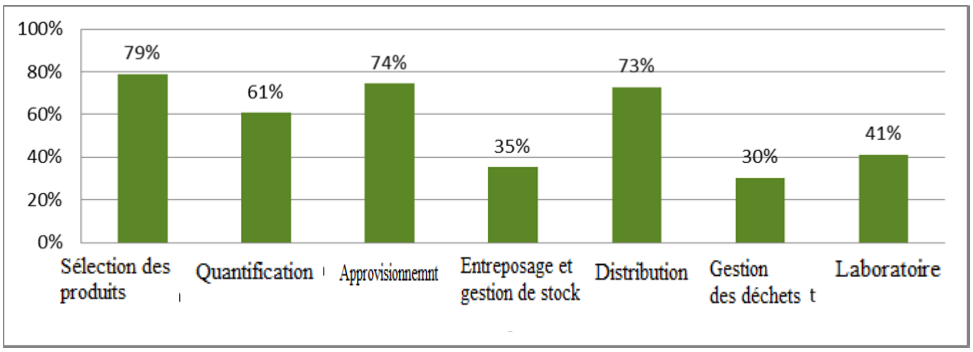


Figure 3: Maturity scores for the supply chain of vaccines

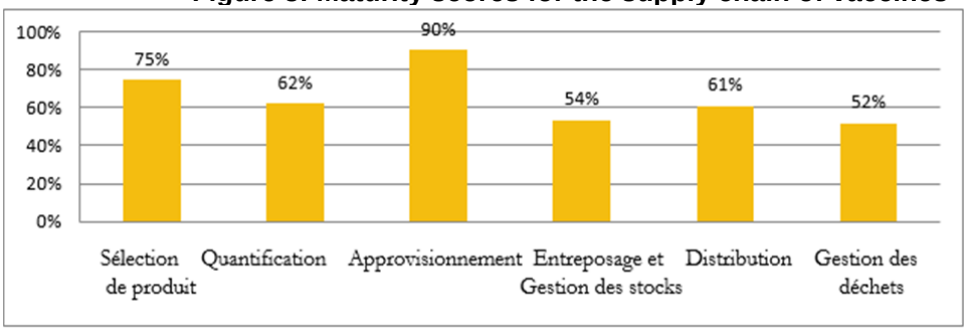
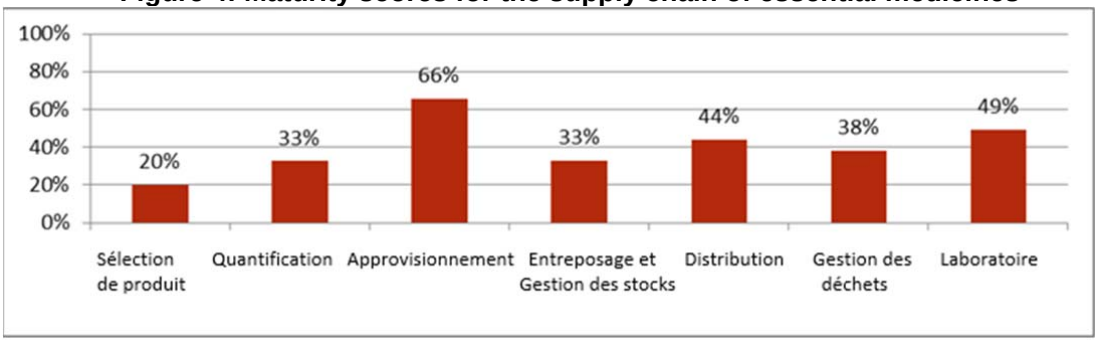


Figure 4: Maturity scores for the supply chain of essential medicines



- In terms of **product selection**, the highest capabilities are associated with essential medicines and vaccines, which are at the "advanced practices" stage, with well-defined processess and integrated technologies. On the other hand, the seleciton of blood safety products is still at the first stage of maturity, which is characterized by informal, reactive and poorly controlled processes as well as the absence of formally established tools for tracking these processes.

- In the area of **quantification**, maturity is at the "qualified" stage for essential medicines and vaccines, which means that processes are generally well defined and documented and the use of certain automated systems is in place. As for blood transfusion products, quantificaiton is at the "marginal" stage, meaning that only basic processes are in place and these are not utilized in a coherent manner, with only manual systems.

- In the **procurement** area, the procurement of vaccines is classifed at the "advanced practices" stage, given the attention to continued improvements and the use of an entireley automated system. The procurement of essential medicines and blood transfusion products remains at the "qualified" maturity stage.

- In terms of **warehousing and inventory management**, for all products, practices are at the "qualified" stage, meaning that processes are well defined and documented and certain automated systems are in use. However, warehousing conditions and inventory management functions deteriorate as we move from the central medical stores down toward the service delivery points at the peripheral level of the healthcare pyramid.

- The maturity of the **distribution** function varies for essential medicines, vaccines, and blood transfusion products but requires overall strengthening. It remains at the "qualified" stage for essential medicines and vaccines, and at the "marginal" stage for blood transfusion products.

- Waste management is one of the lowest among all functional areas with a maturity at the "marginal" stage for essential medicines and blood transfusion products, which is characterized by incoherent basic processes that are for the most part manual. It fairs better, however, for vaccines than for the other products with a score of 52% approaching the "qualified" stage.

- Finally, the **laboratory** component was assessed for the supply chain of essential medicines and blood transfusion products only. The evaluation has classified the maturity

at “marginal” stage, meaning processes are not used in a coherent manner and are principally manual.

Performance

As shown in the table on the following page, the aggregated scores for supply chain performance vary widely depending on the functional area. It should be noted that the waste management and laboratory functions do not have an associated performance score. Only the maturity of these two areas were assessed in the context of this evaluation.

Figure 5: Aggregated results for supply chain KPIs, by functional area

Functional area	KPIs	Essential Medicines	Vaccines	Blood Transfusion
General indicators	Historical stock-outs (6 months)	28%	19%	52%
	Stock-out (on the day of the visit)	29%	14%	17%
	Stock level between the min and the max	65%	59%	87%
Product selection	Percentage of purshases that satisfy the national list of essential medicines requirement (LNME)	95%		
	Percentage of health facilities with an updated LNME	18%		
	Percentage of facilities with STG	5%		
Quantification	Forecasting accuracy		39%	
Procurement	Percentage of supplies planned	95%		
	Supplier’s lead time	121 jours		
	Custom services’ average lead time	9 jours		
	Order fill rate by suppliers	93%	60%	
	Percentage of non regular orders		85%	
	Percentage of on time deliveries by suppliers		77%	
Warehousing and inventory management	Quantity of expiries within the period	113 047	0.01%	
	Percentage of warehouses with storage conditions satisfying at least 80% of the storage guidelines		20%	20%
	Stock Accuracy	68%		60%
	Average order fill rate	54%	67%	
	Average storage conditions	70%	76%	
	Rate of report timeliness	96%	85%	
	Rate of report completeness	68%	70%	
	Percentage of facilities having submitted a report during the study period	59%	100%	
Distribution	Rate of on time deliveries	59%		
	Average delivery time (in number of days)	7 jours		
Human Resources	Rate of job rotation	28%	0%	28%
	Percentage of key job posts filled	66%	100%	66%
	Rate of pharmacy managers trained in supply chain management of pharmaceutical products	14%	100%	14%

Main recommendations

Recommendations are presented in detail in the "Main Recommendations" chapter, but a summary of recommendations is provided below. The recommendations are valid for all three supply chains unless otherwise explicitly stated in the recommendation itself. In general, it seems that a targeted effort on performance improvement at the intermediate level of the logistics system (district pharmacies and regional hospitals) will have a positive and ripple effect at the periphiral level facilities.

The main recommendations by supply chain function are:

Product Selection

1. Set up processes to review and disseminate the National List of Essential Medicines (LNME) and related guidelines at the intermediate level.

2. Create a section for blood transfusion commodities within the LNME.

Forecasting and Supply Planning

3. Support the creation of a National Commission for the Coordination of Medical Supplies and Strategic Commodities in Cote d'Ivoire (CNCAM-CI), to improve information-sharing and monitoring of health supplies among MOH stakeholders.

4. Develop a nationally integrated and preferably automated Logistics Management Information System (LMIS), including the identification of a key entity and sustainable financial resources to manage the LMIS tools.
5. Use different methods for estimating vaccine needs, espeically vaccines that are not part of the Expanded Program on Immunization (EPI).

6. Formalize the process of gauging and/or updating vaccination needs, and of monitoring the procurement plan for vaccines, through the creation of a quantification committee.

7. Make the forecasting and supply planning committee for blood transfusion products operational (i.e. through regular meetings, planned quantifications, etc.).

8. Develop an LMIS for blood transfusion products.

Procurement

9. Set up a monitoring and evaluation system for key performance indicators related to procurement.

10. Request assistance from UNICEF and GAVI for procurement of non-EPI vaccines.

11. Develop standard operating procedures for all logistics functions, including procurement.

12. Implement a procurement strategy for blood transfusion products.

Warehousing and Inventory Management

13. Revise the standard operating procedures manual for public sector facility-based pharmacies by incorporating cold chain requirements.

14. Develop and implement a performance-based contract (agreement) between NPSP and health programs, which specifies the level of service and related costs.

15. Ensure that all district pharmacies meet the organizational and storage standards outlined in PNDAP's handbook on storage conditions and stock management for health facilities.

16. Focus on strengthening service and operations capacity at district pharmacies, so that best practices and lessons learned can be applied to upskill facilities at the peripheral level.

17. Complete a system re-design for the supply chain of vaccines, including a review of mininum and maximum stock levels and order forms.

18. Strenghten the logistics management knowledge of stock managers for blood transfusion products through further training.
19. Improve storage by using a standard method of shelving products and designating a space for unusuable products in each facility.

Distribution

20. Improve NPSP's distribution operations, by conducting a root cause analysis of delivery time underachievement.

21. Standardize the distribution system at district level and focus on strengthtening the district pharmacies' transport capacity.

22. Implement a joint distribution plan for EPI and non-EPI vaccines.

23. Set up a standardized quarterly performance management system for the regional centers of the National Institute for Public Hygiene (INHP).

24. Review and reinforce cold chain management processes, including packaging requirements and methods for temperature monitoring during transport.

Waste Management

25. Develop a standard operating procedure (SOP) on managing unusable pharmaceutical products and methods of financing disposal, and disseminate these procedures in a brief video on storage and stock management.

26. Set up a formal monitoring and reporting system for expired and non-usable products.

Laboratory

27. Develop and disseminate, at all levels of the health system, an SOP on the logistics management of laboratory commodities.

28. Develop and disseminate an SOP for specific laboratory activities to be conducted at the peripheral level.

29. Establish a process to assess the skillset, and provide training and supervision for laboratory personnel.

30. Improve storage capacity and provide adequate equipment to store laboratory commodities.

31. Harmonize processes and tools across all CNTS network laboratories, using as a reference the quality assurance laboratory of CTS Abidjan.

32. Develop an efficient strategy for the maintenance of laboratory equipment, including the process of submitting maintenance requests and monitoring maintenance activities on a regular basis.

1 BACKGROUND

1.1 Introduction to Ivory Coast

1.1.1 Geographic and demographic context

Located in West Africa, Ivory Coast has a geographic area of 322,462 km². The country is bordered to the north by Mali and Burkina Faso, to the west by Guinea and Liberia, to the east by Ghana, and to the south by the Atlantic Ocean.

The climate is tropical wet, which is divided into equatorial wet to the south and Sudanese type tropical dry to the north. Temperatures are generally high, with an average of 30°C. The vegetation is diverse, with the Guinea forest to the south and the Sudanian Savanna to the north. The annual rainfall is between 2300 mm to the south and 900 mm to the north.

The total population of Ivory Coast is estimated at 22,671, 331, with a growth rate of 2.6% per year. Forty-three percent of the population is under 15 years of age; 49% are women, of which 51% are of reproductive age. Fifty-one percent of the population lives in the countryside and 49% in urban areas.

1.1.2 Socio-cultural and administrative context

The national territory is organized into two autonomous districts, 12 districts, 31 administrative regions, and 498 third-level departments. Yamoussoukro and Abidjan, 248 km apart, are the economic and political capitals, respectively.

Ivory Coast has about sixty ethnicities, divided into four main groups: Akan, Mandé, Krou, and Voltaïque.

According the the 2008 Standard of Living Survey (Enquête sur le Niveau de Vie) (ENV), the literacy rate is relatively low: 55.8% among 15 to 24 year olds. The enrollment rate in primary schools went from 56.5% in 2002 to 56.1% in 2008 for boys, versus 53.1% for girls. It is 49.8% and 68.2% in rural and urban areas, respectively.

1.1.3 Economic and political contexts

Independant since August 7, 1960, Ivory Coast is a presidential represenatative democratic republic. Considered for many years a model of peace and stability in West Africa, since 1999 the country has gone through a series of political and military crises. The 2002 politico-military crisis led to a division of the country. Political agreements paved the way for free and transparent elections, under the auspices of the international community. In November 2010, the elections results ignited a civil war, which led to the loss of many lives, the destruction of basic infrastructure, and a massive displacement of the population. After law and order returned, a new government was formed in May 2011. A relatively peaceful political climate has been in place since this date and the institutions of the republic have been reestablished.

The national economy is predominently agricultural, with coffee and cacao being the two major crops, for which the country is the first world producer. Ivory Coast also possesses vast

oil reserves and mineral resources (gold, diamonds, iron, copper, etc.) Gas and oil contributed to 6% of the gross domestic product (GDP) in 2012.

In 2007 and 2008, the growth rate was 1.8% and 2.5%, respectively. The resumption of financial cooperation and the achievement of the Heavily Indebted Poor Country (HIPC) Initiative decision point led to a real GDP growth rate of 3.8% in 2009 and 2.4% in 2010.

Public infrastructure rehabilitation and the progressive return of confidance on the part of the private sector have promoted the gradual return of economic activities.

In 2011, the country ranked 170th out of 187 on the United Nations Human Development Index.

1.1.4 Impact of the 2010 post election crisis on the health system

The 2010 elections led to a civil war, which resulted in many lives lost, refugees, and internally displaced populations as well as the looting of several health facilities and crumbling of the healthcare system.

The United Nations Operations in Ivory Coast (Opération des Nations Unies en Côte d'Ivoire) (ONUCI) stated in a March 2011 report that approximately 50% of the medical personnel had left their assigned posts. This number was 75% in the Western part of the country.

All of the above, coupled with a large increase in unemployment due to a decrease in economic activities, constitued an empediment to access to care and basic social services.

In response to these challenges, on April 10, 2011, the Government of Ivory Coast instituted complete free health care at all its public sector health facilities over a period of 10 months. This exceptional and temporary measure ended on February 16, 2012 and was replaced by more targeted free health care, which launched on February 20, 2012.

1.2 Ivory Coast and the Public Health System

1.2.1 Health policy

The Ivory Coast health policy is articulated in the Plan National de Développement Sanitaire 2012-2015 (National Plan for Health Development) (PNDS). It aims to improve the health and wellbeing of the population. To this end, five specific objectives have been defined and should be achieved:

- Strengthen public sector governance and Ministry of Health leadership.
- Improve availability and use of high quality health services.
- Improve the health of mothers and children under five.
- Strengthen the fight against disease and nosocomial infections.
- Strengthen disease prevention and health promotion as well as outreach medicine.

1.2.2 Organization of the health system

The Ivory Coast health system is comprised of free public healthcare, private healthcare, and healthcare administration. It is a three-level healthcare pyramid (central, intermediate, and peripheral) (figure 1) with two components (adminsitrative and medical). It is a predominently public system, with a flourishing private sector, alongside of which operates a relatively important traditional medicine component.

Health service or healthcare delivery is comprised of:

- The primary level is made up of 1,910 primary care health facilities (établissement sanitaire de premier contact) (ESPC) (1,237 rural health centers; 514 urban health centers, of which 25 are community-based; 127 specialized urban health centers; and 32 urban health facilities, of which 15 are community-based).

- The secondary level is comprised of primary reference health facilities: 66 General Hospitals, 17 Regional Hospital Centers, and two Specialized Hospital Centers.

- The tertiary level is made up of secondary reference health facilities: four University Health Centers; five Specialized National Institutes (National Public Health Institute [Institut National de Santé Publique] [INSP]; National Institute for Public Hygiene [Institut National de l'Hygiène Publique] [INHP]; Raoul Follereau Institute [Institut Raoul Follereau] [IRF]; Pierre Richet Institute [Institut Pierre Richet] [IPR]; and Cardiology Institute of Abidjan [Institut de Cardiologie d'Abidjan] [ICA]); and four other national public facilities (établissements public national) (EPN): National Center for Blood Transfusion (Centre National de Transfusion Sanguine) (CNTS); National Public Health Laboratory (Laboratoire National de la Santé Publique) (LNSP); New Public Health Pharmacy (Nouvelle Pharmacie de la Santé Publique) (NPSP); and Emergency Care Assistance Service (Service d'Aide Médicale d'Urgence) (SAMU).

The management or administrative component includes:

- The central level, comprised of the Ministry Office, central directorates and services, whose core mission is to define, support, and globally coordinate healthcare.

- The intermediate level, comprised of Regional Directorates (20) whose mission is to support health districts in their implementation of health policies.

- The peripheral level, comprised of Health Departmental Directorates (82) or Health Districts, which are charged with the operationalization of health policy.

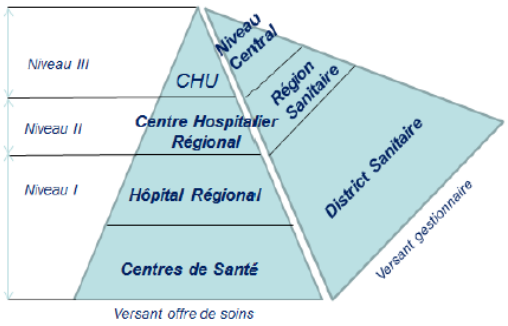


Figure 1. National Health Pyramid

The National Pharmaceutical Policy

A pharmaceutical policy exists (Politique Pharmaceutique Nationale) (PPN), which aims to make high quality medicines available to all populations at affordable prices while ensuring rational use.

The main principles supporting the PPN are:

1. Strenghtening the national pharmaceutical sector
2. Quality improvement of national pharmaceutical sector service delivery
3. Strenghtening international cooperation

The pharmaceutical policy is implemented within the public sector by the following actors:

- The Directorate of Pharmacy, Medicine, and Laboratories (Direction de la Pharmacie, du Médicament, et des Laboratoires) (DPML) ensures the overall implementation of regulatory functions of pharmaceutical drugs and medical laboratories.

- NPSP is the central procurement agency for medicines and strategic commodities for public health facilities. It was created on June 21, 2013 to solve problems posed by the former Pharmacie de la Santé Publique de Côte d'Ivoire (PSP-CI), which had been in charge of public pharmaceutical service in the Ivory Coast since 1958. It has maintained its public service mission as a nonprofit organization (association sans but lucratif) (ASBL).

- LNSP ensures the monitoring and evaluation of laboratory activities, and the quality control of health products.

- The National Program for the Development of Pharmaceutical Activity (Programme National de Développement de l'Activité Pharmaceutique) (PNDAP) contributes to the implementation of the pharmaceutical activity described in the PPN, promoting and coordinating the latter.

1.2.3 Financing

Healthcare financing in Ivory Coast comes from three sources, including the government, private sources made up of companies and households, and development partners (bilateral and multilateral).

The annual share of the government budget allocated to the Ministry of Health is very low. It was 6.48% in 2010. The government contribution remains insufficient in light of the recommendations from the 2001 Abuja summit, which advocates allocating 15% of the country budget to health.

Households' contribution to healthcare financing comes from two sources, including revolving drug fund from service provision and medicine purchase within public health facilities and payments from private insurance as well as mutual health insurance companies. It turns out that the contribution from households constitutes the highest source of revenues, at 57.89%. These revenues went from 440,2 billion Franc de la Communauté Financière Africaine (African Financial Community Franc) (F CFA) in 2010 to 445,8 billion F CFA in 2013, highlighting the disparity in the healthcare system as well as prepaid healthcare mechanisms. This situation places households in a vulnerable position in the face of illness. Commercial companies also participate in healthcare financing through private insurance and taxes, which represent 9.92% of the total healthcare costs.

Bilateral and multilateral funding partners represent 4.33% and 4.07% of the financing sources, respectively.

Expenditures per disease category were as follow:

- Malaria: 220.6 billion CFA F in 2013, of which 210.9 billion were for operating costs (27.39%) and 9.7 billion in investment costs (11.05%).

- HIV and AIDS: 50.5 billion CFA F of the national health expenditure (dépense nationale de santé) (DNS), of which 43.5 billion were for operating costs (5.65%) and 7.0 billion for capital investment (7.94%).

- Tuberculosis: 3.9 billion CFA F, of which 3.2 billion (0.41%) were for operating costs and 698.7 million (0.80%) for investment costs.

- Maternal conditions: 51.7 billion CFA F of the DNS, of which 42.4 billion were for healthcare running costs (dépense courante de santé) (DCS) (5.51%) and 9.3 billion (10.61%) for capital investments.

- Perinatal conditions: 69.7 billion CFA F in 2013, of which 63.3 billion (8.23%) were for operating costs and 6.4 billion (7.26%) in capital investments.

- Nutritional deficiencies: 4.7 billions CFA F, of which 4.6 billion (0.59%) were for DCS and 91.6 million (0.10%) for capital investments.

One hundred fifty billion, and two hundred million (150.2 billion) CFA F (19.70% of DCS) were spent on children under 5 years of age (young children's health). Eighty-three billion (83.0) CFA F (10.78 % of DCS) were spent on children between the ages of 5 and 14. Two

hundred sixty billion and one hundred million (260.1 billion) CFA F, representing 33.78%, were spent on individuals between 15 and 49 years of age, the majority of whom were women of reproductive age.

1.3 Organization of the Health Supply Chain in Ivory Coast

The public health supply chain in Ivory Coast involves a number of actors, including:

- Funders: (USAID/PEFFAR, Global Fund, European Union, UNICEF, etc.)
- Central procurement agencies:
    - Programs for diseases of public health importance, which ensure the availability of health commodities to combat these diseases. They include: the National Program for the Fight against HIV (Programme National de Lutte contre le SIDA) (PNLS); National Program for the Fight Against Tuberculosis (Programme National de Lutte contre la Tuberculose) (PNLT); National Program to Combat Malaria (Programme National de Lutte contre le Paludisme) (PNLP); National Program for Maternal and Child Health (Programme National de Santé de la Mère et de l'Enfant) (PNSME); and the Expanded Programme on Immunization (EPI).
    - The NPSP for free and sold medicines.
    - The CNTS for blood transfusion commodities (blood/blood products as well as consumables required for transfusion).
    - The INHP for free or EPI vaccines (excluding vaccines used during UNICEF mass vaccination campaigns). EPI vaccines are procured for the Coordinating Office of the Expanded Programme on Immunization (Direction de Coordination du Programme élargi de vaccination) (DC-PEV).
- Storage facilities (central level) with:
    - The NPSP for products destined for priority disease programs (PNLP, PNLS, PNLT, and PNSME), and for essential medicines as well as strategic commodities for diseases other than those targeted by the programs mentioned above.
    - INHP for EPI and non-EPI vaccines.
    - The CNTS for blood transfusion commodities.

However, the evaluation team noted the existence of certain PNLT parallel supply chains and PNSME stocks at its warehouse, which distributes products to private clients (specialized centers).

- Warehouses at the intermediate level, which receive products from the storage centers destined for distribution points (regional centers for vaccines coming from the INHP and district pharmacies for products coming from the NPSP).
- Service delivery points

Other actors involved in the supply chain are:

- DPML
- LNSP

- The Directorate for Planning, Prospecting, Evaluation and Health Information (Direction de la Planification, de la Prospection, de l'Evaluation et de l'Information Sanitaire) (DPPEIS)
- Private partners

Depending on the type of health product, health facilities are supplied by three different supply chains:

- One for vaccines (including vaccines and consumables required for vaccine administration).

- One for blood transfusion products (including reagents and consumables used during collection, biological quantification of blood donations, and processing of blood products and their distribution).

- One for essential medicines and consumables (including medicines, consumables, and laboratory reagents dispensed for free to patients by health programs such as the PNLP, PNLT, PNLS, and PNSME, and those targeted for free distribution) as well as medicines and reagents used during care/treatment of other diseases, on a cost recovery basis (sold NPSP medicines and family planning products).

Each supply chain is comprised of a central warehouse and several mid-level stores.

1.4 Supply Chain for Essential Medicines and Consumables

This distribution channel encompasses all essential medicines and consumables, except vaccines and blood products. The term "essential medicines and consumables" refers to commodities for health programs dealing with priority diseases: PNLS (HIV and AIDS products), PNLP (malaria control products), PNLT (tuberculosis control products), and PNSME (reproductive health and family planning products). Commodities selected, forecasted, and procured by the NPSP are considered "out of program" or "cost recovery and targeted for free distribution" products. These commodities, for the purposes of this evaluation, will be subdivided into cost recovery products (sold to health facilities) and non-cost recovery (distributed for free to health facilities).

Figure 2 below illustrates the flow of products and information among the different actors in the supply chain. As part of this evaluation, district pharmacies and hospitals are considered to be at the intermediate level since they receive products directly from the NPSP. Primary care health facilities (ESPC) are considered to be at the peripheral level because they are not supplied by the NPSP, but rather by district pharmacies.

Logistics system functions start with product selection, which is being piloted by the DPML with the participation of other actors in the system. This is followed by forecasting, supply planning, and procurement, which are initiated by health programs for priority diseases and by the NPSP for commodities under their responsibility, with collaboration from the other actors in the health system (such as the DPML et PNDAP). Supply plan monitoring is done by the programs and the NPSP, through its Directorate for programs and special support services. The NPSP receives products and distribute them to its "direct clients" (Centre Hospitalier Universitaire [University Hospital Center] [CHU]; Centre Hospitalier Régional [Regional Hospital Center] [CHR]; hôpital général [general hospital] [HG]; district

pharmacies; and health facilities in Abidjan) through a requisition process, except for HIV and tuberculosis control products, which are distributed through an allocation system. Figure 2 illustrates the product and information flow from the central procurement agency to health facilities at the lowest level of the supply chain.

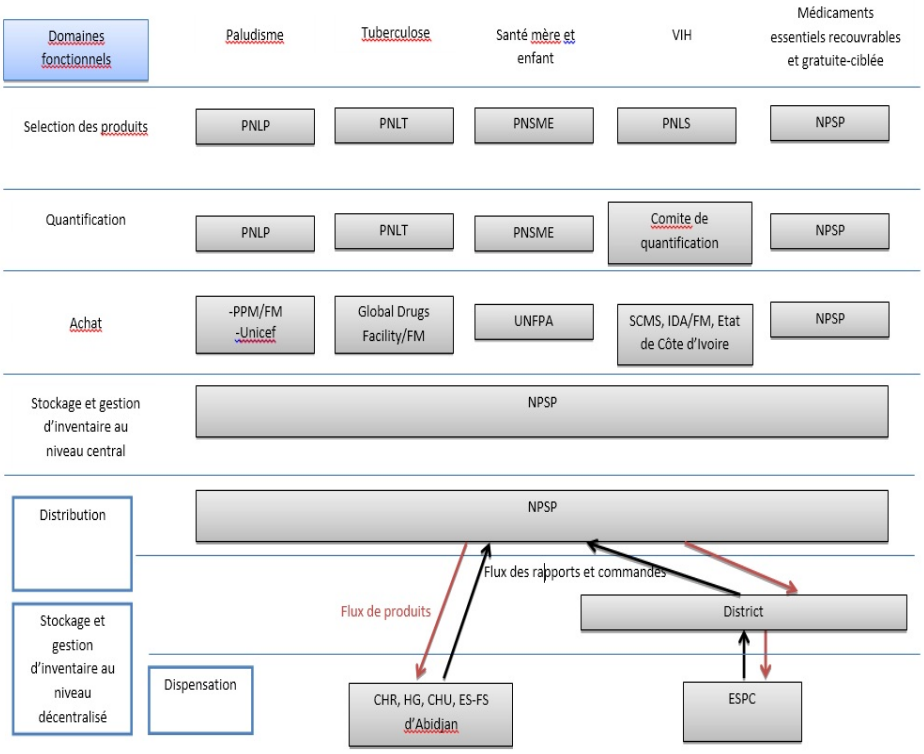


Figure 2. Supply chain for essential medicines and consumables

2 METHODOLOGY

2.1 National Supply Chain Evaluation

The national supply chain evaluation is a complete toolbox developed in collaboration with SCMS, USAID | PROJET DELIVER, and System for Improved Access to Pharmaceutical Products and Services (SIAPS). The toolbox provides tools for evaluating the maturity and performance of supply chain functions at all levels of the healthcare pyramid. It aims to assist in-country supply chain managers and implementing partners with their strategic and operational plans as well as monitoring the achievement of their intended results.

The evaluation toolbox consists of the tools described below and illustrated in figure 3:

- Capability Maturity Model (CMM) diagnostic tool: Assesses supply chain capability maturity at multiple levels, from the central level to the service delivery point (SDP) and within all functional areas and cross-cutting components (catalysts), such as human resources and infrastructure. Capabilities are evaluated along five established maturity levels (level 5 representing the highest level of maturity), modeled after private sector best practices, and adapted to the public health context.

- Supply chain Key Performance Indicator (KPI) tool: A group of indicators that exhaustively measure the performance of a supply chain.

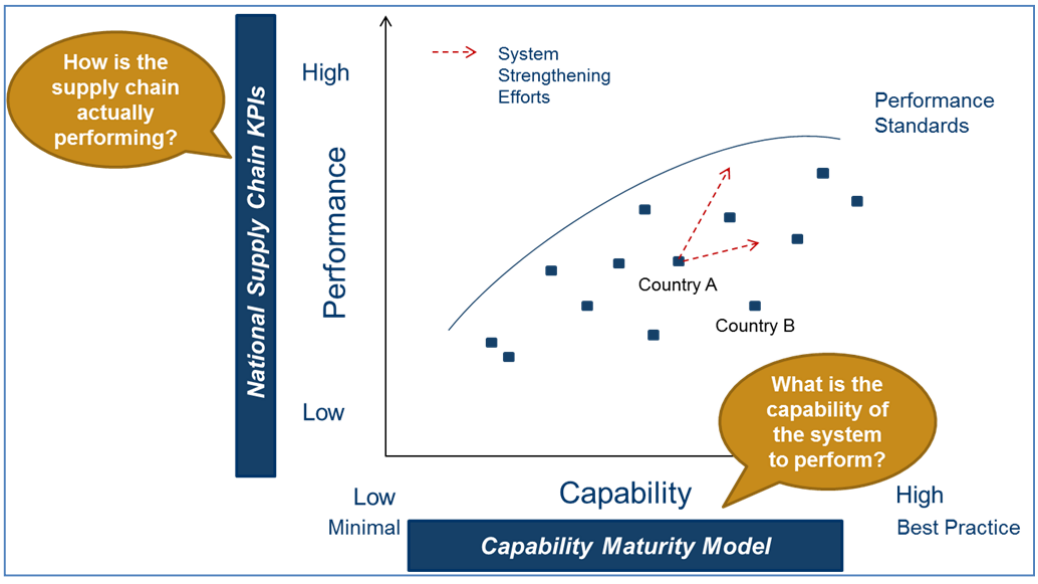


Figure 3. Performance and evaluation of supply chain capabilities

2.2 Capability Maturity Model

The CMM tool encompasses the main supply chain functional areas (product selection, forecasting and supply planning, procurement, storage and stock management, distribution, waste management, and laboratories), and key measures or "catalysts" or "enablers," which impact all functions of the supply chain. As shown in figure 4, the five enablers are:

- Processes and tools
- Infrastructure
- Management information system (MIS)
- Strategic planning and oversight
- Human resources

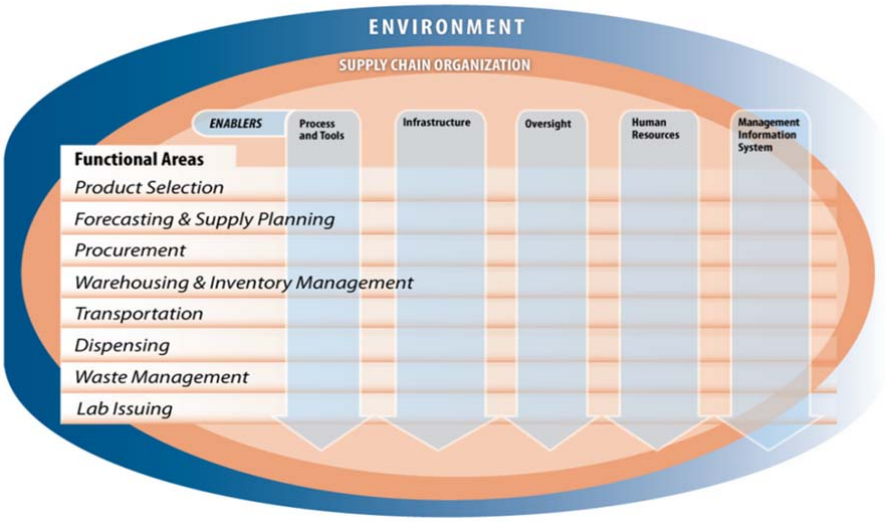


Figure 4. Functional areas and catalysts/enablers covered by the CMM tool*

**Note that the Dispensing function was not included in the NSCA for Cote d'Ivoire.*

For a particular functional area, each catalyst can be further broken down into a certain number of capabilities. For example, the catalyst, "Processes and tools" within the "laboratory" functional area includes, among other capabilities, standard operating procedures (SOP) for laboratory activities, clear procedures for the management of hazardous and flammable products, and a well-defined schedule for external quality assurance (QA) audits.

The CMM rating for each of the capabilities is on a 1-5 maturity scale, based on a group of specific and well-defined criteria. Figure 5 illustrates this maturity scale as a staged representation, with criteria ranging from lowest to highest level for each capability area (1-5).

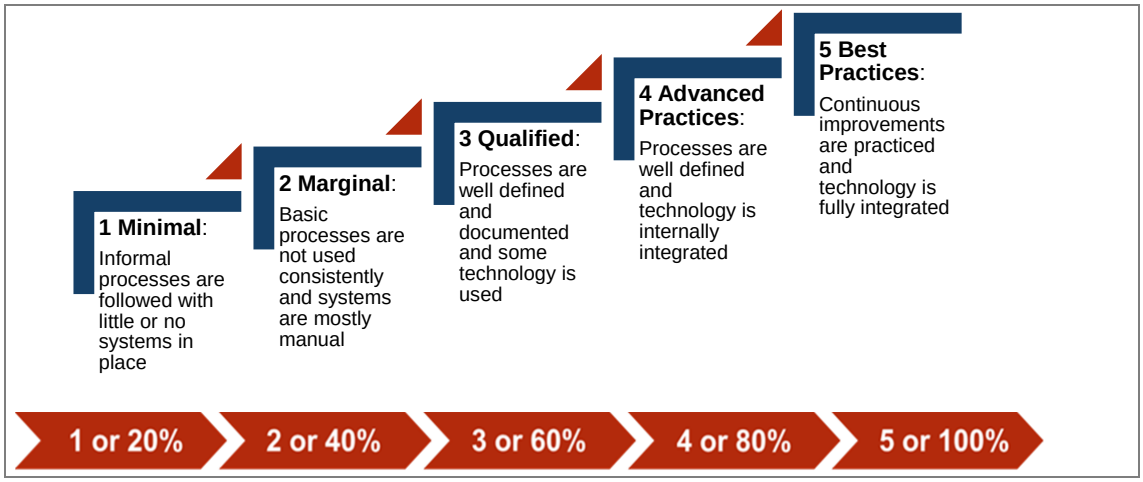


Figure 5. Maturity scale description

For example, as shown in table 1, for a warehouse's capability in terms of SOPs, a maturity at the minimal level (1) means that "procedures are lacking," whereas the best practices level (5) signifies that "detailed SOPs are available for all related storage procedures, that all employees are required to read them, and that the SOPs are in line with national and local guidelines."

4.a.6. Procédures opérationnelles standard

Observations générales :

1	2	3	4	5
▫ Les POS ne sont pas disponibles.	▫ Quelques POS relatives aux opérations de base du processus sont disponibles.	▫ Des POS détaillées sont disponibles pour la plupart des processus. ▫ Il existe une politique de mise en place et de gestion des processus décrits dans les POS.	▫ Des POS détaillées sont disponibles pour tous les processus. ▫ Tous les employés sont tenus de lire les POS, et un registre de respect des exigences est documenté et conservé dans les dossiers du personnel.	▫ Des POS détaillées sont disponibles pour tous les processus. ▫ Tous les employés sont tenus de lire les POS, et un registre de respect des exigences est documenté et conservé dans les dossiers du personnel. ▫ Les POS se conforment aux réglementations nationales et locales.

Table 1. An example of a specific capability, with corresponding CMM rating

Data on maturity are collected through semi-structured interviews with key informants at each health facility. The data collection teams use precise questions and instruct respondants on how to answer on a 1 to 5 scale and how to triangulate their responses with existing documentation. The teams are also allowed to add their own observations to validate the results. Most of the qualitative details in the current report are based on these observations. Results from the CMM diagnostic tool reflect the analysis of functional areas performed by the data collection teams.

2.3 Supply Chain KPI Tool

In addition to data collected on maturity, during each site visit, the National Supply Chain Assessment (NSCA) teams collected data from stock cards, order forms or report and requisition forms, issue vouchers, and non-usable and expired product reports. These data were used to calculate KPIs. Table 2 shows the primary KPIs and respective formulas used to calculate the results. Other formulas were also adjusted in case of incomplete data, which is also mentioned in the results.

Table 2. Key performance indicators per functional area and related formulas*

Functional Area	Ref.	Key Performance Indicator	Formula
Stock Availability	1.1	Stockout rate	$\frac{Number\ of\ tracer\ commodity\ observations\ experiencing\ a\ stock\ out}{Number\ of\ tracer\ commodity\ observations} x\ 100$
	1.2	Stocked between minimum and maximum stock levels	$\frac{Number\ of\ tracer\ commodity\ observations\ with\ months\ of\ stock\ between\ the\ minimum\ and\ maxiumum\ stock\ levels}{Number\ of\ tracer\ commodity\ observations} x\ 100$
Product Selection	2.1	Percentage of products passing a quality audit	$\frac{Number\ of\ product\ batches\ tested\ that\ meet\ quality\ standards}{Total\ number\ of\ product\ batches\ tested} x\ 100$
	2.2	Percentage of procurements in compliance with the National Essential Medicines List (NEML)	$\frac{Number\ of\ products\ procured\ on\ the\ LNME}{Total\ number\ of\ products\ procured} x\ 100$
	2.3	Percentage of facilities in possession of the updated NEML	$\frac{Number\ of facilities\ with\ the\ LNME}{Total\ number facilities\ visited} x\ 100$
	2.4	Percentage of structures in possession of the national health care directives - STGs	$\frac{Number\ of facilities\ with\ national\ directives}{Total\ number facilities\ visited} x\ 100$
Forecasting and Supply Planning	3.1	Forecast accuracy	$1 - \frac{\lvert forecasted - actual\ consumption \rvert}{Actual\ consumption} x\ 100$
	3.2	On-time reporting rate	$\frac{Number\ of\ facilities\ submitting\ reports\ on\ time}{Number\ of\ facilities\ expected\ to\ report} x\ 100$
	3.3	Percentage of facilities submitting a report with all three required components (i.e. stock on hand, monthly consumption, losses and adjustments)	$\frac{Number\ of\ facilities\ submitting\ complete\ reports}{Number\ of\ facilities\ expected\ to\ report} x\ 100$

Functional Area	Ref.	Key Performance Indicator	Formula
	3.4	Percentage of facilities having submitted a report every month over the period of observation	$\frac{Number\ of\ facilities\ submitting\ a\ report\ every\ month\ of\ the\ evaluation}{Number\ of\ facilities\ expected\ to\ report\ each\ month} x$
Procurement	4.1	Vendor on-time delivery	$\frac{Number\ of\ orders\ delivered\ on\ or\ before\ the\ agreed\ delivery\ date\ in\ the\ reporting\ period}{Total\ number\ of\ orders\ in\ the\ same\ reporting\ period} x\ 100$
	4.2	Vendor fill rate	$\frac{Quantity\ of\ product\ received}{Quantity\ of\ product\ requested} x\ 100$
Warehousing and Inventory Management	5.1	Stock accuracy	$\frac{Number\ of\ facilities\ with\ stock\ accuracy\ of\ the\ tracer\ commodity}{Total\ number\ of\ facilities\ assessed\ managing\ and\ stocking\ the\ tracer\ commodity} x\ 100$
	5.2	Order fill rate	$\frac{Quantity\ of\ product\ received}{Quantity\ of\ product\ requested} x\ 100$
	5.3	Percentage of pharmacies in compliance with 80% of storage standards from the	$\frac{Number\ of\ facilities\ assessed\ meeting\ storage\ condition\ standards}{Total\ number\ of\ facilities\ assessed} x\ 100$
Distribution	6.1	On-time delivery rate	$\frac{Number\ of\ orders\ delivered\ within\ the\ distribution\ timeframe\ agreed\ in\ the\ distribution\ plan}{Total\ number\ of\ orders} x\ 10$
	6.2	Average order lead time	$\frac{Total\ lead\ time\ for\ orders}{Total\ number\ of\ orders} x\ 100$

**Please note that the laboratory and waste management areas do not have corresponding KPIs. Only their maturity is addressed in this report.*

2.4 Relationship between Maturity and Performance

The comparison between maturity and capability determines whether a supply chain is below or above expectations in terms of its functions and processes. The comparison informs the health system of the main areas for improvement.

Capability maturity and performance scores for an area of interest may be plotted on a scatter graph, as shown in Figure 6.

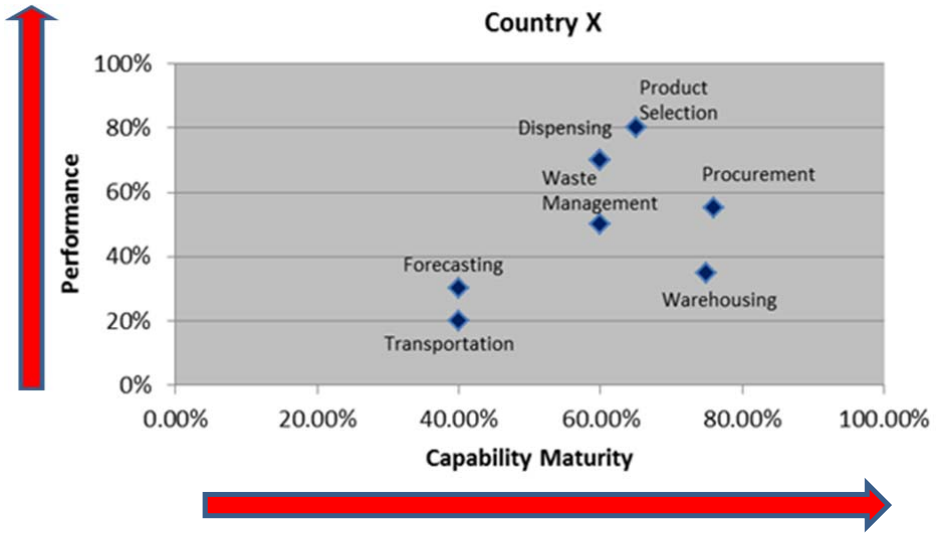


Figure 6. Supply chain capability and performance assessment

Even though stakeholders might be expecting to see a positive correlation between maturity and performance scores, it is not always the case. Previous NSCA assessments have shown that some health systems with high maturity scores may have low performance scores, and vice versa. For example, performance in an area with well-defined processes might be weak if there is a high turnover of personnel or if tools are not correctly implemented. Conversely, performance of a system with low maturity may be high if the personnel is dedicated or is used to working without clear instructions, or if there are culturally or organically developed informal tools in place for day-to-day operations.

Figure 7 shows the three potential rating relationships, with a brief description of each.

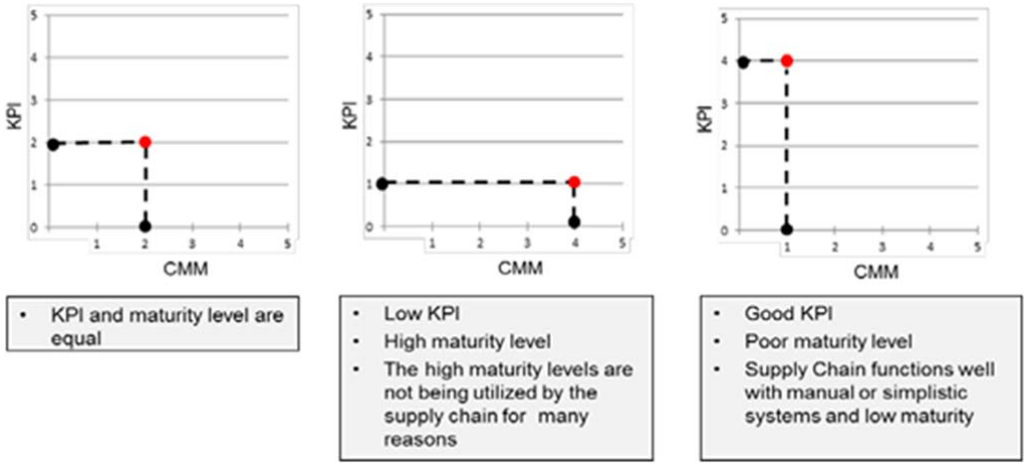


Figure 7. Rating relationships for supply chain evaluation

The relationship between capability and performance scores provides a general view of the public health supply chain functions.

2.5 Scope of the Assessment

This section provides details for all three supply chains for reference, but only the results of the supply chain for essential medicines and consumables will be discussed in this report. Results for the supply chain for vaccines and for blood safety products can be found in the French version of the National Supply Chain Assessment report.

2.5.1 Public health supply chain

The following supply chains for public health commodities in Ivory Coast were assessed in terms of the maturity and performance of logistics functions:

- Supply chain for essential medicines and consumables, from the central level to primary healthcare facilities (peripheral health centers).
- Supply chain for vaccines, which covers EPI and non-EPI vaccines, from the central level to the peripheral health centers.
- Supply chain for blood safety commodities with the CNTS.

As mentioned above, this report will cover only the supply chain for essential medicines.

Information was collected from the public health facilities' pharmacies/stores and laboratories, across several different health regions of Ivory Coast.

All types of public health institutions were taken into account: urban health centers, general hospitals, regional hospitals, specialized hospitals, university hospital centers, CNTS facilities, and INHP branches. They represent all the public and faith-based facilities, which are supplied through the national public supply chain.

2.5.2 Tracer products

The reference list of assessed products reflects the Ivory Coast context and is aligned with the country's corresponding health priority objectives. This list was validated by all the stakeholders as part of the technical committee on the monitoring of the National Supply Chain Strategic Plan (Plan National Stratégique de la Chaîne d'Approvisionnement) (PNSCA).

For assessment purposes, a short list of tracer products was derived from the reference list, based on the following criteria:

- Essential products for priority health programs
- Products used more frequently
- High value products
- Products represented across diverse categories (adult, laboratory, pediatric, cold chain, and critical diseases products, among others)

The list of tracer products for each of the supply chains is given in table 3.

Table 3. List of tracer products for the assessment of the national supply chain in Ivory Coast

#	Type of product	Designation
Supply chain for cost recovery or non-cost recovery medicines and consumables		
1	Malaria	ARTESUNATE + AMODIAQUINE 1 to 5 YEARS
2		PYRIMETHAMINE+ SULFADOXINE
3		RAPID DIAGNOSTIC TEST
4	Tuberculosis	RIFAMPICIN 150 ISONIAZID 75 PYRAZYNAMIDE 400 ETHAMSCOREOL 275
5		RIFAMPICIN 150 INH 75MG (RH150)
6	Reproductive health and family planning	MICROGYNON(LEVONOR+ETHINYLESTRAD
7	Antiretrovirals (ARV), opportunistic infections (OI), and laboratory products (ARV will be used as a general term to describe this category throughout the report).	DETERMINE
8		ZIDOVUDINE/LAMIVUDINE/NEVIRAPINE 150 mg/300 mg/200 mg
9		ZIDOVUDINEW/LAMIVUDINE/NEVIRAPINE 30 mg/60 mg/50 mg
10		NEVIRAPINE (10 mg/ml (50 mg/5ml)/ 240 ml,100ml, 25 ml fl)
11		TRIMETHOPRIME + SULAFAMETHOXAZOLE 800/160 mg
12		CD4 - BD FACSCalibur - BD TriTest CD3/CD4/CD45 Kit of 50 tests with trucount
13		CD4 - BD FACSCount - BD FACS Count Reagent %CD4 - 50 tests or BD FACS Count CD3/CD4 reagent
14		CD4 - GUAVA - Guava Auto CD4/CD4% Reagent Kit, 100 tests
15		CD4 - PIMA - PIMA CD4 cartrige Kit, 100 tests/Kit
16	Cost recovery products, or products sold by the NPSP to its clients as a revenue source for the central procurement agency	ALBENDAZOLE TABLET
17		AMOXICILLIN 250 MG SUSPENSION
18		AMOXICILLIN 1G INJECTABLE
19		AMOXICILLIN 500 MG
20		COTTON WOOL
21		EXAMINATION GLOVES
22		GELOPLASMA 500 ML INJ
23		INFUSION SET
24		OXYTOCIN 5IU INJECTABLE
25		PARACETAMOL 1G INJ
26		PARACETAMOL 500 MG ORAL
27		TRIMETHO + SULFAMETHOX ORAL LIQUID
28	Non-program free products, including products distributed freely by the NPSP to targeted populations in accordance with the government policy	DIAZEPAM INJECTABLE
29		IRON + FOLATE TABLET
30		C-SECTION KIT
31		BIRTHING KIT
32		ORS /Zn

2.6 Sampling Methodology

Given that the different supply chains assessed by this evaluation are managed and operate independently, three samples were drawn, representing each of them.

For the evaluation of the supply chain for essential medicines and consumables, a multi-stage (or cluster) sampling method was used, under which facilities were divided into groups or clusters, and a few facilities were then chosen randomly to be part of the evaluation. This is different from random sampling, where the sample is selected directly from all existing facilities at large. Cluster sampling has the advantage of requiring fewer resources and yielding statistically significant samples, which are concentrated in one area of the study.

As for the supply chains for vaccine and blood transfusion commodities, the total number of sites was low to begin with (50 or less in either case), therefore all facilities were included.

2.6.1 Sampling method for essential medicines and strategic commodities

The initial sample for this evaluation included all public health facilities equipped with a pharmacy as well as private and faith-based health institutions involved in supply chain of public health commodities. The list of facilities was provided by the Ministry of Health's DPPEIS. It is important to note that during the evaluation, some facilities were deemed non-functional and were replaced by others using a random sampling process.

The list provided by DPPEIS included 2,116 health facilities. Using the cluster sampling method, a representative number of regions and districts, grouped by population density, was chosen, comprised of:

- Six health regions out of 20 in the country: two with low-density populations, two with medium-density populations, and two with high-density populations.

- Twelve health districts out of 82 in the country, which means two districts for every six selected regions.

There were 325 primary care health centers in the 12 health districts. To achieve a statistically significant 95% confidence interval at the primary care level, 177 primary care health facilities were randomly selected, in proportion of the different types of health facilities within the districts (for example, rural health centers, urban health centers, urban specialized health centers).

In addition to primary care health facilities, a CHR was visited in each region, except Tonkpi. If the region did not have a CHR, a CHR in another nearby region was included instead. All randomly selected HGs and district pharmacies in the district health catchment area were also visited. This approach yielded a representative sample at the secondary and tertiary levels.

It is important to note that at the request of USAID, two district pharmacies (from the Yopougon-East and Toumodi districts) were added to the initial sample.

Furthermore, at the request of USAID, the following facilities were added to the sample:

- In the Sud Comoé region, two primary care health facilities were randomly chosen.

- Two private polyclinics (Polyclinique des II Plateaux and Polyclinique de l'Indénié), which supply HIV and AIDS commodities through their respective districts.

These additional facilities did not reduce the statistical significance of the sample and did not have an impact on the general results. At the central level, the NPSP, LNSP, different priority disease programs (PNSL, PNLT, PNSME, and PNLP) as well as the DPML were visited. Table 4 shows the statistical significance for each type of facility included in this evaluation, and Table 5 shows which supply chain functional areas were assessed at each facility type.

Table 4. Statistical significance of facilities included in the evaluation

National supply chain baseline sample	Total number of sites	Sample significance level	Number of sites sampled
Supply chain for essential medicines and consumables			
Central warehouse	1	Statistically significant	1
District Pharmacy	82	Representative	15
University Hospital Center (CHU)	4	Representative	1
Regional Hospital Center (CHR)	19	Representative	6
Specialized Hospital Center(CHS-HGS)	3	Representative	1
General Hospital (HG)	80	Representative	12
Specialized Urban Health Center (CSUS)	147	Statistically significant	17
Specialized Medical Center (CMS)	59		7
Rural Health Center (CSR)	1332		121
Urban Health Center (CSU)	389		35
Polyclinics (private clinics)	NA	NA	2

Table 5. Supply chain functions assessed according to the facility type

Facility type	Level of supply chain	Product selection	Forecasting & supply planning	Procurement	Storage and stock management	Transportation	Waste management	Laboratories
Supply chain for essential medicines and consumables								
Central Medical Store	Central	x	x	x	x	x	x	x*
District pharmacies	District				x	x	x	
HG, CHR	Hospital				x		x	x
CHU, CHS, Center for Research and Training (CEPREF)	Hospital				x		x	x
CMS, CSR, CSU, CSUS	Peripheral				x		x	x

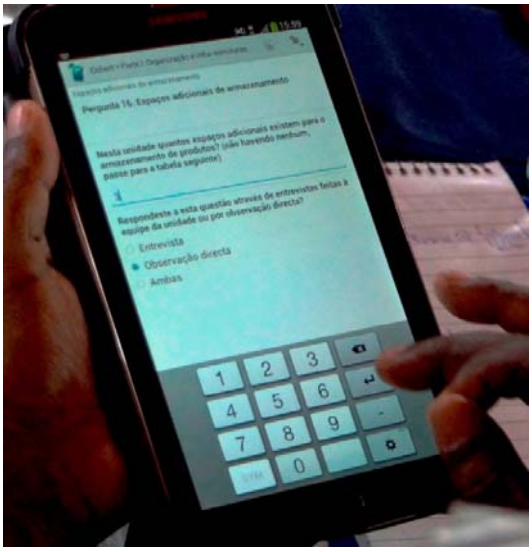
* LNSP data

2.7 Data Collection

There were two teams of three data collectors each for the central level, and 17 teams of four data collectors each for the decentralized levels. Team members were from the Ministry of Health, such as the PNDAP (also part of the technical working group, NSCA), other Ministry of Health agencies, and implementing partners (Health Hope Life Ivory Coast [Santé Espoir Vie Côte d'Ivoire or SEV-CI], and ACONDA-VS CI).

The teams received a four-day training on the evaluation tools, including one used for testing at a site that was not part of the evaluation, thereby allowing the data collectors to familiarize themselves with the different tools. Data collection lasted three weeks. A coordinating team comprised of PNDAP and SCMS personnel was established to ensure that all geographic areas in the sample were covered and that data were being transmitted, and to offer support to the data collection teams during the data collection period. The aggregated database was

checked by both PNDAP and SCMS personnel for quality assurance before data analysis was conducted.



Data collection at the decentralized level was performed using the Samsung Galaxy 5 tablet, which:

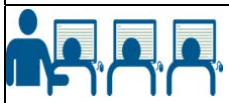
- Facilitated data entry into the long CMM questionnaires.
- Facilitated regular data transmission to the coordinating team.
- Helped reduce the costs and level of effort required to transmit data from paper-based forms following data collection.

A data collection tool named Enquête CTO (CTO Survey) was used. It is an open-source platform, which allows data to be exported in Excel format.

At the central level, data were simply collected using Excel.

3 BEST PRACTICES IN SUPPLY CHAIN MANAGEMENT

3.1 Product Selection

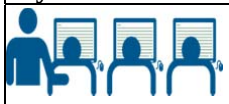
 **Processes and tools**	Key elements for product selection included the existence of the LNME and STGs validated by the MSLS. As a best practice, the LNME should align with the STGs. The LNME and STGs should be updated periodically by the specific national committees (pharmaceutical and therapeutic). The updated guidelines should be disseminated to all levels and stakeholders, including supply chain managers.
 **Strategic Planning and Monitoring**	A surveillance board or committee monitor adherence to the STGs. The LNME is a tool for planning appropiate product selection. Development and implementation of strategies for priority disease programs constitute a key element of procurement planning, and thus of product selection for the programs in question. As a best practice, each priority disease program should include short-, medium-, and long-term (five years or more) strategies. Each program strategy should specify a plan for monitoring progress toward the achievement of goals.

3.2 Quantification: Forecasting and Supply Planning

 **Processes and tools**	<u>Forecasting</u> Forecasting determines the quantities of products required for priority disease programs to ensure continued availability. Forecasting is conducted annually and covers a 24-month period. All assumptions generated during the exercise are documented to allow the results to be replicated and explained, and to facilitate future forecast updates using previous data as well as new assumptions. <u>Supply Planning</u> A supply plan documents the delivery schedule necessary to: 1) ensure that adequate stocks are available to satisfy consumption needs; and 2) maintain continuity of the distribution system. Supply plans cover an 18-month period and are updated quarterly.
Logistics Management Information System	A good estimation of needs and assoicated costs and a good supply plan require reliable data on prevalence and incidence of diseases, stocks, and courses of treatment. Best practices require an efficient mechanism for archiving, reporting, collecting, reviewing, and analyzing data for the purposes of improving forecasting and supply planning.

Strategic Planning and Monitoring	Estimation of quantities needed and their costs as well as supply planning are performed by a unit within the Ministry of Health, whose responsibilities are clearly defined for monitoring these activities. The Ministry of Health is responsible for needs estimation and supply planning.
 **Human Resources**	Roles of the personnel in charge of forecasting and supply planning should be formally recognized as being part of the Ministry of Health organizational chart. Job descriptions specifying appropriate basic skills related to forecasting, forecast monitoring and updating, and suppy planning should be available.

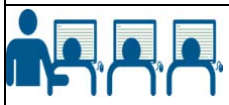
3.3 Procurement

 **Processes and tools**	Procurement at the central level is based on standard product specifications and a reference list of items. These two elements should be updated periodically by qualified personnel. Stakeholders responsible for procurement should know product substitutions, generics, and other internationally recognized products. Suppliers should be monitored regularly through documented formal processes, and their performance measured based on results. SOPs related to procurement should help personnel follow the appropriate steps.
 **Logistics Management Information System**	An electronic procurement system should be used to monitor requests for bids, orders/awarded contracts, fulfilled orders, and payments made to suppliers. The MIS provides a platform for monitoring suppliers' performance. A system for managing SOP archives and regular internal and external audits ensure that adequate documentation is maintained.
 **Strategic Planning and Monitoring**	In the procurement process, internal and external audits ensure transparency. They take into account purchase orders and payment approval, through audit control mechanisms that are clearly defined, and which helps oversee the procurement function. In addition to the internal control mechanisms, an anticorruption and ethics training will help adequately fulfill transparent procurement management requirements. An independant mechanism for requesting bids from suppliers should be in place, and regular audits should be performed by external procurement audit experts. Suggested recommendations by the audit team are followed for continued improvement of processes.

 **Human Resources**	Job descriptions and key responsibilities are defined, including invitation for offers, receipt of proposals from suppliers, management of committees in charge of evaluating offers, drafting procurement contract documents, development of supply plans, and managing suppliers.

3.4 Storage and Stock Management

 **Processes and tools**	Implement and maintain stock management best practices, such as: • Rotate products with each issue: Principle of first expiry, first out (FEFO) to avoid expiries. • Prepare orders in a systematic and controlled way ; • Perform physical inventories on a regular basis. Maximum (max) and minimum (min) stock levels should be established for each level of the supply chain. To maintain stock between the min and max, reordering should be systematically done by the forecasting and supply planning service or through a stock management system, which uses pre-defined values for each level. A cyclic, daily, or monthly count should be performed. Ideally, corrections are notified to the financial service so that accounting adjustments may be made. An SOP describes the processes for each warehouse department and for the management of stocks. They are managed by a specific service, disseminated to all employees for training purposes, evaluated at least once a year, updated in case of changes, and archived at a central location.
 **Infrastructure**	Best practices in infrastructure consist in making sure that there are no expired or unusable products taking up storage space in the warehouse or storeroom, and that the arrangement of existing zones and/or the flow of products is evaluated. Products are stored on shelves or pallets and are correctly labeled. A warehouse with best practices has a receiving area, which is separated from the loading/shipping area, and all operational areas are correctly identified. Inside the warehouse, mature processes include the use of electric material-handling equipment, such as a forklift or pallet truck. A training program is in place for all personnel who handle this equipment. A power generator and a backup power source are available. Mature storage facilities make available processes, procedures, and equipment for hygiene and security. Facilities are cleaned at least weekly, and procedures for combating insects and rodents are in place. Guidelines are included in the SOP and align with local, national, and World Health Organization (WHO) standards for storage of pharmaceuticals.

	The heating and cooling systems maintain a constant temperature and have a daily maintenance schedule. Cold chain equipment is electronically monitored and has an alarm system in case of temperature deviation. A mature security system includes a fence, controlled access through a security guard, registration of incoming and outgoing vehicles, security badges for personnel, and security cameras.
 **Logistics Management Information System**	To ensure best storage practices, an organized system for monitoring products is vital. At the central level, products are entered into a software program or an electronic stock management system, or are recorded in advance on an issuing document. At the lower levels, all items are entered into a software program or at least recorded on stock cards or other stockkeeping records. Received products are cross-checked against requisition and issuing vouchers to make sure that ordered quantities are the same as issued quantities. In mature systems where technical infrastructure exists and the warehouse functions are completely automated, the stock management system is linked to the enterprise resource planning (ERP) system.
 **Strategic Planning and Monitoring**	Best storage and stock management practices ensure that multiyear operational plans conform to the national strategy and allow for the achievement of clear objectives. Operational plans include resources for responding to fluctuations in volume as well as performance objectives and measures for all services being monitored and reported on. These activities are conducted by the Ministry of Health with full ownership of the results and of storage and stock management processes.
 **Human Resources**	Supply chain positions are included in the facility's organizational structure and are filled by qualified personnel. Basic competencies are clearly defined for all positions at all levels and are correctly and equitably applied in terms of job assignments. A combination of off-site and on-the-job training for managers, a mentoring program for personnel, supported by supervision and a performance management plan, are effective for strenghtening human resource capacity in the areas of storage and stock management.

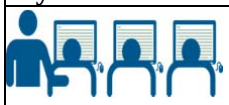
3.5 Distribution (Transportation)

Processes and tools	All transportation process elements are clearly defined, with assigned roles and responsibilities. SOPs and performance measures are available. A detailed delivery schedule that is clearly written is kept and regularly disseminated to all stakeholders to ensure that everyone is fully aware of the expected delivery times.
 **Infrastructure**	Vehicles used to distribute products should be customized to maintain product stability and packaging integrity. A maintenance program is in place to ensure the availaibility and durability of vehicles. Special equipment and packaging, and temperature control devices should be in place for the transport of cold chain products. All options for the "last kilometer" distribution should be considered (own fleet, vehicle rental, and/or outsourcing distribution).
 **Logistics Management Information System**	Delivery plans should be effective, and monitored on a regular basis with an adequate network to satisfy the delivery schedule. Supply chain transportation data should be available in real time, accessible to all stakeholders who can understand how to use this information to streamline processes and improve performance. Computers with appropiate software programs are available to all who need them for collecting supply chain transportion data.
 **Strategic Planning and Monitoring**	A unit within the government or approved by it, usually the Ministry of Health, is in charge of making sure that transportation of products is done according to procedures in place, with results monitored and evaluated. This unit implements transportation processes through outsourced contracts. KPIs are established to control the transportation process and are compared between the different providers. KPI action plans are generated monthly, with performance expectations clearly defined and measured. Roles and responsibilities for risk management and an emergency plan are clearly defined, reviewed each year, updated, and actively followed.
 **Human Resources**	Transportation job descriptions are published in the organization and filled by personnel with proper licensing, training, and specific basic skills required. A supervisor is placed in charge of monitoring outside private service providers. A performance contract is documented and signed between the party and the provider, and should be closely monitored by the supervisor. The latter submits quarterly performance reports to the operations office. A performance and accountability culture is encouraged within the organization.

3.6 Waste Management

 **Processes and tools**	Unusable pharmaceutical products should be disposed of in accordance with national guidelines, if available, or WHO standards. An environmental impact study (EIA) should be done for monitoring and authorization by the proper government regulatory authority. Processes (procedures and their implementation) and regulatory documents (for guidelines and their implementation) should be in place to correctly identify, categorize, and separate waste. An inventory of unusable pharmaceuticals, including returned products, should be regularly performed. Unusable pharmaceutical products should be quarantined. Their tracability should be ensured through documentation, which provides information related to their quality, quantity, source, and origin. A temporary location for storing unusable pharmaceutical products exists with controlled access, is well ventilated, secured, and clearly identified. An SOP for waste management should be implemented according to local and national norms. A competent individual should be assigned to waste management policy. All employees assigned to this activity are expected to read and understand the SOP, and documentation should demonstrate that they follow proper procedures.
 **Infrastructure**	A dedicated location for unusable pharmaceutical products should have limited access, be secured, clearly identified, and marked. Personnel have complete access to all necessary individual protective gear (EPI), and long-term planning guarantees continued availability of EPI.
 **Logistics Management Information System**	Supply chain waste management data should be available in real time, and accessible to all stakeholders who can understand how to use this information to streamline processes and improve performance. Systems and registration (manual or electronic) should be accessible to all personnel in need of data on waste management to fulfill their responsibilities. KPIs are established to monitor the process of waste management, and a comparison is made between different sites. KPI action plans are developed monthly or quarterly, ideally.
 **Strategic Planning and Monitoring**	Responsibility for managing waste is given to a competent unit in the Ministry of Health. The Ministry of Health has entire ownership of the waste management process and the results of waste management. Trained waste management auditors perform annual audits. Their recommendations are taken into account and implemented to proactively resolve issues of waste management for continued improvement.
 **Human Resources**	The basic competencies are clearly defined for all waste management-related positions and are applied judiciously. A qualified individual should be assigned to waste management policy.

3.7 Laboratory

 **Processes and tools**	SOPs for all processes related to the laboratory supply chain are in place and align with local and national guidelines. Within each laboratory: an SOP manual is available; a person is in charge of the SOP implementation policy; and reading of the SOP by all personnel is documented. SOPs are updated every time there is a change in system procedures or functions. Printed copies are available to the appropriate personnel and control procedures for the new version of the SOP are in place. The required national and local guidelines for hazardous chemical products are in place. Personnel are trained annually on these guidelines, and the training is documented in the personnel records. KPIs are established for laboratory processes and results are compared between facilities. KPI action plans are developed monthly. Quality control by external auditors is done more than once a year, according to a set schedule; processes are well defined; corrective actions are initiated and followed up; and the results are presented to identify issues related to the entire network of laboratories.
 **Infrastructure**	All individual protective and security equipment, including secured cabinets, is available and meets the standards. As a best practice, a commercial grade refrigerator or freezer is available and equipped with automatic temperature control. All temperature records are kept and regular performance management, repairs, and maintenance contracts are monitored. The refrigerator or freezer is powered by a generator or a back up electricity source. Storage space for laboratory products is sufficient. The facility is equipped with a central heating and cooling system, with a temperature alarm monitor. Security measures include doors with locks, windows with iron bars, a limited number of individuals with access keys, and a policy requiring that one of the keyholders be present at all times.
 **Logistics Management Information System**	The laboratory software program is integrated with a logistics management information system or with a laboratory management information system, and reports are transmitted monthly to identify soon-to-expire products.
 **Strategic Planning and Monitoring**	An ideal supply chain for laboratory products is comprised of a standardized network of laboratories, with limited diversity in equipment and products. Clinical advantages of a standardized laboratory network include the ability to:

	• Identify and take care of cases on a continuous basis. • Reduce variability in laboratory testing methods. • Improve the quality of services. • Improve the equipment maintenance response time because of the limited number of types of equipment. Equipment maintenance contracts are established, reviewed quarterly, and updated for national coverage.
 **Human Resources**	Job positions for laboratory personnel are established in the organizational chart and are filled by qualified individuals, with basic supply chain skills. The basic competency framework is clearly defined for all supply chain jobs at all levels and is applied.

4 DATA ANALYSIS AND RESULTS

As mentioned above, the results in this section will focus on the supply chain for essential medicines. Results for the supply chain of vaccines and the supply chain of blood safety products can be found in the complete NSCA report by PNDAP (available in French only).

4.1 Supply Chain for Essential Medicines

Context

As mentioned previously in the overview, the supply chain for essential medicines and consumables is composed of three levels, including: a central procurement agency (NPSP); an intermediate level of district pharmacies and reference hospitals; and a peripheral level made up of the ESPC.

At the central level, the central medical store is represented by the NPSP. In 2013, the NPSP underwent important reforms, which allowed it to change from a state-run organization with limited financial resources and a limited autonomous management statute to a semi-independent nonprofit organization (ASBL).

Over the last two years, the NPSP has received financial and technical support to:

- Increase storage capacity: two warehouses were renovated and a prefabricated warehouse with a capacity for 4,000 pallets was procured; it was to be delivered in August 2015.

- Improve performance: more than 30 SOPs related to 184 job aids have been established, which focus on six main functions (receipt of products, storage, resupply, orders, order processing, distribution, and billing).[1]

- Improve management systems: the NPSP financial and accounting system (Système de Gestion d'Entrepôt de l'Agence et Entrepôt Central) (SAGE®) has been updated from version 5 to version 6.

The goal of this part of the evaluation was to determine the current state of the NPSP, and of the lower supply chain levels.

[1] Philippe Delamare, "Ivory Coast PSP Project Improvements", SCMS Technical Report.

4.2 Product Selection

Context

Information regarding the selection of essential medicines and consumables was obtained from:

- The DPML, which is responsible for the development and revision of the LNME.
- Priority disease health programs included in the evaluation, which develop their own strategic plans and STGs.
- The NPSP, the public sector central procurement agency.

Maturity

The supply chain for essential medicines and consumables was appraised at 79% maturity, which corresponds to the advanced practices level. Figure 8 shows the results by area. Please note that the overall score is not a simple average of the two areas.

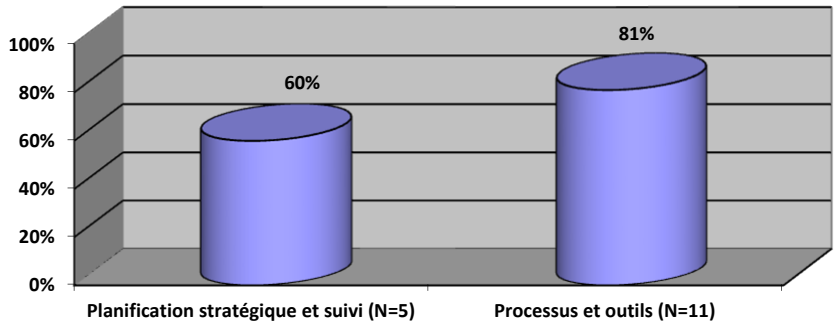


Figure 8. Maturity for "product selection" by area

An overall 79% maturity level is high, however, the high maturity for the area "processes and tools" should have been accompanied by an elevated maturity level for the process area "strategic planning and monitoring," which is not the case, as seen in figure 8. This could be explained by weaknesses in certain health programs for priority diseases.

Processess and tools

- ✓ **National List of Essential Medicines**

Observations: As per the WHO, selection of essential medicines is one of the basic principles of a national pharmaceutical policy. The LNME should be developed "for different levels of healthcare and based on typical recommended treatments for diseases and conditions commonly treated at each level. A careful selection of essential medicines is the first step in guaranteeing access to the latter."

Table 6. Processes and tools for the LNME

Capability	Observations	Score
Committee for evaluation of products	The LNME exists and is taken into account when procuring products. The LNME is not updated every two years. The latest version, referred to as the National List of Essential Medicines and Biomedical Material, was established by the January 14, 2014 Ministry decree 006/MSLS/CAB, however the previous version dates back to 2010.	20%

✓ **Standard Treatment Guidelines**

At the central level, all programs interviewed (PNLP, PNSR, PNLT, and PNLS) had STGs at their disposal related to their diseases of interest. However, the central procurement agency for essential medicines (NPSP) did not have the STGs for the different priority programs. The PNS were using universal clinical guidelines, such as WHO's, to guide their treatments. The guidelines are reviewed at intervals of more than one year.

Strategic planning and oversight

Table 7. Observations on strategy for priority disease programs

Capability	Observations	Score
Strategy for priority diseases programs	The PNLS, PNLT, and PNLP all had a multiyear national strategy, which allowed them to plan their resources and activities. The PNSME had its reproductive health strategy incorporated within the National Reproductive Health Plan and a multiyear action plan. At the national level, there also exists a National Supply Chain Plan for pharmaceutical products and strategic commodities (PNSCA 2012-2015), which serves as the main guide for logistics activities and ensures "continued availability of high quality medicines and strategic products at all levels of the healthcare pyramid." This plan was spearheaded by the MSLS.	80%

Performance

Percentage of purchases that satisfy the LNME: 95%

Use of the LNME for purchasing products is a strong logistics point for Ivory Coast, as indicated in figure 9.

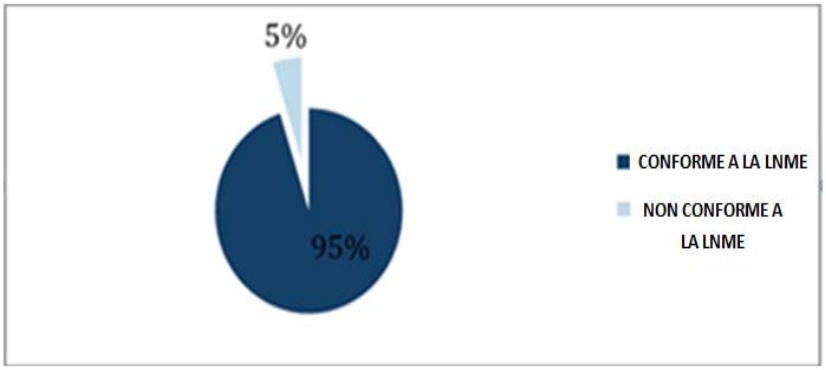


Figure 9. Percentage of purchases by the NPSP that satisfy the LNME – 2014 international requests for bids

In the last NPSP international request for bids launched in 2014 and related to the purchase of essential medicines and consumables, 95% of purchased commodities were listed on the LNME. This shows that purchases are done in conformity with national policy on essential medicines.

Percentage of district pharmacies, hospitals, and primary care health facilities that had the updated LNME: 18%

To ensure rational use of quality medicines, it is important that the LNME is widely disseminated. Figure 10 below shows the availability of the LNME at the peripheral level facilities that were assessed.

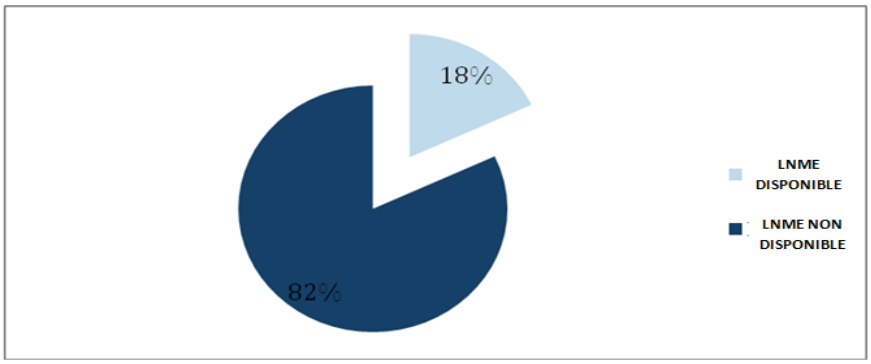


Figure 10. Availability of LNME at the peripheral level

The evaluation revealed that only 18% of health facilities visited across the country had a copy of the LNME. Figure 11 shows the availability of the LNME by type of health facility.

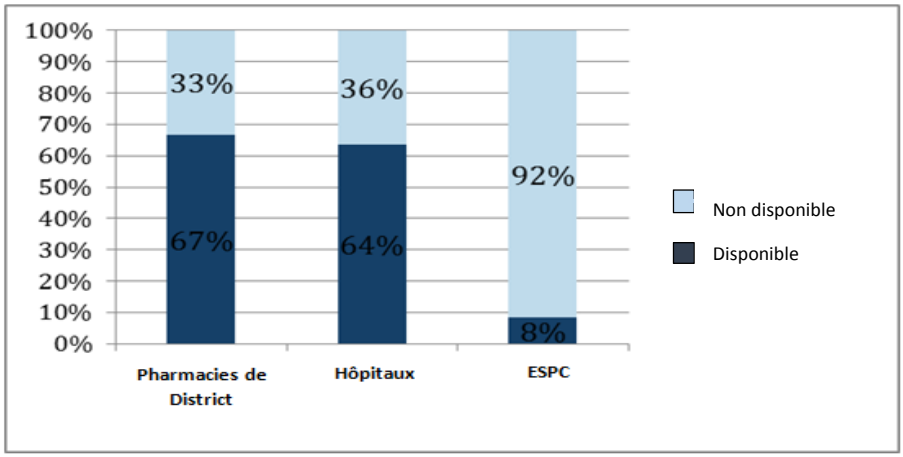


Figure 11. Availability of the LNME by facility type

As seen in figure 11, LNME availability varied by health facility type. For district pharmacies and hospitals, LNME availability is above 60%, whereas it is 8% for primary care health facilities. The peripheral level of the supply chain, therefore, is the most affected by the lack of LNME dissemination.

Percentage of facilities with all the STGs at the peripheral level of the supply chain: 6%

Observations: In Ivory Coast, STGs are available individually and as part of the National Directory of Treatment Protocols (Répertoire des Protocoles Thérapeutiques Nationaux) (RPTN). The availability of STGs was assessed for the different health facilities at the intermediate and peripheral levels, either as a stand-alone document or as part of the RPTN associated with the National Program for Non Communicable Diseases (Programme National des Maladies Non Transmissibles) (PNMNT).

The assessement of STG availability was done by facility type.

Figure 12 shows the percentage of health facilities with complete STGs at the decentralized level.

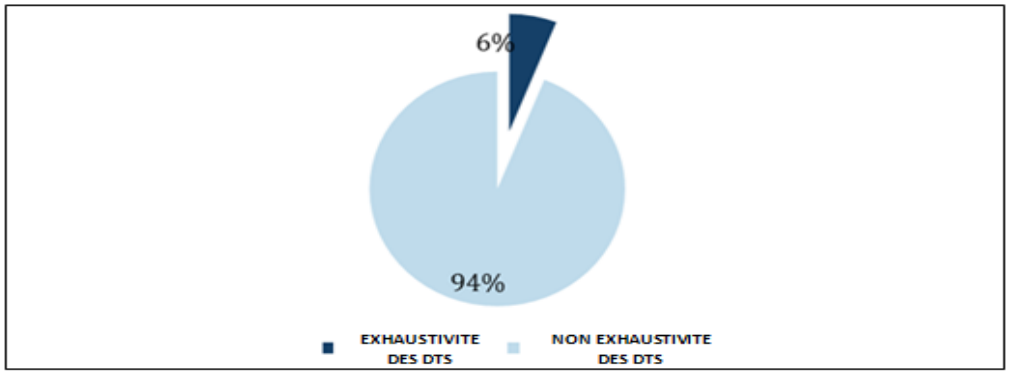


Figure 12. Percentage of health facilities with complete Standard Treatment Guidelines (at the peripheral level of the supply chain)

Only 6% of health facilities had complete STGs, demonstrating a very low dissemination level among these facilities, which can affect the prescription and rational use of medicines, delivery of appropriate care to populations, as well as the different logistics functions. It should be noted that delivery of care was not evaluated during this study, and there are therefore no results to comment upon.

The results below show availability by type of PNS (figure 13) and by type of healthcare facility (figure 14).

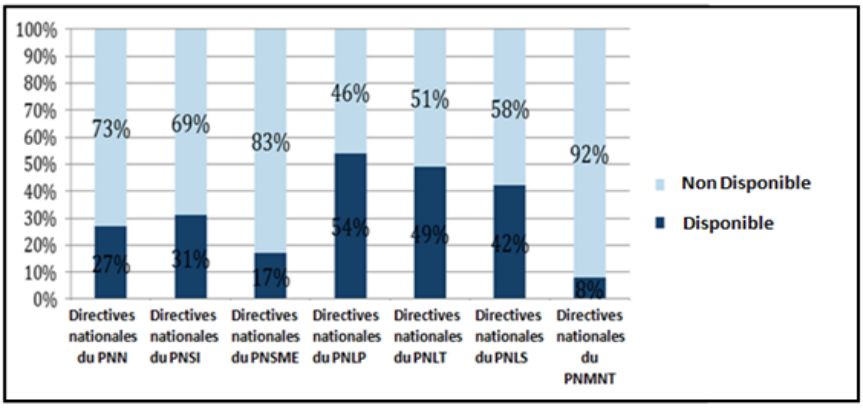


Figure 13. Percentage of health facilities with STGs by priority disease program

Results differed from one program to another. The best results were from the PNLPL (54%), PNLT (49%), and PNLS (42%). The PNMNT and PNSME had the lowest percentages of availability, at 8% and 17%, respectively. STG availability throughout the supply chain, therefore, is an issue. Overall, the results reveal that STGs are not widely disseminated among all the PNS.

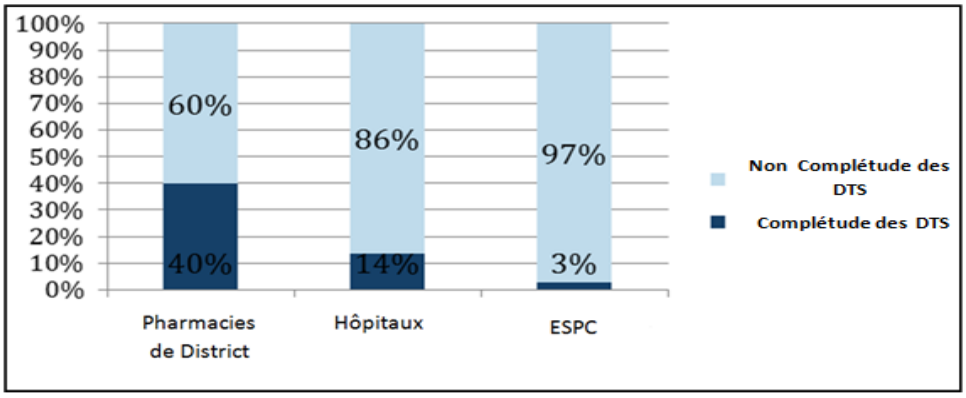


Figure 14. Availability of complete STGs by facility type

As illistrated in figure 14, STGs are not disseminated to all levels of the supply chain. Only 3% of the ESPC, 14% of the hospitals (HG, CHG, and CHU), and 60% of the district pharmacies had them available, respectively.

It should be noted that within the system, district pharmacies are responsible for making the STGs available to the lower levels.

Percentage of tested products that passed quality standards: 100%

In 2014, the NPSP sent the LNSP 10 Pyrexal™ 1G (PARACETAMOL) lots obtained from one supplier, and all of them met quality standards, which is a 100% satisfaction rate. However, this result should not be generalized because only one product was tested. It is worth noting that in 2013, as per the LNSP activity report, 305 products were sent by the NPSP for quality control. This significant decrease in product lots sent for testing between 2013 and 2014 may be explained by the fact that the agreement between the former PSP and the LNSP came to an end.

Observations: With its new statute, the NPSP is progressively establishing quality control processes, through its dedicated Department for Pharmaceutical Quality Assurance. The main objective of the latter is to reestablish the agreement with the LNSP and other international laboratories, and to strictly control certificates of analysis at the receipt of export documents. In 2014, testing of some PNLS products was taken care of by SCMS following their receipt at the NPSP warehouses. The products were sent to laboratories in the United States and South Africa for quality control. Certain funders, such as the Global Fund, require that laboratories be certified by the WHO for the results to be accepted. The LNSP has not yet obtained WHO certification.

Recommendations for the selection function

- Establish a new process that allows for a biannual review of the LNME.
- Establish a new process that allows for an annual revision of the STGs.
- Make the STGs for the different priority disease programs available to the NPSP.
- Ensure wide dissemination of the LNME and STGs to all levels of the healthcare pyramid.

4.3 Forecasting and Supply Planning

Context

Forecasting and supply planning of essential medicines and consumables in Ivory Coast are performed vertically. As shown in figure 15, forecasting and supply planning for the different types of products are done by corresponding stakeholders. The NPSP does forecasting and supply planning for essential medicines and consumables and non-revolving products (for targeted free distribution).

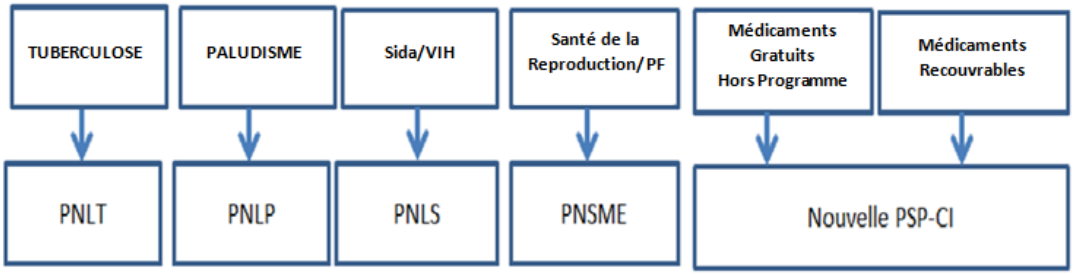


Figure 15. Stakeholders responsible for forecasting and supply planning in Ivory Coast

However, it is important to note that national committees on quantification (forecasting and supply planning) should be established for the different types of products. These committees will be incorporated within the National Committee for Supply Coordination of Essential Medicines and Strategic Commodities of Ivory Coast (Commission Nationale pour la Coordination des Approvisionnements en Médicaments essentiels et produits stratégiques en Côte d'Ivoire) (CNCAM-CI) under Ministerial decree No 134/MSLS/CAB of March 20, 2015. CNCAM-CI will be charged with the "coordination and monitoring of logistics activities related to essential medicines and strategic products, for the diagnosis, prevention, and treatment of targeted health conditions for priority diseases programs; from estimation of products needed to their utilization in the field." More precisely, CNCAM-CI will be responsible for:

- Coordinating forecasting activities.
- Coordinating the development, monitoring, and validation of supply plans.
- Advocating for financial resource mobilization.
- Ensuring the development and implementation of a Logistics Management Information System (LMIS) (i.e., data collection, analysis, and decision making) for essential medicines and strategic commodities.
- Ensuring the rational use of essential medicines and strategic commodities in line with established norms and protocols.
- Managing all questions related to the security of the supply chain for essential medicines and strategic commodities.

Maturity

The composite maturity score (all actors taken into account) is 61%, which corresponds to a maturity level of advanced practices. Individually, the PNLS (76%) and NPSP (68%) are at the best practice stage; the PNLP, PNLT, and PNSME achieved a "qualified" maturity level. The differences may be explained by the fact that the PNLS and NPSP have more defined processes, with the use of technology. Figure 16 shows the maturity score for each actor and the national score, and figure 17 presents the disaggregated scores for forecasting and supply planning.

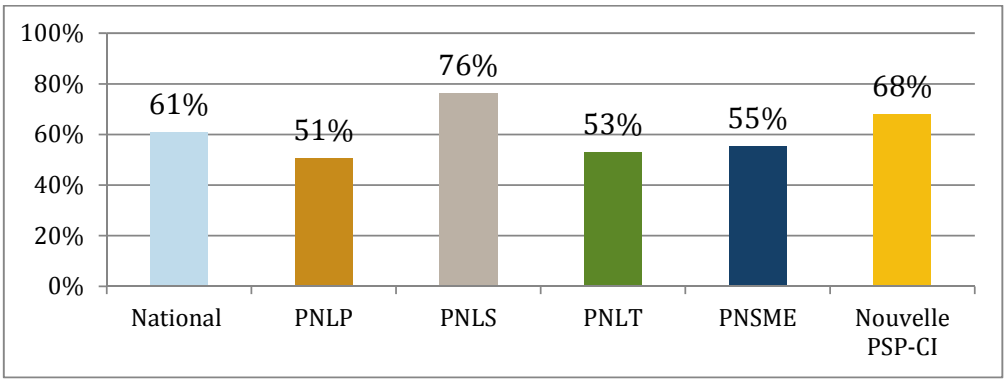


Figure 16. Forecasting and supply planning maturity, by supply chain actor

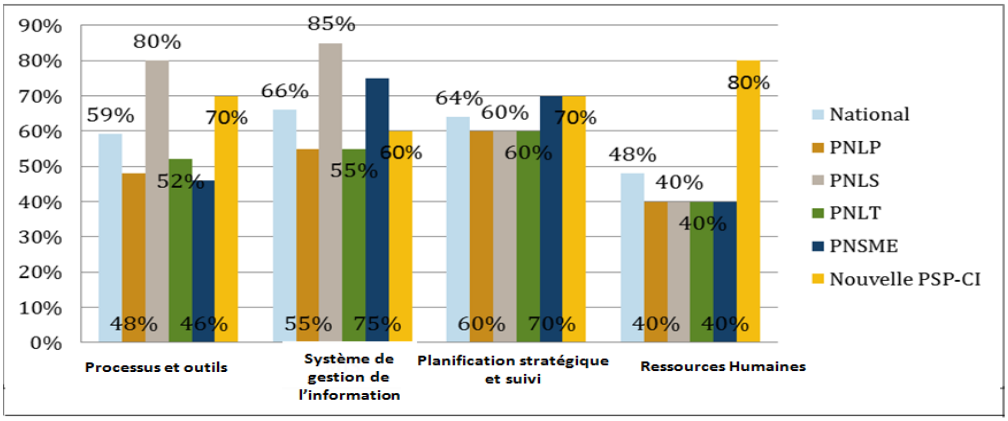


Figure 17. Forecasting and supply planning maturity, by functional area

Results by functional area vary by actor. The PNLS, followed by the NPSP, achieved the best results for the fuctional areas "processes and tools" and "management information system," while the NPSP outperformed the rest in "human resources." Maturity for "strategic planning and monitoring" is between 60% and 70% for all stakeholders. Major challenges identified are presented in table 8.

Table 8. Key observations for forecasting and supply planning, by functional area

Functional areas	Challenges
Processes and tools	Regarding the estimation of needs, all stakeholders use one or two different methods, excluding the consumption-based method. The quality of consumption data is low; in fact, all stakeholders indicated that they experience difficulty with their LMIS, which suffers from data reporting weaknesses in terms of completeness, reliability, and timeliness. These weaknesses have an impact on the forecasting process. On the other hand, the PNSME does not have an LMIS in place as yet for the management of its products.
Management Information System	All the actors, except PNLS and PNSME, lack special forecasting and supply planning software programs. These two organizations use Quantimed® and FORLAB® as well as PIPELINE® for forecasting and supply planning, respectively. All the other stakeholders, including the NPSP, use Excel.

Functional areas	Challenges
Human Resources	The human resources functional area achieved the lowest score. At the time of this evaluation, only the NPSP had detailed job descriptions available. Priority disease programs have yet to develop their own job descriptions detailing the responsibilities and key competencies of personnel.

More information on capabilities is given in tables 9 and 10 for the functional areas "processes and tools" and the "management information system."

Table 9. Processes and tools, by capability

Capability	Observations	National average score
Forecasting methods and assumptions	The PNLS is the only actor that uses two different forecasting methods. The program achieved a high score for laboratory products, for which it uses morbidity and service data and compares the results. Only the morbidity method is used for ARVs. Other priority disease programs mainly use the morbidity method. The NPSP uses only one method, which is mainly based on historical sales over a period of three to five years. In case of a new product or the absence of historical data, morbidity data provided by the directorate in charge of health information (DPPEIS) are used.	64%
Forecasting data quality	The quality of data used for forecasting by all PNS is acceptable. The PNLS has the best quality control procedures in terms of data validation and adjustment processes. However, as mentioned previously, one of the main challenges remains with logistics management information systems (LMIS).	64%
Development and monitoring of supply plans	The PNLP, PNSME, and PNLT develop a supply plan at the begining of each year, in collaboration with their funders. However, the updating process is informal, and monitoring is done mainly by the respective funders. PNLS uses PIPELINE® to monitor its supply plan and updates it quarterly. The NPSP uses an Excel worksheet to "monitor its shipments" and updates its supply plan quarterly.	60%
Long-term financial planning	Priority programs have funding from their financial partners lasting several years to ensure continued availability of products.	56%

Table 10. Management information system highlights, by capability

Capability	Observations	National average score
Tools and forecasting software applications	Only the PNLS and PNSME use a software program other than Excel to perform forecasting activities. The PNLS uses Quantimed® for ARVs and FORLAB® for laboratory products (since 2014). The PNSME has used PIPELINE® since 2014.	68%
Tools and software applications for supply planning	The PNLS and PNSME use PIPELINE® for their respective products, except for laboratory commodities, for which the PNLS uses an Excel worksheet. Other stakeholders also make use of Excel.	68%
Monitoring and evaluation (M&E)	An M&E system is formally in place for the NPSP and PNLS, but remains informal for the other PNS.	52%

Performance

In this evaluation, forecasting and supply planning performance was evaluated in terms of the indicator, "forecast accuracy," as well as indicators related to the LMIS.

Rate of forecast accuracy

Although all stakeholders were asked about forecast data, only the PNLS and PNLT were able to provide them. For these two priority disease programs, forecast accuracy for selected tracer commodities was measured by comparing the 2014 forecast to the issues by the NPSP for the same year.

Observations: It is recommended that the rate of forecast accuracy be calculated based on real consumption. Since reliable consumption data were lacking due to challenges with the LMIS, NPSP sales/issues data were used instead.

Forecast accuracy of PNLT tracer products: 77%

The two selected combinations of antituberculosis tracer products for this assessment were Rifampicin-Isoniazid-Pyrazinamide-Ethambutol 150 mg/75 mg/400 m /275 mg, tablet (RHZE 150) and Rifampicin-Isoniazid 150 mg/75 mg, tablet (RH 150). Forecast accuracy for the two medicine combinations is 73% and 80%*, respectively (table 11). These positive results may contrtibute to the good availability of antituberculosis tracer products.

Table 11. Forecast accuracy for PNLT tracer products

Products	Forecasted consumption	Quantities distributed by NPSP	Gap	Forecast accuracy
Rifampicin-Isoniazid-Pyrazinamide Ethambutol 150 mg/75 mg/400 mg/275 mg, tablets	4,931,220	6,741,420	1,810,200	73%
Rifampicin-Isoniazid 150 mg/75 mg, tablets	8,917,440	7,462,140	1,455,300	80%*

*Note: The stated value in the original French version of this assessment was 84%. The currently stated value of 80% has been updated to conform to SCMS data standards.

Forecast accuracy for PNLS tracer products: 75% and 92% for laboratory products and ARVs, respectively

For the PNLS, forecast accuracy for tracer products is good (75% for laboratory products and 92% for ARVs) (table 12). Two laboratory products out of five and all the ARV tracer products assessed have an accuracy rate of greater than 80%.

Table 12. Forecast accuracy for PNLS tracer products (weighted percentage)

Products	Fore-casted consump-tion	Quantities distributed by NPSP	Gap	Forecast accuracy	Avg by Type of Product
Laboratory products					
BD FACSCalibur - BD TriTest CD3/CD4/CD45 Kit of 50 tests with trucount	1692	1286	406	68%	75%
BD FACSCount Reagent %CD4 - 50 tests	4928	3184	1744	45%	
Guava Auto CD4/CD4% Reagent Kit, 100 tests	858	870	12	99%	
PIMA CD4 cartrige Kit, 100 tests/Kit	486	523	37	93%	
Determine VIH kit/100 with chase buffer	21371	31015	9644	69%*	
ARV products					
ZIDOVUDINE/LAMIVUDINE/NEVIRAPINE 150 mg/300mg/200 mg	45,782,246	41,751,201	4,031,045	90%	92%
ZIDOVUDINE/LAMIVUDINE/NEVIRAPINE 30 mg/60 mg/50 mg	3,076,575	3,504,334	427,759	88%	
NEVIRAPINE 10 mg/ml	11,551	12,354	803	94%	
TRIMETHOPRIME/SULAFAMETHOXAZOLE 800/160 mg	40,912,652	42,788,990	1,876,338	96%	

*Note: The stated value in the original French version of this assessment was 31%. The currently stated value of 69% has been updated to conform to SCMS data standards.

LMIS performance

In Ivory Coast, and as part of the LMIS, health facilities submit requisition vouchers or "report and requisition" to the central procurement agency when ordering products.

LMIS performance related to revolving drug fund essential medicines and those targeted for free distribution to NPSP clients

In terms of the LMIS, three key indicators were assessed:

- Percentage of facilities that submitted a monthly report during all the months of the study period (July through December 2014).

- Percentage of facilities that submitted a report containing the three essential logistics data (consumption, usable stock on hand, losses and adjustments).

    - Percentage of facilities that submitted a report with complete consumption data.
    - Percentage of facilities that submitted a report with complete losses and adjustments data.

- Percentage of facilities that sumbitted a report with complete usable stock on hand data.
- Rate of reports submitted on time (timeliness) during the study period (July through December 2014).

Percentage of facilities that submitted a report during all the months of the study period (July through December 2014): 81%

On average, 80% of hospitals and 81% of district pharmacies sent a report during all the months of the evaluation period. Lack of reporting by 20% of the hospitals and pharmacies constitute a loss of visibility into consumption and stock on hand data for the NPSP.

Percentage of facilities that submitted a report containing the three essential logistics data (consumption, usable stock on hand, losses and adjustments): 83%

In addition to transmitting an LMIS report monthly, it is also important for hospitals and district pharmacies to provide the essential logistics data. Figure 18 shows the percentage of LMIS reports that were complete among those submitted by the district pharmacies and hospitals.

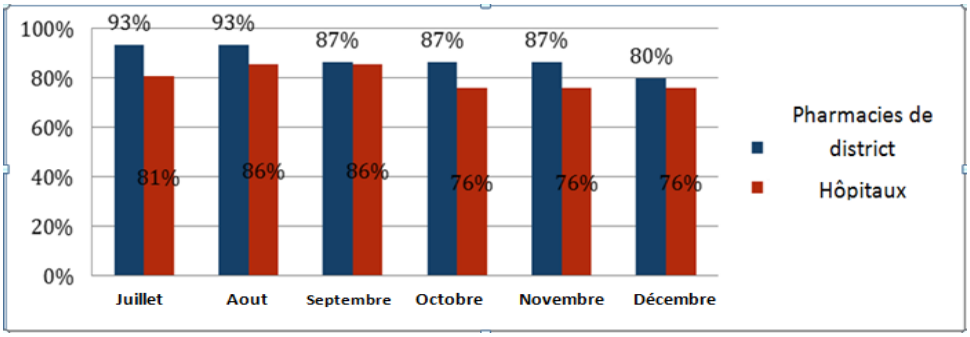


Figure 18. Percentage of facilities that submitted a monthly report containing the three essential logistics data, from July through December 2014

The percentage of district pharmacies that submitted reports with all three essential logistics data over the six-month study period (from July to December 2014) was 88% compared to 80% for hospitals, with an overall slight decrease throughout the study period. When hospitals and pharmacies fail to send essential logistics data, the decision-making process is impacted. Figure 19 disaggregates the results by essential logistics data for each month of the study period.

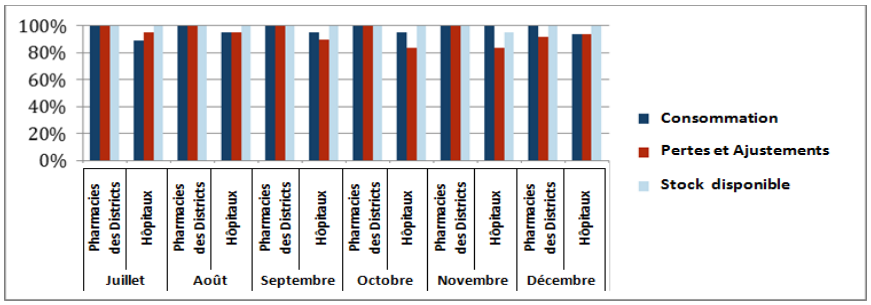


Figure 19. Rate of reporting completeness of each essential logistics data – for districts and hospitals revolving drug fund and free medicines

District pharmacies have a higher percentage of completeness for essential logistics data compared to hospitals, namely 100% for all months except December, for which the "losses and adjustments" completeness rate was 92%. As for hospitals, the completeness of essential logistics data varied between 84% and 100%. The average rates for "losses and adjustments" and "stock on hand" were 90% and 99%, respectively. Consumption data, which are important data for forecasting activities, had a completeness rate of 95%.

Overall, the results for both district pharmacies and hospitals are good.

Rate of reporting timeliness from July to December 2014: 97%

The timeliness rates of LMIS reports for the revolving drug fund as well as for essential medicines targeted for free distribution were 97% and 98% for district pharmacies and hospitals, respectively. Figure 20 shows the monthly disaggregared results for the two types of facilities, between July and December 2014.

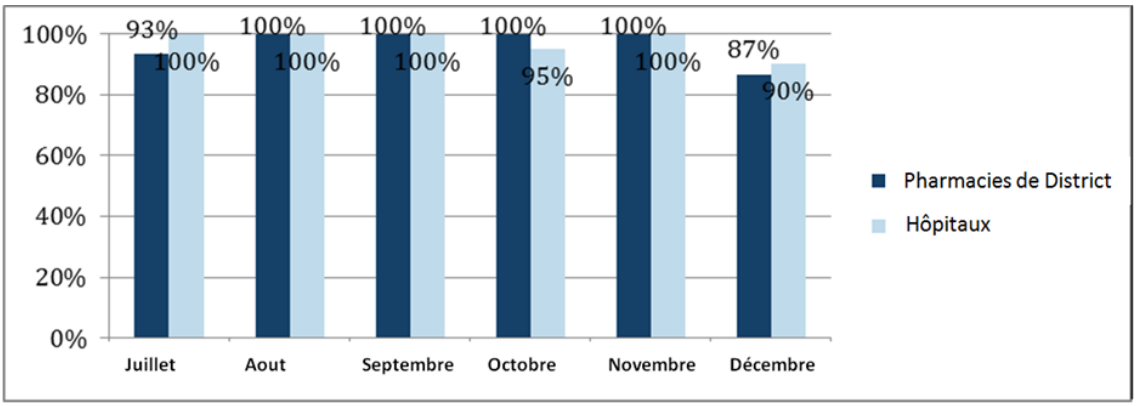


Figure 20. Rate of reporting timeliness for revolving drug fund and essential medicines targeted for free distribution, from July to December 2014

Good rates are observed during all the months except December, where there was a slight decrease for both types of facilities.
LMIS performance between the NPSP and its clients showed good results, which are summarized in table 13. Nevertheless, for optimal LMIS functioning, information should also be collected at the peripheral levels of the supply chain.

Table 13. LMIS performance among district pharmacies, hospitals, and NPSP, from July to December 2014

Key performance indicator	Hospitals	District pharmacies
Percentage of facilities that submitted a report during all the months of the study period	81%	80%
Percentage of facilities that submitted a report containing the three essential logistics data (consumption, usable stock on hand, losses and adjustments)	80%	88%
Average rate of reporting timeliness	95%	100%
Average rate of reportng completeness for losses and adjustments data	90%	99%
Average rate of reportng completeness for usable stock on hand data	99%	100%
Rate of timeliness	98%	97%

LMIS performance for costs recovery and targeted free essential medicines, from July to December 2014

Peripheral level health facilities do not have standardized LMIS forms for either sold or targeted free essential medicines. The forms used primarily contain ordered quantities, and occasionally, stock on hand.

Moreover, at the peripheral health center level, the evaluation revealed a low availability of stock cards, and if present, they were not always updated. Consequently, even if standardized LMIS forms exist, it would be difficult to transmit reliable LMIS data as long as the traceability of stock movements remains weak.

Despite the good LMIS performance noted between the intermediate supply chain level and the NPSP, the same cannot be said between peripheral level health facilities and health districts, where performance is very low.

These results do not speak to the quality of the transmitted LMIS data.

LMIS performance related to priority health program medicines for district pharmacies, hospitals, and Abidjan health facilities at the NPSP

For practical reasons, data collection teams did not collect data from facilities on priority health programs during site visits. However, LMIS data are available at the NPSP for all types of products. Therefore, to assess LMIS performance for these differents health products, LMIS data on ARVs and antimalaria medicines were extracted from the NPSP software, BIOS, (integrated database of LMIS tools), whereas data on antituberculosis medicines came from an internal NPSP monitoring Excel worksheet.

These data helped with the calculation of KPIs:

- Percentage of facilities that submitted a report during all the months of the study period (July to December 2014)
- Rate of timeliness over the study period (July to December 2014)

Indicators were calculated for each of the health programs with an established LMIS, including the PNLS with a specific LMIS for ARVs and rapid tests and consumables (RTC), the PNLP, and the PNLT. Results are presented in figure 21. While ARV, RTC, and

antimalaria reports are transmitted on a monthly basis, those for antituberculosis are transmitted quarterly.

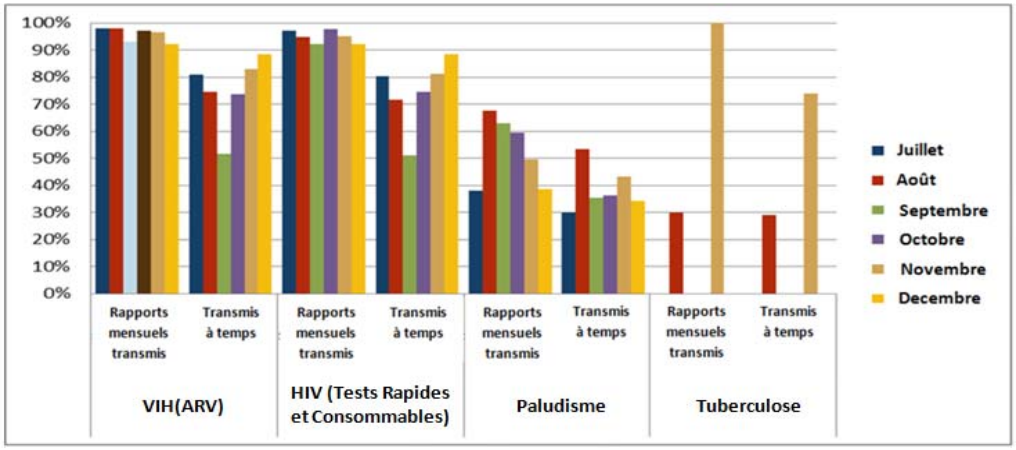


Figure 21. Percentage of facilities that submitted a report on time during all the months of the study period

Results vary significantly, by product types:

- While the overall percentage of HIV reports (ARV and RTC) is 96% and 95%, respectively, from July to December 2014, the rate of on time reporting is less satisfactory and varies significantly month to month. Rates of reporting timeliness tend to be similar for ARVs and RTCs, with the lowest rate (50%) occuring in September. The overall good results in terms of HIV LMIS reporting/on time reporting may be attributed to the strenghening of the supply chain for medicines at the decentralized level (Renforcement de la Chaine d'Approvisionement en Médicaments au niveau Décentralisé) (RCAM-D), through which regional pharmacists, with support from SCMS, encourge all clients to complete, on the a daily basis, LMIS forms related to HIV commodities. A feedback system is also in place, through which LMIS performance for each facility is evaluated and results are transmitted to pharmacy managers. There is no such process for the other programs, which explains their poor performance (figure 21).

- Reporting and on time reporting rates vary considerably from one month to another for antimalaria medicines, with overall rates averaging 53% and 39%, respectively, over the six months. These rates are very low compared to those for HIV/ARV products.
- As for antituberculosis medicines, reporting rates were 30% in August, reaching 100% in November. Similarily, on time reporting rates went from 29% in August, to 74% in November.

Performance related to LMIS reporting and on time reporting for program medicines differs from program to program, with the best scores being achieved for HIV reports. From their site visits, all data collectors indicated during the debrief the high workload for health

personnel, given the multiple LMIS forms to fill out, with different instructions, in addition to taking care of the routine management activities.

Recommendations for the forecasting and supply planning functional area

- Continue with the process of improving data (essential medicines).
- Formalize collaboration among all stakeholders through:
  - the establishment of CNCAM-CI
  - a clear definition of roles for each actor within this committee
  - the coordination and monitoring of the differents supply plans
- Perform regular supervision and follow up on recommendations.
- Revise the current LMIS every year, with the objective of establishing a national integrated LMIS.
- Identify an organization that will be in charge of this electronic LMIS.
- Establish sustainable means for financing management tools.

4.4 Procurement process

Context

The essential medicines and consumables procurement process is managed vertically. Programs, funders, and the central procurement agency individually procure their products. For cost recovery and targeted free medicines, the evaluation focused on the performance and maturity of NPSP procurement.

Having changed from being a state entity with limited financial resources and autonomy to a semi-independent non-profit organization, the NPSP is not subject to public market rules. However, it has adopted procedures from the latter in the procurement process area.

Moreover, it is interesting to note that at the time the former PSP served as the commercial and industrial public agency (établissement public industriel et commercial) (EPIC), financial difficulties had a negative impact on its ability to purchase commodities. No international invitation to bid was launched in 2013 during the institutional reform, and debts to suppliers negatively impacted order fulfillment and on time delivery.

Maturity

The NPSP procurement process achieved an overall 74% maturity rating, meaning the processes are well defined and documented, and some technologies are in place to support operations. Figure 22 shows maturity for the procurement process by functional area.

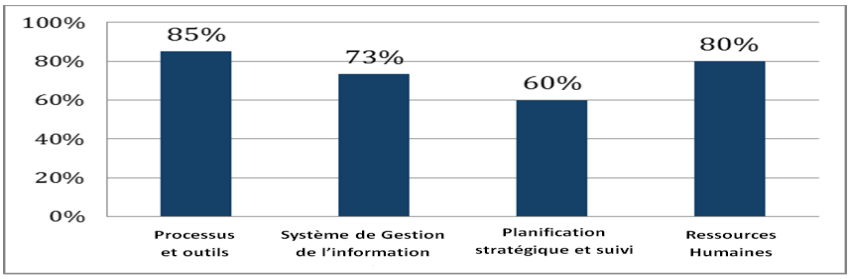


Figure 22. Procurement process maturity by functional area

The functional areas, "Processes and tools" and "Strategic planning and monitoring," achieved 85% and 60%, respectively. Selected capabilities for these two areas are presented in tables 14 and 15.

Table 14. Key maturity elements for the functional area "Processes and tools"

Capability	Observations
Vendor prequalification	With the creation of the NPSP, a new pre-selection of suppliers was realized during the 2014 international invitation for bidding (tender No. 01/2014). This pre-selection followed good practices, such as the use of quality and pertinent international criteria for offer approval/rejection, pre-qualification certificate issued by WHO for each manufacturing site, or Good Manufacturing Practices (GMF) for each drug production site. These pre-selection criteria included supplier performance, in-country registration, financial capabilities, and product quality.
Evaluation of offers	At the time of this evaluation, tender No. 01/2014 followed good practices, with the review of several proposals, prices, supplier financial and technical capabilities, and previous performance, if necessary. There were specific committees for prequalification, selection, and contract awards. Moreover, the opening of bids was witnessed by the bailiff.
Management of purchase orders and deliveries	There is regular communication with the supplier throughout the ordering and delivery processes. The procurement service has visibility into the quantities on order, and the purchasing unit monitors suppliers' performance. However, the NPSP does not carry out inspections before issuing, and the systematic review of export documents is progressively being implemented, particularly by the quality assurance department.
SOPs	SOPs are in place, but there is no compliance documentation in the employees' files. SOPs were reviewed at the time of the evaluation.
SOP update	SOPs related to procurement have the notations "REVISION DATE" and "VERSION" number, but no mention of "ORIGINAL" or "COPY."

Table 15. Key maturity elements for the functional area "Strategic planning and monitoring"

Capabilities	Observations
Supplier performance management	Supplier performance is regularly measured, through Excel, and takes into account on time delivery, cost changes, and product quality. This performance informs future purchase decisions. However, the results are not shared with suppliers.
Internal audit policy	Internal audit policies are strictly enforced. Purchase order approval is done separately from payment approval. However, mapping of the risks related to suppliers was still a work in progress at the time of the evaluation.
Ethics and the fight against corruption	Certain anticorruption measures were put in place, including the presence of a bailiff at the opening of bids for tender No. 01/2014. Nevertheless, the NPSP has not yet formally established a specific ethics or anticorruption program, which would guarantee a transparent procurement process and ensure stakeholders' legal protection by clarifying responsibilities.
Transportation of goods after arrival	All deliveries are done according to the "Delivered at place" (DAP) principle, meaning that suppliers are responsible for delivering products to the NPSP warehouses.

Performance

Using the supply chain analysis tool, procurement performance was measured by two KPIs: the order fill rate and the percentage of on time deliveries. Given changes in planning and terms of payment methods, available procurement data could not be used to calculate these KPIs. For example, it was not possible to define the delivery reference dates. As for purchasing options, there were four big purchases in 2014, which are described in table 16.

Table 16. Different types of purchases done by the NPSP in 2014

Purchasing Type	Characteristics
Emergency purchase	Conducted at the beginning of 2014, this purchase was meant to fill the gap created by the former PSP's inability to acquire new products due to its numerous debts with its suppliers. This purchase was in the form of a limited competitive bid, with prequalified former PSP's suppliers.
Specific purchases	The specific purchases were related to Ebola prevention, whereby short lead times imposed by the emergency required that the NPSP use the already-selected suppliers for the emergency purchase.
Supplementary purchases	These purchases were done for different reasons, including: • Late or incomplete deliveries of emergency purchases (with staggered deliveries, from January to June 2014). • Late implementation of supply plan from international bids. • Expressed needs, after completion of the different planned purchases. Most of these products were also procured as part of the emergency purchase and/or international competitive bidding and/or specific purchases. Given the reasons mentioned above, supplementary purchases are considered as "unplanned." They were carried out based on concurrence from at least three suppliers.
International competitive bidding	The international competitive bid took place during the second semester of 2014, with prequalified suppliers.

Figure 23 shows the percentage quantities of products procured, by purchasing mechanism.

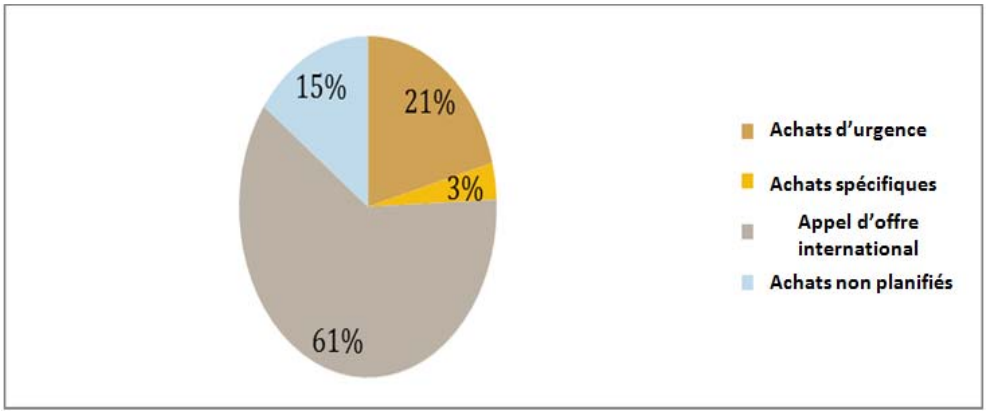


Figure 23. Quantities of products procured in 2014, by purchasing mechanism

With the creation of the NPSP, the agency emerged from a period of heavy debts incurred by the former PSP, yet restoring suppliers' confidence was a real challenge. The NPSP suppliers' performance related to emergency purchases illustrates the negative impact resulting from the previous debts: there were 52% partial deliveries and 83% late deliveries, of which 75% were more than 30 days late.

At the beginning of 2014, the suppliers' poor performance had a negative impact on product availability, at both the NPSP and its clients' levels. The late and partial deliveries explain the supplementary purchases, which are, in reality, unplanned purchases.
Figure 24 shows the unplanned purchases, according to whether they were "supplementary" or acquired through other purchasing options.

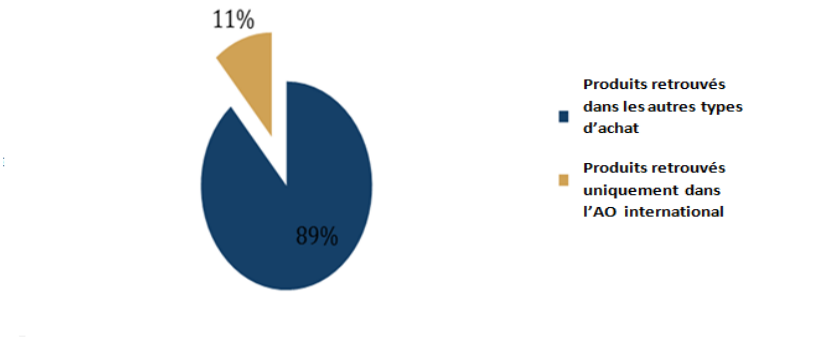


Figure 24. Analysis of unplanned purchases, 2014

This analysis demonstrates that 89% of the NPSP's unplanned purchases may be attributed to partial or late deliveries and/or late implementation of supply plans from internationl bids, given that these purchases were also performed through another purchasing option. The 11% may reflect purchases of new products.

The international competitive bidding performance for 2014

A total of 49 suppliers were selected by the NPSP through tender No. 01/2014. These suppliers come from 13 different countries, and included local, regional, and international companies. The majority of purchases were through suppliers from Ivory Coast (38.4%), France (25.1%), Senegal (10.1%), and India (7.4%) (table 17 and figure 25).

Table 17. Monetary value of purchases, by supplier's country of origin

Supplier's country of origin	Purchase value (F CFA)
Ivory Coast	4,099,545,143
France	2,684,521,197
Senegal	1,078,164,475
India	791,265,585
China	566,365,160
Morocco	471,730,751
Tunisia	350,655,367
Cambodia	196,790,476
Togo	168,757,180
Switzerland	145,603,107
Germany	98,393,343
USA	25,608,177
Indonesia	7,987,998

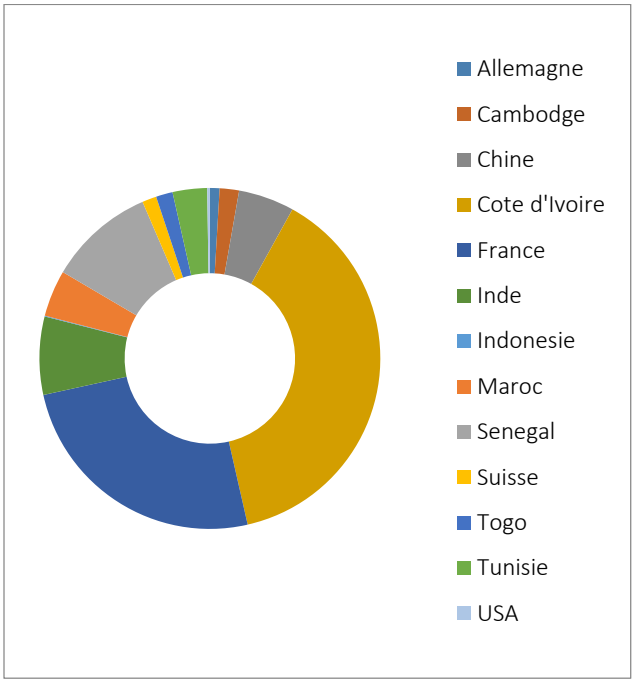


Figure 25. Percentage of monetary value of purchases, by supplier's country of origin

Figure 26 shows the percentage of purchase orders in monetary value, by supplier's region of origin.

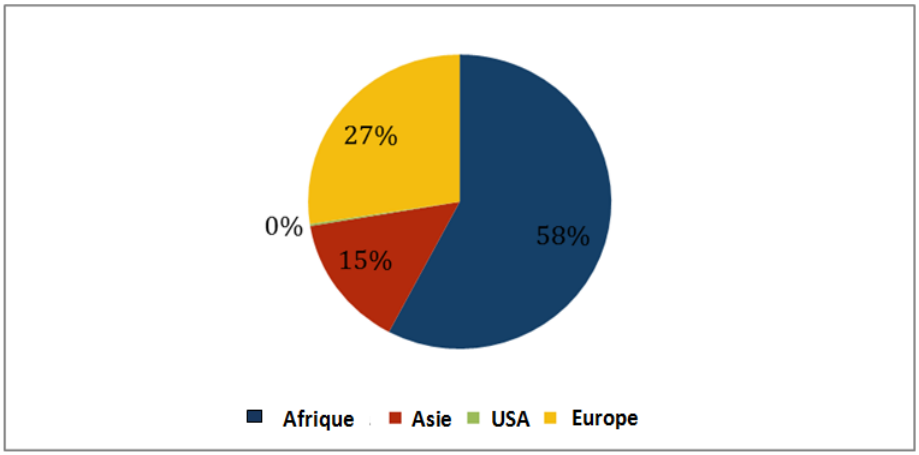


Figure 26. Percentage of NPSP purchase orders in monetary value

Most suppliers (58%) were located on the African continent.

Compliance with bidding requirements

The international bid offer was adjusted in terms of deliveries. The delivery schedule for this tender offer (appel d'offre) (AO) was finalized in August 2014, and adjusted in September to include staggered deliveries for the months of November 2014, January 2015, and March 2015. In December 2014, a third schedule was developed, incorporating the other non-AO current purchases.

The NPSP gave two main reasons for the schedule changes, as described in table 18.

Table 18. Reasons for the 2014 AO delivery schedule changes

Storage capacity constraints	Financial constraints
Physical inventories conducted at its warehouses during the month of December disrupted the receipt of new products. The setting up of the new version of SAGE (a central and agency warehouse management system) at the begining of 2015 also slowed down the NPSP's ability to receive new deliveries.	The need to maintain the best performance in terms of payments to suppliers, through staggered deliveries, in order to restore their confidence.

In addition to weaknesses noted in supply coordination, the NPSP has to store large quantities of the priority disease programs' products, which considerably reduces its storage capacity.

Due to frequent changes, and particularly due to the fact that the latest delivery schedule integrated quantities from several different sources, at the time of the evaluation, it was not possible to effectively measure supplier performance in terms of the KPIs mentioned previously.

However, the changes had an impact on suppliers' deliveries, which are discussed below.

Average international supplier's lead time: 126 days

The NPSP international suppliers' lead time was 126 days, ranging from 16 to 209 days. The lead time disaggregation demonstrated the following values:

- An average of 117 days between product order and arrival at customs (approximately four months).
- An average of nine days spent at customs for each product.

Originally, when staggered deliveries were planned for November 2014 , and January and March 2015, the NPSP requested a supplier's lead time of 90 days for products to be delivered to its facilities. With all the suppliers' delivery schedule changes mentioned above, the average supplier lead time significantly increased (to 126 days) from what was initially requested.

Observations: As part of a long term supply planning strategy, the NPSP should establish a "vendor managed inventory," (VMI) (stock management by the supplier), a system in which suppliers determine when and what quantities to resupply based on data provided by clients. In this case, the NPSP would no longer be in charge of the delivery schedule, including dates and quantities to be delivered.

Recommendations related to the "Procurement" function

- Strengthen supply plan coordination among the different product sources (NPSP, programs, and donors).
- Improve the management processes for purchase orders and deliveries.
- Strenghten supplier performance management, with strict performance review procedures as well as a transparent process under which results are communicated to suppliers.

4.5 Storage and Stock Management

Maturity

Maturity of the function "Storage and stock management" was 35%, which corresponds to a marginal stage.

Figure 27 shows the disaggregation of the overall maturity score of the "Storage and stock management " function, by health system level.

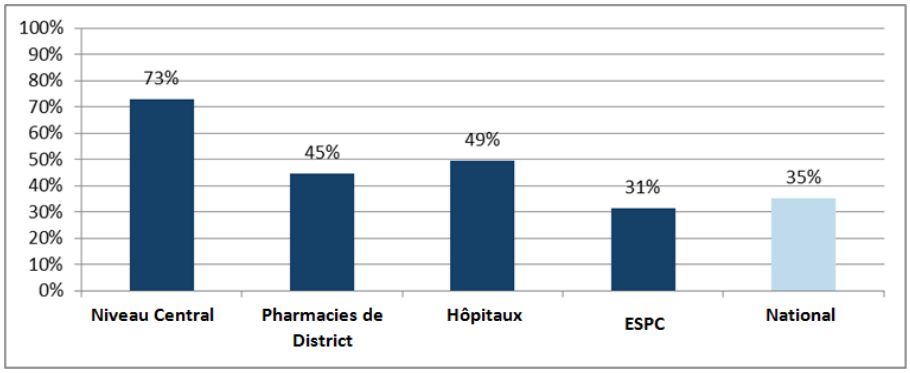


Figure 27. Maturity of the function "Storage and stock management," by system level

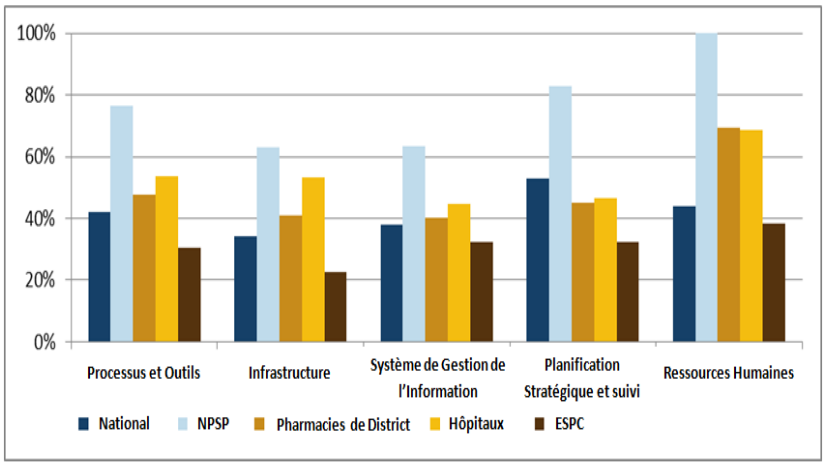


Figure 28. Maturity of "Storage and stock management," by functional area and health system level

Figure 28 provides detailed results as well as key elements for each functional area. As illustrated, there is a wide maturity gap between the central level and the lower levels. While the central level shows an "an advanced practices" stage for some functional areas, several intermediate- and peripheral-level facilities have only informal processes in place.

Observations: Storage operations at the central level are carried out by two entities: the central medical store and the main agency (located within the building). The central store is in charge of receiving and storing products, and the agency is responsible for processing orders, managing distribution, and billing. In reality, this means that commodities are transferred from the central warehouse, and pass through the main agency before being delivered to clients.

Table 19. Key elements of the overall maturity score, disaggregated by health system level

Functional area	Observations	Infrastructure type	Average score
Processes and tools	Even though there is an incentive to develop detailed SOPs related to storage and stock management at the central level, several processes are still being validated, and there is not yet a monitoring system to ensure that procedures are disseminated to and followed by personnel. Furthermore, 172 facilities at the intermediate and peripheral levels do not have procedures in place, including 10 of the 21 hospitals and 8 of 15 district pharmacies visited. More than half the facilities visited (57%) have a minimum arrangement of products, with some placed on the floor wherever there was open space available.	Central level	76%
		District pharmacies	48%
		Hospitals	54%
		ESPC	31%
Infrastructure	At the central level, performance is high for security, infrastructure, and cold chain, but low (scores 1 to 2) for storage capacity and temperature control. At intermediate and peripheral levels, 68% of facilities (including three district pharmacies and two hospitals) do not have a temperature control system. In addition, 37% (including one district pharmacy and three hospitals) did not have basic security (for example, door locks). Most sites (9 district pharmacies, 14 hospitals, and 100 ESPC) have locks on the pharmacy doors and/or security agents who guard the facility. Forty-two percent of the facilities do not have any dedicated space for non-usable pharmaceutical products (produit pharmaceutique inutilisable) (PPI).	Central level	63%
		District pharmacies	40%
		Hospitals	45%
		ESPC	32%
Management information system	At the central level, the warehouse management system, called MACS ®, and the software program for enterprise planning (SAGE), monitor storage activities, from product receipt to shipment. Although data are collected and available, there is no unit within the NPSP to analyze them. At the intermediate level, data analysis reveals high variability in scores, notably: • Three district pharmacies with a score of 1, which corresponds to an absence of systematic data collection for performace monitoring. • The majority of district pharmacies (11) have a score between 2 and 3, which corresponds to irregular data collection for decision making. • And one district pharmacy achieved a score of 5, due to the fact that this facility collects data and performs a quarterly analysis.	Central level	63%
		District pharmacies	41%
		Hospitals	53%
		ESPC	23%
Strategic planning and monitoring	The NPSP has an operational plan called “Action and Communication Matrix for 2014.” It uses KPIs to monitor performance (stock availability rate, on time deliveries rate, rate of losses). Risks are also identified quarterly and categorized by order of importance, using a risk management matrix. Furthermore, as part of its certification process, the NPSP is assessed by a private entity,so in this case an external audit was performed. Results and recommendations have been used internally to inform decisions to improve	Central level	83%
		District pharmacies	45%
		Hospitals	47%
		ESPC	32%

Functional area	Observations	Infrastructure type	Average score
	operations. At lower levels, 81% of facilities indicated not ever having been subject to an external audit. Nonetheless, supervision by regional directorates or health districts (in the case of peripheral facilities) was done in 51% of the facilities. A large number of district pharmacies indicated that supervision is done either quarterly or every four months, but results cannot be generalized, and its use to improve operations or performance remains unclear.		
Human resources	This functional area helped assess whether the required competencies were clearly defined, and whether the corresponding job posts were held by qualified personnel. It did not take into account employees' performance. The NPSP indicated that competencies were clearly defined for all job posts. All posts were held by employees with the required technical skills. On the other hand, the majority of facilities at the intermediate and peripheral levels (68%) indicated that they had personnel constraints, and that knowledge/skills related to storage and stock management functions were not a requirement for anyone working in this area. In most cases, nurses and midwives carried out stock management duties, on top of their regular functions.	Central level	100%
		District pharmacies	69%
		Hospitals	69%
		ESPC	38%

Performance

NPSP central warehouse and main agency

Storage conditions

The NPSP manages 12 warehouses, of which 10 are its own facilities: eight belong to the central warehouse and two to the main agency. The NSCA data collection team identified 20 storage locations in the twelve warehouses. Strengths and weaknesses resulting from the analysis are presented in table 20.

Table 20. Number of NPSP warehouses that meet standard storage guidelines

Standard guidelines	Number of warehouses meeting the standard guidelines	Score
Cartons are intact from the outside.	12	100%
Cartons are kept away from direct sunlight.	12	100%
The storage facility is secure and only accessible to NPSP personnel.	12	100%
Expired and non-usable products are separated from the usable stock.	11	92%
Cartons are protected from wetness and humidity.	10	83%
The storage area is well maintained and shelves are clean.	10	83%
A fire extinguisher is available and easily accessible.	8	67%
The storage area is free of insects and rodents.	4	33%
Products are stored according to required temperature specifications.	1	8%
The storage space is large enough for the receipt of new stock.	1	8%

Stock management and stock accuracy

Observations: All central store products are managed using the MACS software program, regardless of their location.

Products at the main agency are managed using SAGE version 5. Twice a week, the agency places an order with the central store, based on data generated by the sofware application for products that have reached the minimum stock level.

When the agency reaches its minimum stock for any product, and after approval from the manager, an official order is placed for product transfer to a store, which can process the order within 12 working hours.

Central store personnel are in charge of recording the transfer in MACS as a billed product; then the product arrives at the agency, accompanied by an issue voucher, and is recorded in the SAGE system. Store employees have to compare quantities received with quantities ordered before entering the information into the system.

This practice may influence stock accuracy.

December inventory data were used to calculate stock accuracy, which measures the difference between physical stock and stock recorded in the automated warehouse management system. It is important to note that out of 36 tracer products evaluated, 31 were found in inventory records. Of these, only seven had a physical stock that matched the quantity recorded in the system.

The NPSP gave three reasons for these performance gaps:

- The establishment of a sales unit different from the software management unit, which created confusion in product counting.
- Delays in inventory, which led to deliveries with issue vouchers that were not yet processed at the time of the evaluation.
- Some of the products transferred from the central warehouse to the main agency were not recorded in SAGE.

All these human error-related reasons call for specific solutions, which are discussed in the Recommendations section.

Percentage of stored products between the min and the max levels

This indicator was created to measure the NPSP's ability to maintain the min and max stock levels established by the central store. The average stock on hand per month was calculated by dividing the average quantity of initial stock for each tracer product by the average monthly consumption during the study period. The average stock on hand was then compared to the NPSP's established min and max levels. This method is illustrated in table 21.

Table 21. Calculation of the percentage of well stocked tracer products

Tracer product	July		August		September		Avg initial stock	Avg monthly consumption	Avg months of stock	Min & Max (yes/no)
	Initial Stock	Consumption	Initial Stock	Consumption	Initial Stock	Concump-tion				
A	200	100	350	50	300	50	283	67	4.2	Yes
B	500	100	450	100	500	25	483	125	3.9	Yes
C	500	0	500	450	200	100	233	183	1.3	No

Example: Score = 2 (number of products well stocked) / 3 (total number of products) = 67%

The NPSP provided the data collection team with the min and max stock levels used, as shown in table 22:

Table 22. Maximum and minimum stock levels for all product types

	NPSP		DS/CHR/CHU/HG		CS	
	MIN	*MAX*	*MIN*	*MAX*	*MIN*	*MAX*
Medicaments essentiels recouvrables	3	6				
Gratuité ciblée	3	6				
ARV	5	8	2	4	1	2
Tuberculose	9	12	4.5	6	4.5	6
Paludisme	3	6				

During the study period, only one product was stocked between the correct levels (CD 4 PIMA test cartridges). Variations exist between stock levels for the different tracer products. For example, out of ten HIV and AIDS commodities, eight were below the minimum level, and one (the fixed combination dose, zidovudine/lamivudine/nevirapine/60 mg/50 mg/ 30 mg) was above the maximum level, with an average of 24 months of stock.

Of the three antimalaria products, two were below the minimum level (rapid diagnostic test kits and artenusate), whereas the third (pyrimethamine and sulfadoxine) was above the maximum level, with an average of 35 months of stock.

Stock-out rate: 21%

The NPSP did not provide specific data on stock-outs of tracer products but did give data on beginning stock, received stock, and consumed quantities from July to December 2014. The stock-out rate was calculated using an indirect method. For any tracer product, a stock-out was defined as having zero beginning and ending balances, without new stock during the period. In other words, only stock-outs during the particular month were recorded. Use of this

method was driven by the fact that available data did not allow for the determination of the exact stock-out date. Therefore, if new stock arrived on the first day of the month and the initial stock from the preceding month was zero, the stock-out would not be captured in this case.

This method helps avoid underestimation of a facility's performance. The approach is shown in table 23. The numerator is the number of "full months of stock-out" that occurred during the evaluation period (July to December 2014), and the denominator represents the total possible number of stock-outs. Only products with data available for July through December 2014 were taken into account. This indirect method does not consider stocks whose received quantities were not recorded in the system (for example, due to human error).

Table 23. Method for calculating stock-outs rate

Tracer product	July			August			September			Total number of stock-outs per month per tracer product
	Initial stock	Received stock	Consumption	Initial stock	Received stock	Consumption	Initial stock	Received stock	Consumption	
A	200	0	200	0	0	0	0	0	0	2
B	500	100	600	0	100	100	0	0	0	1
C	0	0	0	0	200	100	100	200	50	1

Example : Score=4 full months of stock-out/(3 products x 3 possible months of stock) = 4/9 = 44%

Using this method, there were 41 cases of stock-outs in a month, for all tracer products, out of 198 possible cases, thus a **full month stock-out rate of 21%**.

In reference to table 23, the main cause for this situation seems not to be the lack of products at the central level. We believe that improvements in management processes at the NPSP warehouses will have a positive impact on these results.

Observations: Based on data received from the NPSP, the four biggest full month stock-out events (5 months) occurred for the following products : CD4 BD FACS Calibur TRITEST kits, CD4 GUAVA kits, oxytocin inj, and nevirapine 10 mg /ml /25 ml (fl).

Order fill rate

Observations: Note that data on quantities ordered were collected only for revolving drug fund essential medicines and those targeted for free distribution, for which the NPSP is in charge. The results therefore closely represent the NPSP's performance.

The "order fill rate" indicator at the central level measures the NPSP's ability to fill orders received from the intermediate level. It is calculated by dividing the quantity of the product issued during the study period by the total quantity requested. The NPSP is in charge of

resupplying district pharmacies, hospitals, and peripheral health centers for the Abidjan district. Peripheral facilities outside Abidjan (also known as countryside) are resupplied by district pharmacies (order fill rate for district pharmacies is discussed separately below).

As shown in figure 29, with the exception of the six orders coming from the CSUS, the order fill rates varied from 24% to 68%, with a median of 38%. Based on stock availability at the intermediate and peripheral levels, these results could lead to stock-outs at the service delivery points (directly resupplied by the NPSP or indirectly supplied through district pharmacies). In fact, as is demonstrated below, the majority of stock-outs at lower levels involved cost recovery essential medicines and those targeted for free distribution. However, figure 30 shows that the average months of stock for these medicines at lower levels would be sufficient to prevent possible stock-outs, given the fact that the NPSP resupplies monthly. This tells us that the weak performance is probably due to failure in procedures rather than stock unavailability. Some recommendations have been suggested for the central level.

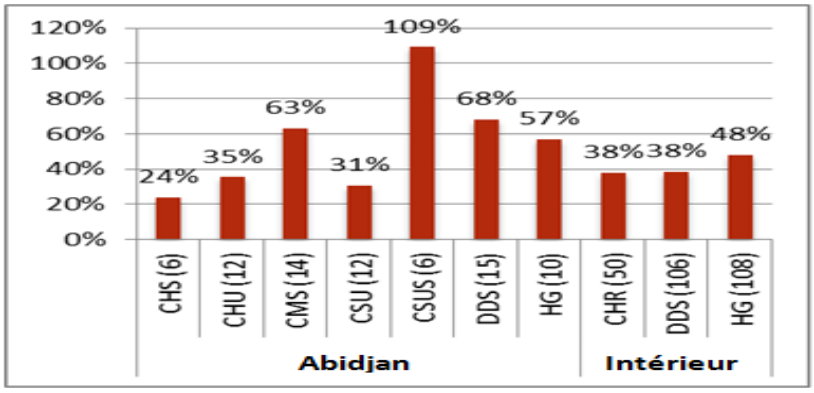


Figure 29. Order fill rate by type of facility, and average number of months of stock for medicines at the peripheral levels (N=Number of orders)

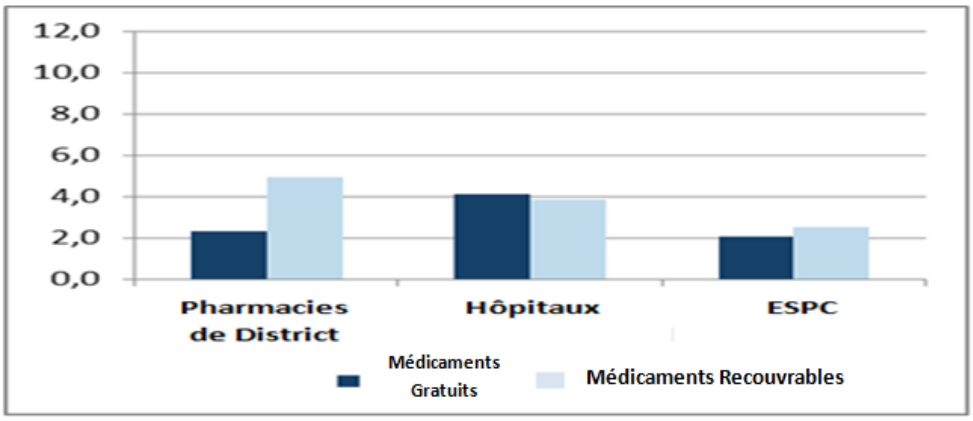


Figure 30. Average number of months of stock at the peripheral levels

Observations: An NPSP client typically places six orders at a time (one order per program, comprised of several products). NPSP personnel have three days to review all the customer's orders for a particular distribution zone and record them in the system for later product pick up. All customer orders are processed by one individual. This time constraint seems to negatively impact careful analysis and validation of historical data. It would therefore be best to create a special unit, which would be in charge of data analysis and validation.

Recommendations on storage and stock management at the central level

- Formulate and implement a performance contract (agreement) between the NPSP and health programs specifying the level of service and associated costs.
- Require that all district pharmacies (82) comply with product storage and management guidelines.
- Strengthen operational capacity of health district pharmacies with more resources to improve the performance of ESPC.

District Pharmacies, Hospitals, and Peripheral Health Centers

Storage conditions

Observations: The SOP manual for public health sector pharmacies contains a section on storage conditions and stock management procedures with which facilities at the intermediate and peripheral levels are supposed to comply. This manual was disseminated without proper personnel training on its use, which could have an impact on their understanding of its content and implementation of procedures.

Data collection teams verified whether storage conditions met the norms established for intermediate and peripheral level facilities.

Percentage of health facilities for which at least 80% of storage guidelines were met: 6%

Major challenges identified are described in table 24.

Table 24. Number of facilities that met storage guidelines (N = 218)

Capability	Observations	# of facilities meeting storage guidelines
Temperature and humidity monitoring	Only 30% of health facilities performed continuous temperature monitoring of their storerooms. Out-of-range temperatures and humidity levels may affect the efficacy of products.	22
Security	Storage best practices require the availability of basic security equipment, such as a fire extinguisher, protective gear, and security kits. However, 83% of facilities did not have any security equipment.	5
Meet storage guidelines (N = 215)	Excluding the two sample "Polyclinics," 41% of facilities did not comply with the manufacturer's and supplier's storage instructions for the arrangement of products.	119
Arrangement	Fifty percent (50%) of facilities arrange their products by frequency of use, weight, and volume. This include 36% of the ESPC.	109
Storage capacity (N=200)	Several facilities at the intermediate and peripheral levels, of which nine are district pharmacies, did not have enough space to receive new stock. In this case, stock was arranaged at a minimum, and products were placed on the floor.	35

These storage constraints meant that there was no receiving zone in almost half of the intermediate facilities (47% of district pharmacies and 45% of hospitals) as well as 78% of peripheral facilities. However, these conditions do not seem to impact the receipt of products. It was observed that 83% of facilities (180 out of 218) verified the ordered quantities and quantities were recorded on issue vouchers or packing lists before entering information on stock cards or in other records.

Stock management

Availability of stock cards: 56%

Observations: Instructions on the correct and appropriate use of stock cards are contained in the SOP manual for supply chain management of ARVs, OI medicines, and HIV laboratory commodities, which was developed in July 2012. This manual has been distributed to all health facilities involved in HIV and AIDS care and treatment, and personnel at all levels of the supply chain have been trained.

It was noted that facilities did not record or did not update key product information on stock cards. Only 56% of products managed by facilities had stock cards assigned to them. Figure 31 shows stock card availability by facility type.

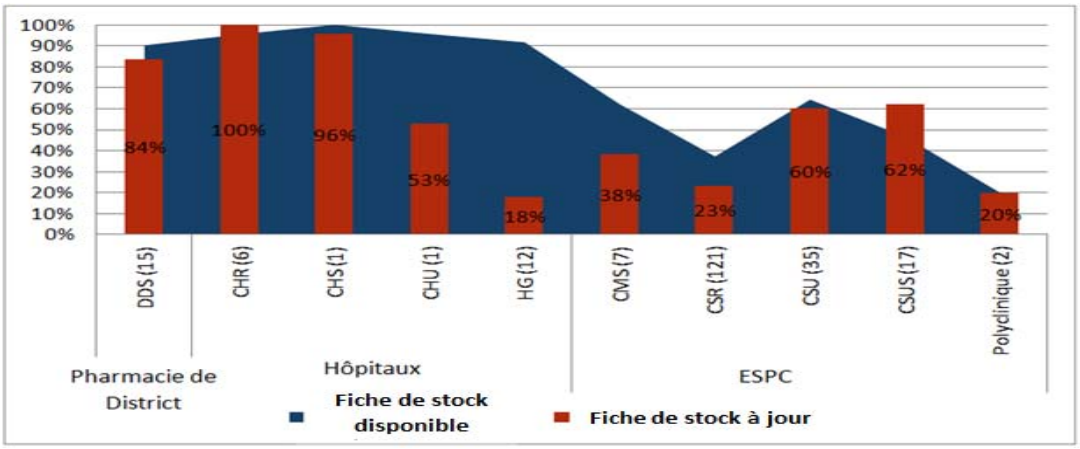


Figure 31. Percentage of stock cards available and updated

Performance varied according to facility type and level. District pharmacies and hospitals had the highest availability of stock cards (90%), whereas rural health centers had the lowest availability (37%). As for the percentage of updated stock cards, general hospitals achieved the lowest score (18%).

Stock accuracy: 67%

Observations: For facilities that perform monthly physical inventories, stock accuracy should be high because a verification process is theorically in place.

For all facilities with stock cards, actual stock was compared to recorded stock on stock cards. The accuracy achieved was 67%.

Figure 32 disaggregates the score by facility type and compares it to the percentage of facilities that perform monthly physical inventories.

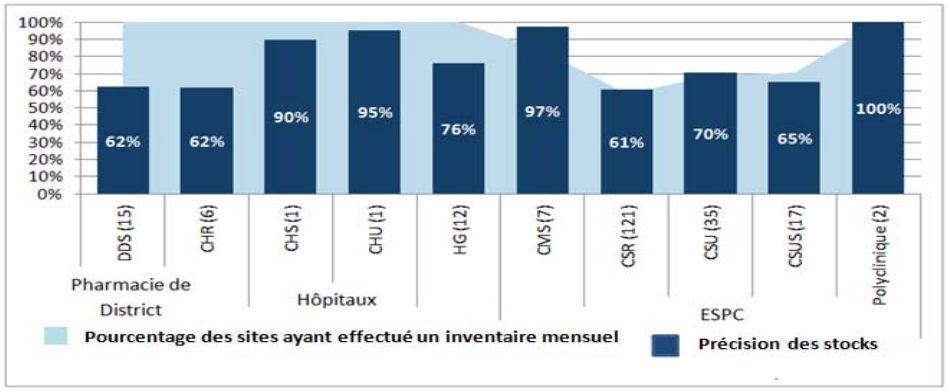


Figure 32. Stock accuracy by facility type and percentage of facilities performing a monthly physical inventory (N = Number of sampled facilities)

As demonstrated, all intermediate-level facilities perform a monthly physical inventory, but stock accuracy for district pharmacies is only a little over 60%. While the sample of facilities for the peripheral level was larger (CSR, CSU, CSUS), their performance was similar to that of district pharmacies, with an average of 66%. It is important to note that pharmacy managers are theoritically responsible for managing stock, however, in many cases there was no job description indicating this task. Interestingly, stock accuracy was higher for hospitals, even though only 43% had clear guidelines related to stock management by pharmacy managers. The two figures suggest that other personnel be involved with this task, particularly at peripheral health centers level.

Three main observations may be drawn from these findings:

- All district pharmacies (100%) perform monthly inventories, but they are not done according to best practices. In fact, seven of fifteen district pharmacies corrected the differences by matching actual stock to recorded stock. Only two of the fifteen district pharmacies used an Excel database to make the adjustments.

- A performance intervention at the peripheral level will have less of an impact due to human resource constraints, whereas, at the district pharmacy level where human resources are available, an immediate and targeted performance improvement action could have a positive downstream effect.

- Hospitals performed better than district pharmacies. There is an opportunity to apply hospital best practices at the district pharmacy level in order to achieve the desired impact.

Stock levels between pre-established min and max values: 30%

The case of HIV and AIDS commodities

The HIV and AIDS program in Ivory Coast was the first to formally set minimum and maximum stock levels, way before the cenral medical store reforms of 2013. The pre-established levels are presented in figure 33. After the NPSP became a semi-autonomous agency, and because of storage space constraints, the min and max values were modified for the central level (4-6 months).

Figure 33 shows the percentage of facilities that had HIV and AIDS products within the correct stock levels during the evaluation period.

Even though the overall performance was strong for hospitals, the addition of a two-week tolerance band to the minimum and maximum levels showed a large percentage of facilities whose stock levels were close to the required min and max, in general.

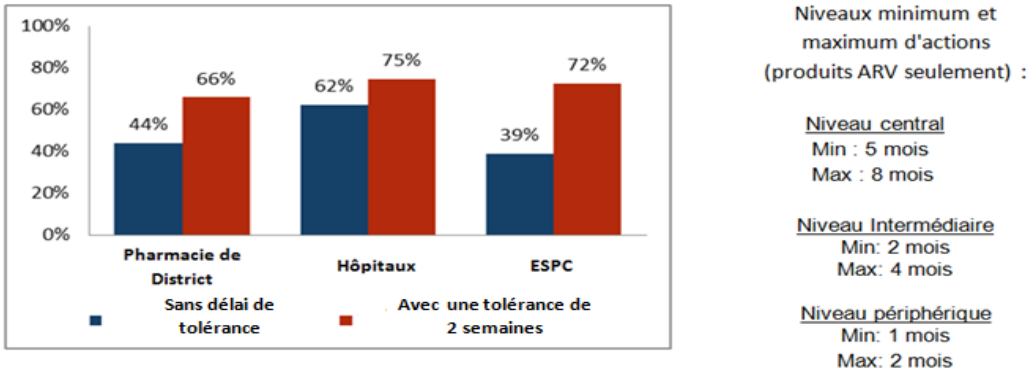


Figure 33. Percentage of facilities with HIV and AIDS products within the required min and max stock levels (July-December 2014)

Keeping in mind that the blue bars in figure33 represent both the adequately stocked and over-stocked products, it is important to analyze the months of stock on hand according to the types of facilities throughout the entire system. In figure 34, we can see that HIV and AIDS products were well stocked.

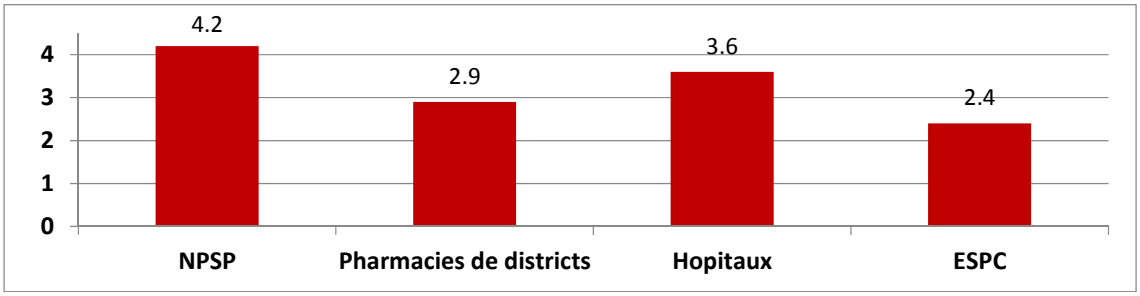


Figure 34. Months of usable stock on hand for HIV and AIDS products (July-December 2014)

The case of antituberculosis products

In 2014, the PNLT established the minimum and maximum stock levels for the intermediate peripheral sites, which are 4.5 and 6 months, respectively. Figure 35 shows the percentage of facilities with adequate stock levels during the evaluation period.

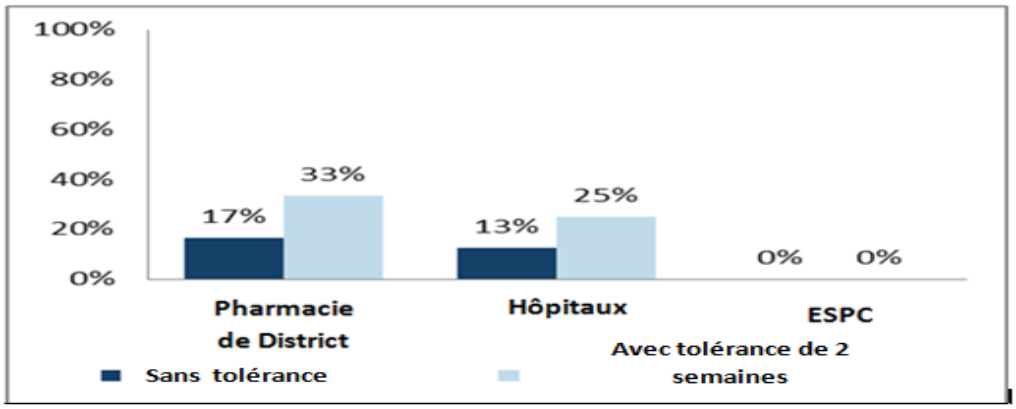


Figure 35. Percentage of facilities with adequate stock levels during the evaluation period

The results show a low percentage of district pharmacies and hospitals with products stocked within the required min and max levels. Despite this weak performance, antituberculosis medicines had a low stock-out rate during the study period.

Paradoxically, the number of months of stock on hand was also lower than the minimum, as indicated in figure 36.

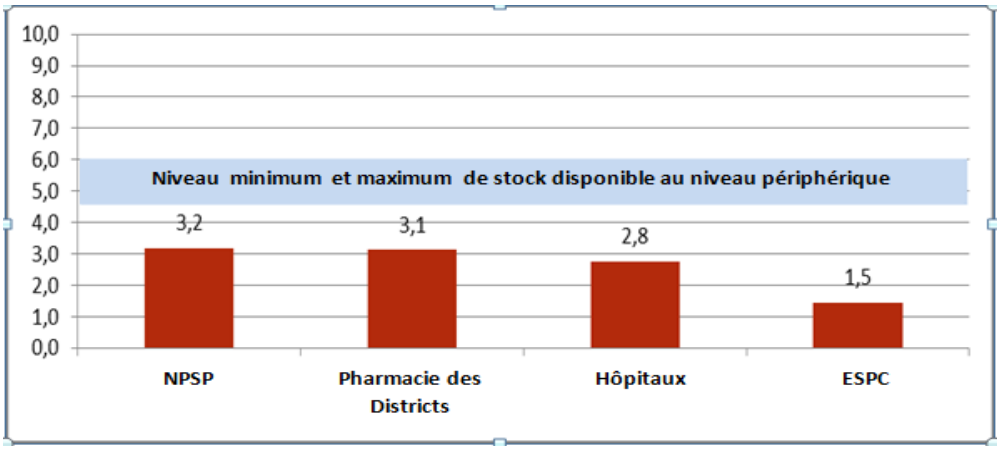


Figure 36. Months of stock on hand for antituberculosis products

This suggests that the minimum and maximum levels for antiturberculosis products were higher, particularly at the peripheral level, and should therefore be reviewed.

Order fill rate for revolving drug fund medicines and those targeted for free distribution: 71%

The indicator, “order fill rate,” aims to measure the capacity of facilities (in this case, district pharmacies) to fulfill orders from the peripheral level facilities that they resupply.

Observations: In the countryside (outside of Abidjan), essential medicines and consumables managed by the NPSP (revolving drug fund and those targeted for free distribution) are ordered or “requisitioned” from district pharmacies by the ESPC. Other products are allotted to the ESPC by district pharmacies. Only requisitioned products were evaluated (revolving drug fund medicines and those targeted for free distribution).

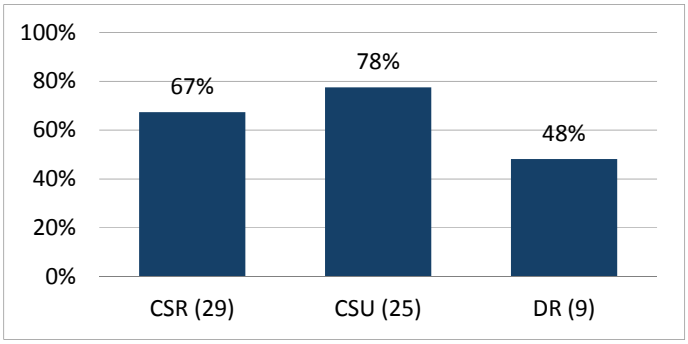


Figure 37. Order fill rate for revolving drug fund medicines and those targeted for free distribution, from district pharmacies to peripheral sites

Figure 37 shows the order fill rates from district pharmacies to peripheral sites. In 23% of the cases, stock managers indicated insufficient stock as a reason for partially filling orders from the lower level. In another 69% of cases, the reason remained unknown. Partially filled orders might be due to the fact that requested quantities were overestimated. In fact, ESPC are known to order more than necessary when they believe they will not receive the right quantities needed (lack of confidence in the supplier). There is no stock management system with established parameters for ordering products. Therefore, such a formal system should be put into place.

Documentation on order fulfillment is not standardized across districts, and only four of fifteen sampled district pharmacies assessed their own capacity to fill orders.

Stock-out rate: 27%

Observations: Theoritically, when orders from facilities are not entirely filled, the risk of disruption in the availability of stock is high. For this evaluation, stock-out rates at the intermediate and peripheral levels were calculated using a formula based on facility stock management units (unité de gestion de stock) (UGS). This method uses the total number of UGS as the denominator, meaning a combination of the total number of tracer products and the number of facilities over the study period *(namely, the number of sampled facilities x the number of products managed by each x the number of study months).* The numerator is the total number of stock-outs noted at these UGS.

In our case, there were 2,443 confirmed stock-out events out of 9,119 observations, or a stock-out rate of 27%.

Figure 38 disaggregates this overall rate by facility type, for all tracer products.

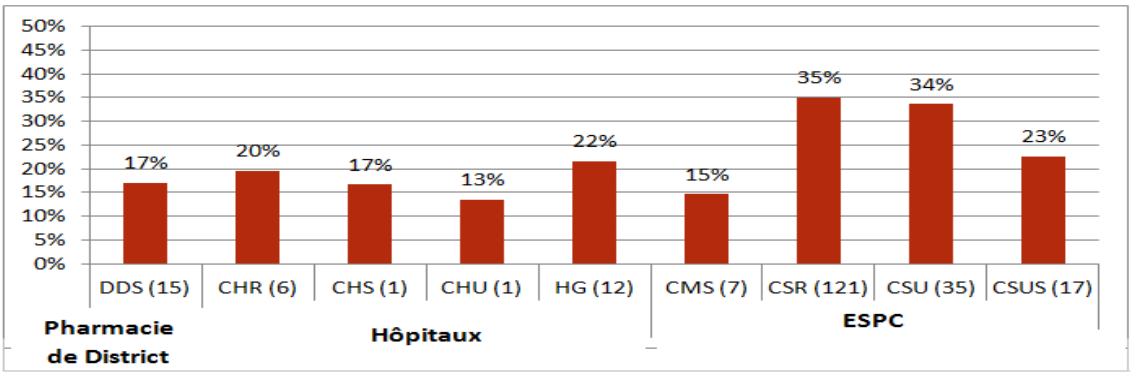


Figure 38. Stock-out rates by facility type, July-December 2014 (N = Number of sampled facilities)

ESPC have the highest stock-out rates.

Figure 39 shows the distribution of the total number of stock-outs, by facility type and tracer product category. Of the 17% stock-out rate noted in districts, more than half involved revolving drug fund medicines and those targeted for free distribution, followed by HIV and antimalaria products.

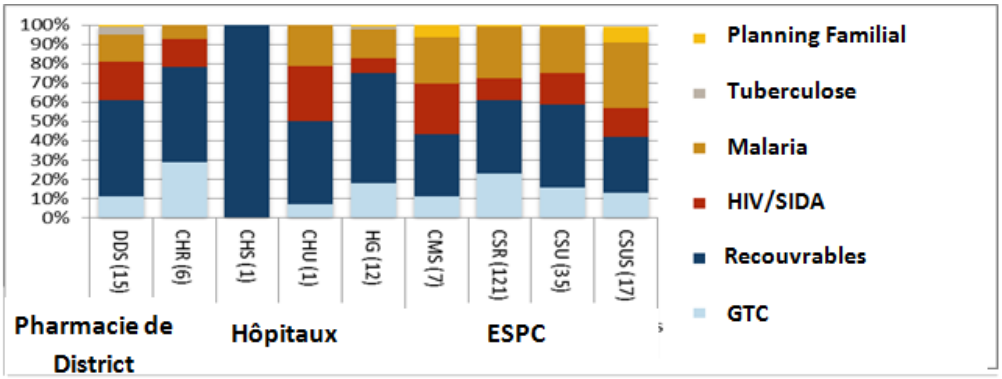


Figure 39. Proportion of product categories, by facility type

This figure demonstrates that the majority of stock-outs involve essential medicines and those targeted for free distribution. This is not surprising because the NPSP had unplanned purchases in 2014 and also postponed its international bidding invitation several times, as discussed previously in the procurement section.

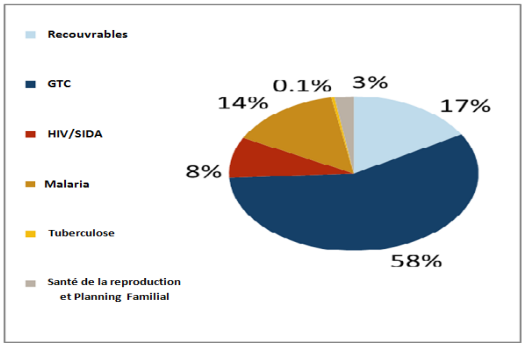


Figure 40. Overall percentage of stock-outs, by product type, July-December 2014 (N= number of tracer products)

As seen in Figure 40, with the exception of reproductive health commodities, HIV and antituberculosis products experienced the least number of stock-outs, which were 13% (on the day of the visit) and 12% over the study period, from July to December 2014, respectively. Since sample districts were selected from low, medium, and high density population areas, a detailed analysis was performed to determine whether stock-outs were concentrated within a certain population range. However, this does not seem to be the case, as demonstrated by stock-out rates noted on the day of the visit in figure 41. This makes sense, given the fact that the NPSP distribution plan is not based on population density of serviced areas. However, this could change once the new 90-90-90 PEPFAR strategy, which gives priority to geographic areas with high prevalence rates, is implemented.

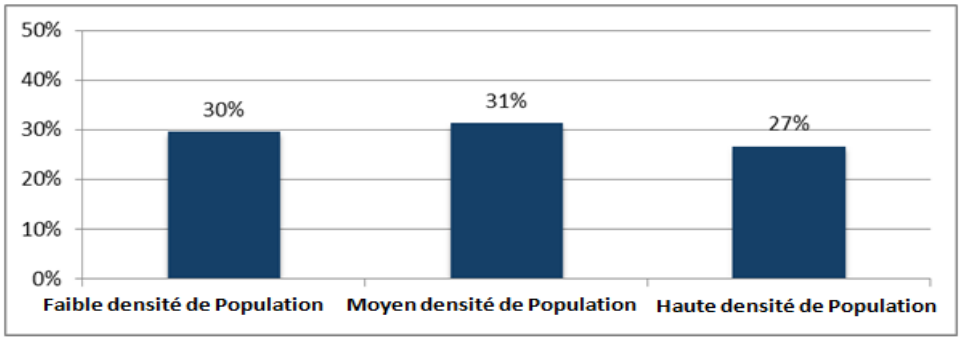


Figure 41. Stock-out rates on the day of the visit, by population density

Recommendations on storage and stock management procedures for intermediate and peripheral levels

- Require that all district pharmacies (82) comply with product storage and management guidelines.
- Strengthen operational capacity of health district pharmacies with more resources to improve the performance of the ESPC.
- Establish an integrated LMIS (for all product types).
- Put in place an integrated management software program at the NPSP level.

4.6 Distribution (Transportation)

Context

The NPSP is responsible for product distribution from the central level to district pharmacies and hospitals across the country and to some ESPC in Abidjan. District pharmacies resupply the ESPC at the peripheral level. Sixty-eight percent of the roads used to access the health facilities are not paved.

According to the current distribution scheme, Ivory Coast is divided into five areas: four cover the interior of the country (West and Coastal, Center–West, North and East, Center–East and South), plus an area in Abidjan. Each area in the interior of the country is subdivided into five or six networks. The lead time in Abidjan is set at five working days, whereas for facilities outside Abidjan, it is seven working days.

The NPSP has subcontracted part of its distribution to a third party supplier. This contract is financed through PEPFAR and the Global Fund, and is administered by the NPSP.

Of the 26 transportation networks, 11 are being managed by the third party subcontractor. It is important to note that the NPSP distribution strategy does not plan on outsourcing transportation, therefore, it has shored up its fleet of vehicles over the past year. Results discussed here only speak to the NPSP's capacity and do not take into consideration the third party contractor.

Distribution plans are managed by the NPSP's main agency. Every six months, the latter develops and disseminates a delivery schedule for its clients, which contains schedules for receipt and delivery of products. Product delivery challenges were noted (for example, unpaved roads, rainy season).

Maturity

The maturity score for the distribution function at the NPSP is 73%. This means that processes are well defined and documented, and that there is a strategy for strengthening operations. Figure 43 shows the disaggregated maturity score by catalyst.
At the intermediate level, it is worth noting that most of the district pharmacies in the sample do not transport products. One of 15 district pharmacies assessed, only Grand-Bassam district, is equipped with a vehicle for activities related to the supervision and distribution of vaccines and essential medicines. Furthermore, access roads to 68% of the facilities are not paved (figure 42).

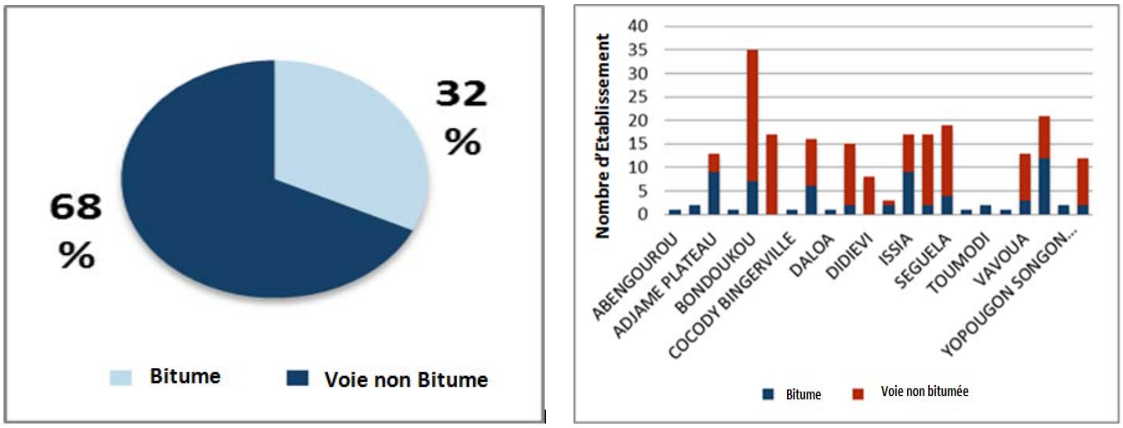


Figure 42. Types of access roads to facilities (less than 1 km)

Maturity of the transportation function is shown, by catalyst.

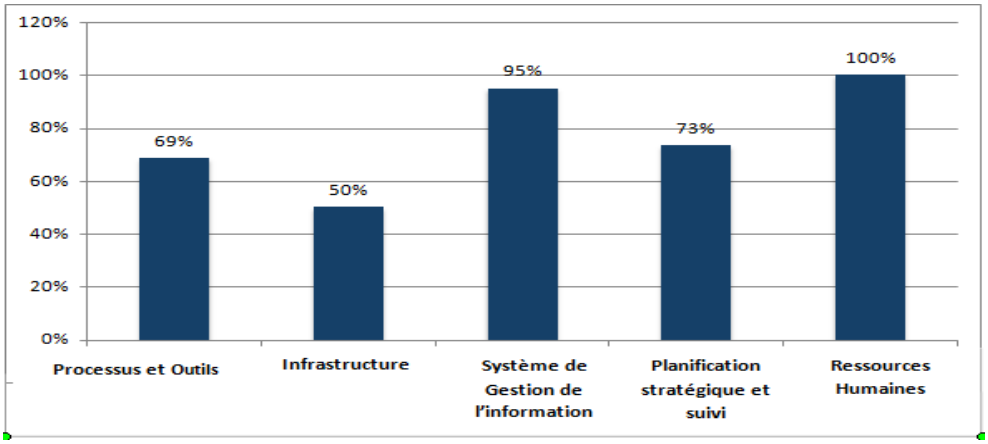


Figure 43. Transportation maturity, by catalyst

Table 25 provides more details on the results, with the main points for each catalyst.

Table 25. Main elements of the overall maturity score, disaggregated by level

Catalysts	Observations	Facility type	Average score
Processes and tools	At the central level, there are SOPs for all functions related to transportation, which are in the process of being validated. However, there is no mechanism to ensure that employees read and follow the SOPs. At the district level, only Grand-Bassam district has some transportation-related SOPs. At the central level, a reverse logistics procedure exists, which requires that drivers obtain approval via the telephone from the NPSP's main agency before returning products. A verification of quantities is performed by the personnel from the	Central level	66%
		District pharmacies	73%

Catalysts	Observations	Facility type	Average score
	main agency, in the presence of the driver. At the district level, the Grand-Bassam district has a procedure in place for reverse logistics. At the central level, NPSP vehicles are monitored, using an Excel spreadsheet. There is a manual procedure for comparing proof of delivery (signed issue voucher) to shipping documents. According to the NPSP, until now, there has not been any loss of products reported. Trucks are regularly inspected and repaired within a reasonable time; however, the fleet size is limited and insufficient to satisfy the demand (thus, the reliance on a third party transportation service). At the district level, only Grand-Bassam district has its own vehicle, which allows for on time delivery to all the peripheral sites in the district.		
Infrastructure	This catalyst was measured in terms temperature monitoring and compliance to temperature guidelines during transportation. During the evaluation period (July to December 2014), the NPSP had 20 vehicles: two 16-ton trucks; ten 11-ton trucks; six 5-ton trucks; and, one minivan. Transportation of cold chain products was done with coolers. There was no system for controlling temperature during transport, and temperature requirements were not consistently observed. At the district level, the Grand-Bassam district also has large coolers for transporting cold chain products and regularly makes sure that the temperature is well controlled during transport.	Central level District pharmacies	40% 60%
Management information system	This catalyst assesses the existence of a data collection system, and the availability of equipment as well as software programs for managing distribution. At the central level and in the Grand-Bassam district, data on transportation performance are regularly collected. The central level indicated that data were transmitted weekly, monthly, and quarterly, from the service delivery point, sub-directorate, and directorate levels, respectively. However, there is no dedicated data analysis unit. Suitable electronic equipment and software programs were noted at the central and district levels.	Central level District pharmacies	90% 100%
Strategic planning and monitoring	This catalyst measures**:** the existence of a KPI; MSLS involvement in the distribution process; and the existence of risk	Central level	73%

Catalysts	Observations	Facility type	Average score
	management procedures. The NPSP monitors distribution by subcontractors, with the financial support of the Global Fund. The NPSP achieved the lowest score in terms of risk management. In fact, it did not perform any activity related to risk identification, reacted to situations only when they occurred, and did not have a risk prevention strategy.		
Human resources	This catalyst assesses whether required competencies related to the distribution function are clearly defined, and the corresponding posts filled by trained personnel. At both the central and Grand-Bassam district levels, competencies related to distribution activities are well defined in job descriptions. All posts are occupied by skilled professionals.	Central level	100%
		District pharmacies	100%

Performance

Observations: The distribution KPIs were calculated using data on quantities of essential medicines ordered by and issued to facilities. Because transportation is integrated for all product types, this choice of data did not have a significant impact on the results. Moreover, the existence of a real requisition system for revolving drug fund essential medicines and those targeted for free distribution, makes it an ideal choice for measuring distribution performance. Finally, these products are managed by the NPSP, from selection to distribution, and the NPSP receives part of the revenues from revolving drug fund commodities.

Compliance with the deadline for submitting orders: 93%

As mentioned in the introduction section above, the NPSP has a pre-established delivery plan, including deadlines for submitting orders, which is sent to its clients every six months.

Figure 44 shows client performance in terms of meeting the deadline for submitting orders. Performance for hospitals in Abidjan (CHS, CHU, and HG) varies between 60% and 78%, whereas that of other sites is higher. For all sites, in general, if there was a delay in submission, it did not exceed one week. This shows that the process is well understood and respected by the NPSP's clients.

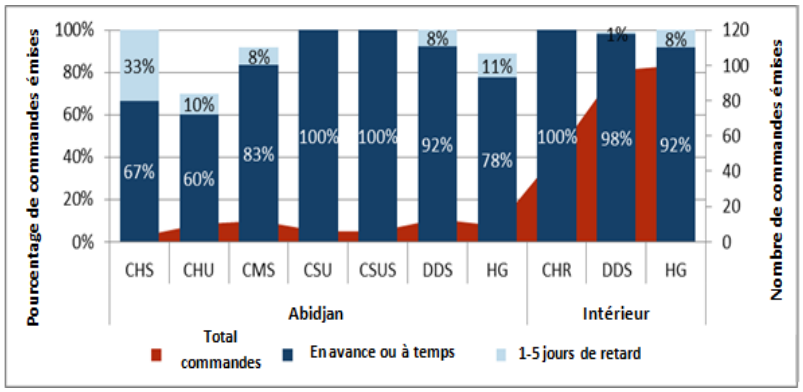


Figure 44. Percentage of orders submitted to the NPSP on time or with a delay of up to one week

*Note: Orders submitted five days after the deadline are not taken into account in the figure and represent the delivery difference where bars are at less than 100%.

Rate of compliance with on time delivery: 17%

Compliance with on time delivery is measured with regard to the preset NPSP internal schedule of five working days for orders from facilities within Abidjan and seven working days for facilities outside Abidjan.

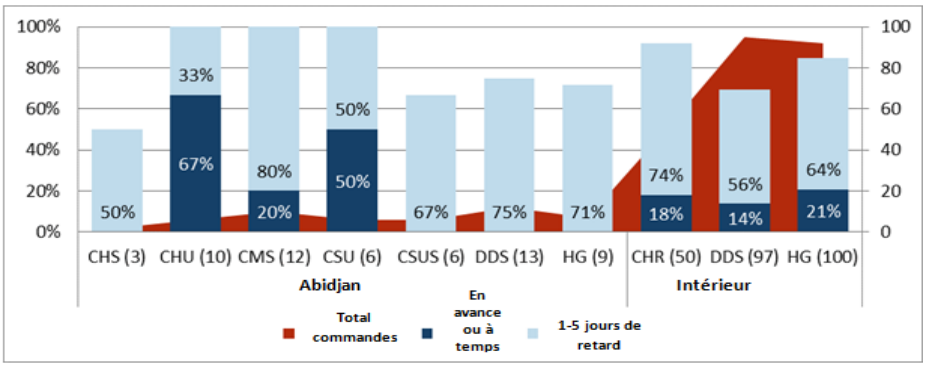


Figure 45. Percentage of on time deliveries, by type of facility (N =Number of orders)

Note: Orders submitted five days after the deadline are not taken into account in the figure and represent the difference where bars are at less than 100%.

Even though most orders were received before or at the required deadline, most deliveries were late (figure 45). This suggests that order submission peaks observed at the main agency put enormous pressure on the NPSP to process (electronic information management, product pick up, verification, and packaging) and to deliver on time. This could be explained by the fact that the NPSP has three days to analyze orders and enter the data into the system, leaving only two and four days for pick up, packaging, and delivering products within Abidjan and outside Abidjan, respectively.

Close to half of the orders in the city of Abidjan and more than 70% of orders outside the city were late (figure 46). The average lead time was 9.4 days, or 7.8 days for the city of Abidjan, and 9.8 days for areas outside the city.

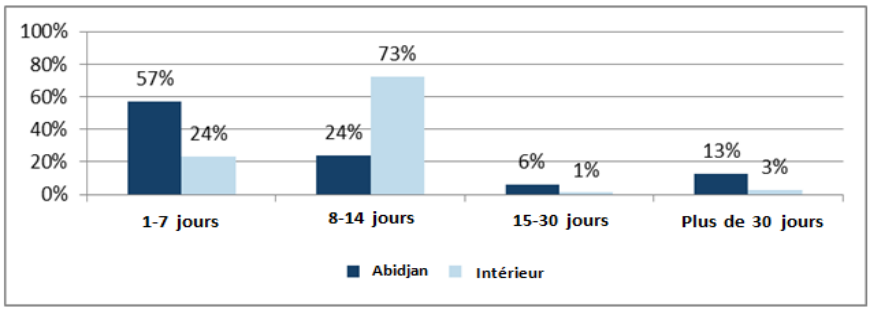


Figure 46. Percentage of deliveries, by time interval

Figure 47 shows the average delivery time, by district. Out of fifteen sampled district pharmacies, the NPSP met its delivery deadline for one district in Abidjan and two districts outside the capital. Furthermore, lead times varied, sometimes very significantly, according to client location.

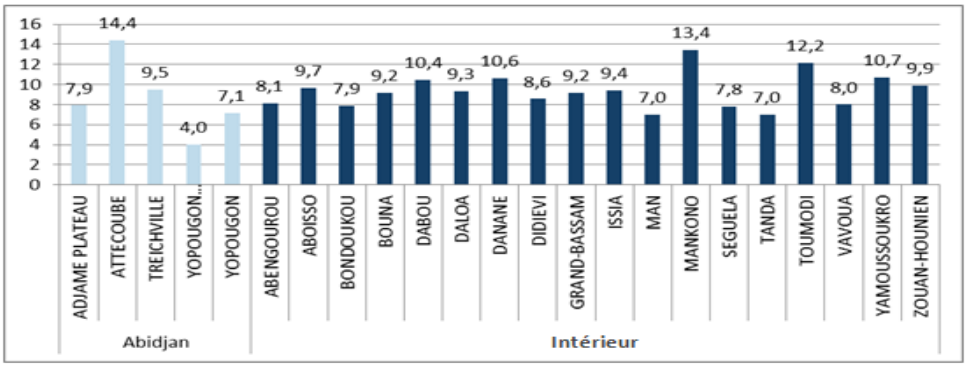


Figure 47. Average lead time, by district

In Ivory Coast, the combined report and requisition form is transmitted to the NPSP. Each of the two components of the form has its own due date. LMIS reports are monthly but their submission is tied to the NPSP's schedule. According to the latter, product requests are made on a 28-day cycle. Depending on the client's location (areas 1-5), stock used between the inventory and delivery dates varies and could be up to a month of stock. This situation is dangerous, especially when the order fill rate is low.

Suppose that in a given month, a center's usable stock on hand and the average monthly consumption are calculated on the last day of the month. A client from area 1 submits its monthly report and request form by the deadline, which is the fifth of the month. Orders are processed on the sixth and the client receives products on the eleventh day of the month, which leaves a period of 11 days between the inventory and the request dates. A client from area 2, however, will have the twelfth as a deadline, and its order will be processed on the

thirteenth, for delivery on the eighteenth. The time interval between the inventory and delivery dates is therefore 18 days. This scenario will repeat itself for the rest of the areas, and the number of days will reach 32 for the last area.

Observations: Two additional factors might have influenced the NPSP's delivery time performance during the evaluation period. The NPSP was asked to deliver:

- Ebola prevention commodities on behalf of UNDP.
- Products from the Soros Foundation to support the targeted free distribution.

These unplanned deliveries led the NPSP to postpone some deliveries to programs. Finally, there was a delay in the resumption of activities related to the storage, management, and distribution of products following the 2014 physical inventory.

Recommendations related to the distribution function

- Improve the NPSP's distribution operations following a thorough analysis of root causes of the below-average delivery time performance, which will identify and resolve bottlenecks.
- Strengthen district operational capacity in terms of distribution (distribution plan, monitoring, reverse logistics, cold chain product management, vehicle maintenance, fuel allowance, etc.).
- Put in place a standardized distribution system for essential medicines at the health district level, which could be financed by 8% of the transportation revenues channeled back from the NPSP.

4.7 Waste Management

Context

In 2007, MSLS and the Ministry of the Environnement, Sustainable Development and Public Hygiene of Ivory Coast, and other partners, decided to improve policy related to waste management.

These measures included, among others, the establishement of an emergency plan for collecting and destroying 27,812 kg of expired ARVs from health facilities in 2011.

It also involved the establishment of a monitoring and evaluation committee for the disposal of expired products and the development of a national strategy for strengthening routine management of PPI. Despite these efforts, large volumes of PPI remain at all levels of the supply chain and are still waiting for proper disposal.

As part of its committment to improving waste management, Ivory Coast developed a "Standard Operating Procedures Manual for the Management of Unusable Pharmaceutical Products" in 2012. This manual contains guidelines for the identification, quarantine, and transfer of PPI to definitive disposal sites. It also describes the disposal method (meaning,

incineration at 1200 degrees Celsius or more, with gas emission control, and a required presence of a DPML representative). Each facility that requests authorization for the destruction of its PPI should prepare a file containing the list of products destined for destruction, their value, their weight, and seek formal approval from the appropriate authority.

Maturity

The maturity score for the supply chain of essential medicines in waste management is 30% (please note that this is not an average of the five catalysts since the weighting varies). Figure 48 shows this score, by catalyst.

Each catalyst is described in the sections below.

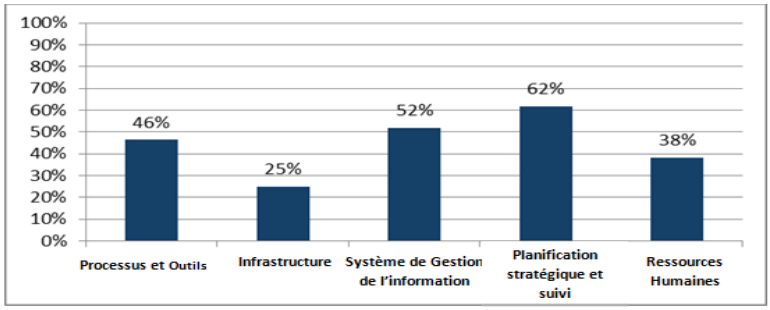


Figure 48. Scores for the waste management function, by catalyst

Processes and tools

Table 26 provides the breakdown of the results by the catalyst, "Processes and tools," by facility type. For most capabilities, a high score is noted at the central level and decreases in the peripheral levels of the supply chain. At the intermediate level, hospitals have a higher score than district pharmacies.

Table 26. Main elements of maturity for waste management

Capabilities	Description	Type of facility	Average score
Standard operating procedures	Both the DPML and NPSP have SOPs for waste management, which follow the national guidelines. The NPSP does not require its employees to read the procedures nor does it enforce compliance. More thant 80% of intermediate and peripheral facilities do not have SOPs for managing PPI. A large percentage of hospitals and district pharmacies have the national manual at their disposal, but the latter is not available at peripheral sites.	Central level	80%
		District pharmacies	29%
		Hospitals	32%
		ESPC	22%
Identification, sorting, and storage of PPI The central level scores have been divided among the NPSP's central warehouse (4), the NPSP's central agency for distribution (3), and the DPML (5).		Central level	80%
		District pharmacies	29%
		Hospitals	32%

Capabilities	Description	Type of facility	Average score
At the central warehouse, soon-to-expire products are identified three months in advance. The unusable stock is removed and stored in an appropriate place. However, this stock is not always counted, and the data collection team observed that boxes of expired products are piled up to 10 meters high. The main agency has procedures in place for identifying PPI. These commodities are removed for destruction, but the space for their quarantine is filled up. The DPML follows processes in place for the identification and classification of pharmaceutical waste, and keeps an updated count of PPI. Space reserved for these products is secured, well ventilated, and marked. The majority of intermediate and peripheral sites have informal processes for identifying unusable stock. In most cases, these products are kept in the same store, but away from the good stock; they are not in a dedicated space.		ESPC	22%
Reverse logistics	Scores for this capability vary significantly at the central level, ranging from 1 for the NPSP's central warehouse to 5 for the DPML. At lower levels, 41% of facilities (72 ESPC, 11 district pharmacies, and 16 hospitals) do not have reverse logistics processes in place. Forty-two other facilities transport waste in non-secured conditions, in unsealed boxes and alongside usable products.	Central level	80%
		District pharmacies	29%
		Hospitals	32%
		ESPC	22%
Incineration	The NPSP does not incinerate products, rather, it has subcontracted this service to a specialized private company. The DPML achieved a score of 1 for this capability. In fact, PPI are stockpiled, awaiting destruction. This was also the case at most peripheral level facilities.	Central level	80%
		District pharmacies	29%
		Hospitals	32%
		ESPC	22%
Availability of KPIs	The DPML and NPSP have KPIs for the waste management function. At the NPSP, these indicators are compared to best practices, and corrective actions are applied, if necessary. The majority of intermediate and peripheral sites (159 peripheral sites, 8 hospitals, and 11 district pharmacies) do not have KPIs for monitoring and evaluating performance, even though some facilities measure performance in an informal and non-systematic way.	Central level	80%
		District pharmacies	29%
		Hospitals	32%
		ESPC	22%

Infrastructure

For this evaluation, the catalyst, "infrastructure," aimed at determining whether sites had individual protective gear for handling pharmaceutical waste.

Type of facility	Average score
Central level	100%
District pharmacies	27%
Hospitals	27%
ESPC	24%

As shown in the table above, the central warehouse achieved a score of 100%, meaning it has sufficient resources (masks, protective glasses, resistant gloves, closed toe shoes, etc.) and a budget that guarantees access to this equipment. Lower level facilities achieved minimum scores. It is important to note that financing sources for EPI are not clearly defined.

Management information system

This catalyst aimed at assessing whether personnel had access to hardware and software programs designed for pharmaceutical waste management. At the central, it also measured how often data on pharmaceutical wastes were being collected and transmitted.

Type of facility	Average score
Central level	90%
District pharmacies	37%
Hospitals	33%
ESPC	31%

As seen with the infrastructure catalyst and in the table above, a higher rate is found at the central level, which means that NPSP and DPML personnel have access to a computer and a basic software program (for example, Excel or Access).

Most ESPC as well as hospitals and district pharmacies do not have any computer or software applications for managing pharmaceutical waste. Given the higher volume of activities at hospitals (CHU, CHR, HG) and the fact that district pharmacies receive waste from the ESPC for temporary storage, these two types of facilities should be equipped with automated systems for better management of waste.

The NPSP and DPML collect data on waste management-related activities. The DPML collaborates with the Ivory Coast Antipollution Center (Centre Ivoirien Antipollution) (CIAPOL) on the monitoring and evaluation of activities.

Strategic planning and monitoring

This catalyst assessed whether activities related to waste management were monitored. At the central level, the degree of ownership by decision makers was also assessed. The results are shown in the table below.

Type of facility	Average score
Central level	50%
District pharmacies	25%
Hospitals	41%
ESPC	21%

One of the weaknesses observed in the overall Ivory Coast system is the absence of an audit system for activities related to waste management. Nevertheless, a large difference in scores was noted between the NPSP (4) and the DPML (1). While the central warehouse performs annual audits, with specific recommendations that are followed throughout the year, the DPML does not engage in any such activity with regard to health facilities.

These two agencies perform waste management activities, in partnership with all relevant ministries and with financial support from donors.

Most of the lower-level facilities (172 ESPC, 10 hospitals, and 11 district pharmacies) did not undergo an external audit related to the management of pharmaceutical waste.

Human resources

This catalyst is used to determine whether a job description of all required skills for the management of pharmaceutical waste exists and whether the posts are filled by qualified personnel. It does not measure employees' productivity.

Type of facility	Average score
Central level	100%
District pharmacies	61%
Hospitals	63%
ESPC	33%

At the central level, only the NPSP was evaluated in the area of human resources. It does have job descriptions clearly defined for waste management and skilled personnel with good knowledge of processes and tools related to this activity.

Average scores achieved by hospitals and district pharmacies were 63% and 61%, respectively, as seen in the table above, and indicate that most personnel are arbitrarily assigned to the pharmaceutical waste management function, and that acquisition of the required skills is still in process. Thus, these employees have not yet mastered all best practices with regard to this activity.

Competencies at the ESPC level are not generally well defined, given that these facilities do not directly destroy pharmaceutical waste, but rather, return them to district pharmacies. Nonetheless, some ESPC admitted that their PPI were destroyed at neighboring hospitals.

Recommendations related to the waste management function

- Identify a dedicated secured area for storage of PPI at each facility. For sites with limited storage capacity, consider a simple solution, such as a sealed cage.
- Print and disseminate the "Standard Operating Procedures Manual for the Management of Unusable Pharmaceutical Products" to the peripheral level of the supply chain.
- Develop SOPs (on financing, procurement of EPI, reverse logistics, destruction) and a module on the management of pharmaceutical waste, which will be incorporated into a training video on storage and stock management.
- Establish a decentralized process for the destruction of PPI.
- Establish a system for tracing information on PPI.
- Establish a system for regular collection and destruction of PPI, to avoid their accumulation.

5 LABORATORY

Context

This function was assessed at: the LNSP; 20 CHU, CHR, and HG laboratories; and 22 ESPC laboratories. It is worth noting that this evaluation did not aim to measure laboratory performance in terms of equipment optimization, but rather, give an overall view on best practices in the area of laboratory logistics management in order to draft appropriate recommendations.

Maturity

Figure 49 shows the scores for the laboratory function, by catalyst.

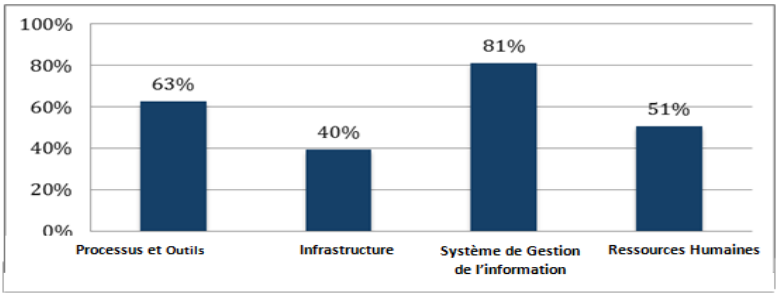


Figure 49. National maturity scores, by catalyst

The maturity of the "laboratory" function is 41%, corresponding to a marginal quasi-state. This means that processes are generally in place but are not used, and that systems are manual. Again, please note that the overall score is not a direct average of the four catalysts since the weighting of percentages varies.

Processes and tools

Table 27 highlights key capabilities and performance, by supply chain level.

Table 27. Main elements of the catalyst, "processes and tools," by type of facility

Capabilities	Observations	Type of facility	Average score
Standard Operating Procedures	At the LNSP, procedures are in place for all supply chain processes. They are reviewed annually and updated, if necessary, but there is no system to ensure employees' compliance. Unlike at the central level, 87% of health facilities, of which 16 are hospitals, either did not have or had rudimentary SOPs related to basic laboratory processes.	Central level	60%
		Hospitals	49%
		ESPC	36%

Capabilities	Observations	Type of facility	Average score
Management of hazardous and flammable products	At the LNSP, dangerous products are stored in a secured, fire-proof location, and an SOP for their handling is reviewed annually. An official process is in place for integrating all the modifications to the existing norms. However, personnel training on the SOP and compliance with procedures are not documented. For a little over half of the intermediate and peripheral facilities (56%), there is no separate location or any guideline for the management of hazardous chemical products.	Central level	80%
		Hospitals	32%
		ESPC	29%
Internal and external quality assurance	The LNSP achieved the highest score in terms of its internal quality control capabilities. In fact, it demonstrated formal and systematic sampling procedures (for ARVs, new medicines, RDTs). There is also a system to document the release of quarantined products. Samples are kept in a secured location, for later testing, in case of litigation. External quality assurance is performed as part of WHO accreditation. In 2013, the LNSP department of quality control of medicines was accredited ISO 17025. Preventive and corrective measures are prescribed, when needed. Nonetheless, it is difficult to know if they are implemented or reviewed before the next audit.	Central level (Internal QA I)	100%
		Central level (External QA I)	80%
Management of expired products	At the LNSP, expiration dates are recorded on an informal basis. The FEFO rule is followed inconsistently; expired products are not systematically separated from the usable stock. However, unusable reagents are recorded, decontaminated, and destroyed by a specilized company, in the presence of an appropriate regulatory authority. Likewise, the majority of laboratories at the lower level apply the FEFO rule inconsistently and have an informal system or paper form to keep track of the expiration dates. However, several laboratories indicated that because of high inventory turnover and usage, they have been able to limit the number of expiries at their level. A number of facilities also indicated that they send their expired stock to the nearest hospital for disposal.	Central level	40%
		Hospitals	44%
		ESPC	45%
Availability of KPI	The LNSP has established laboratory KPI and a corresponding “action plan,” which is evaluated every two years.	Central level	80%

Infrastructure

Type of facility	Average Score
Central level	44%
Hospitals	45%
ESPC	35%

Infrastructure is the catalyst that received the lowest score at all levels, as seen in the table above. Three challenges were observed :

- Space : Data collection teams for the NSCA noted insufficient space and shelving at both the LNSP (score 1) and 55% of health facilities, including eight hospitals.

- Security: Limited and non-maintained security equipment was noted at the LNSP and 91% of health facilities (score 2).

- Temperature control: The LNSP has a refrigerator on site for activities related to cold chain, but temperature control is not consistent. There are not enough thermometers and temperatures are not recorded (score 2). Almost half (47%) of the hospitals and peripheral facilities do not have any refrigerator or thermometers; 23% have an insufficient number of thermometers.

Management information system

This catalyst assessed whether a LMIS for laboratory commodities was in place, at all supply chain levels. In addition, at the central level, the catalyst assessed whether employees had access to tools and software applications and whether data were collected and transmitted regularly.

Type of facility	Average score
Central level	80%
Hospitals	49%
ESPC	36%

At the central level, performance data are collected on a regular basis and are analyzed by a monitoring and evaluation unit, using a group of KPIs. Employees have adequate equipment and software applications at their disposal to perform their tasks.

The LNSP uses Open ELIS for monitoring of laboratory products.

For the lower-level facilities visited, 12 did not have any management information tool, 11 had some basic record form, and 15 had standardized LMIS reports, which included the biological monitoring report for people living with HIV and AIDS, monthly hematology report, monthly CD4 report, monthly biochemistry report, and/or monthly RDT and consumables report.

Human resources

This catalyst aimed to determine whether job descriptions explained the skills required and whether corresponding posts were held by trained personnel.

Type of facility	Average score
Central level	80%
Hospitals	65%
ESPC	39%

The LNSP has job descriptions, with clearly defined competencies, and all related posts were filled. Nonetheless, more than half of the intermediate facilities did not have any job descriptions related to laboratory functions. Managers were informally assigned to posts.

Strategic planning and monitoring

It is worth noting that the Directorate for Infrastructure, Equipment, and Maintenance (Direction des Infrastructures, de l'Equipement et de la Maintenance) (DIEM), not the LNSP, is responsible for the strategic planning and monitoring of laboratory equipment. DIEM was not part of this evaluation; however, it did receive support from partners for the development of a national standardized list of laboratory equipment that:

- Defines the tests to be performed, according to the type of laboratory, for each level of the supply chain (also known as level I, level II, level III, and level IV).
- Categorizes the necessary instruments for each level according to the type of test to be performed (for example, ESPC should use RDTs for HIV and AIDS diagnosis, whereas hospitals are free to use RDTs or ELISA tests).
- Determines the equipment brand and specifications to be used.

A formal procedure has been established for revising the equipment standardization policies biannually, based on the equipment's robustness and suppliers's responsiveness. All equipment purchased since the developement of the national standardized list of laboratory equipment comply with the established guidelines. Table 28 shows the 2013 laboratory standardization exercise, by level, with obsolete equipments highlighted in yellow.

Table 28. Overview of results from the 2013 laboratory equipment standardization exercise

Test	Instrument	CIP proposed Harmonized List					
		Level IV	Level III	Level II	Level I		
		CHU/INS	CHR	GH	CSUS/FSU	CSU	CSR
CD4	FACSCALIBUR	X	X				
	FACSCOUNT	X	X	X	X		
	GUAVA		X	X	X		
	PIMA				X	X	
	CYFLOW						
Biochemistry	COBAS INTEGRA 400 /C311	X					
	HITACHI 902						
	KONELAB 20	X	X				
	COBAS C111		X	X			
	FULLY			X	X		
	KENZA MAX				X	X	
	HUMALYSER				X	X	
	GLUCOMETER						X
	REFLOTRON PLUS						
Hematology	ACT 5 DIFF						
	SYSMEX XT2000i/1800i	X	X				
	ACT DIFF		X	X	X	X	
	SYSMEX KX21N		X	X	X	X	
	HEMOGLOBINOMETER (HEMOCUE/HEMOCONTROL)						X
	MEDONIC CA620						
Viral load	TAQMAN 48	X	X				
	NUCLISENS	X	X				
	ABI PRISM 7000	X					

Although this evaluation did not broach the topic of instrument utilization and optimization, the below figure provides the percentages of tests conducted by each type of machine according to laboratory specialty area, for information.

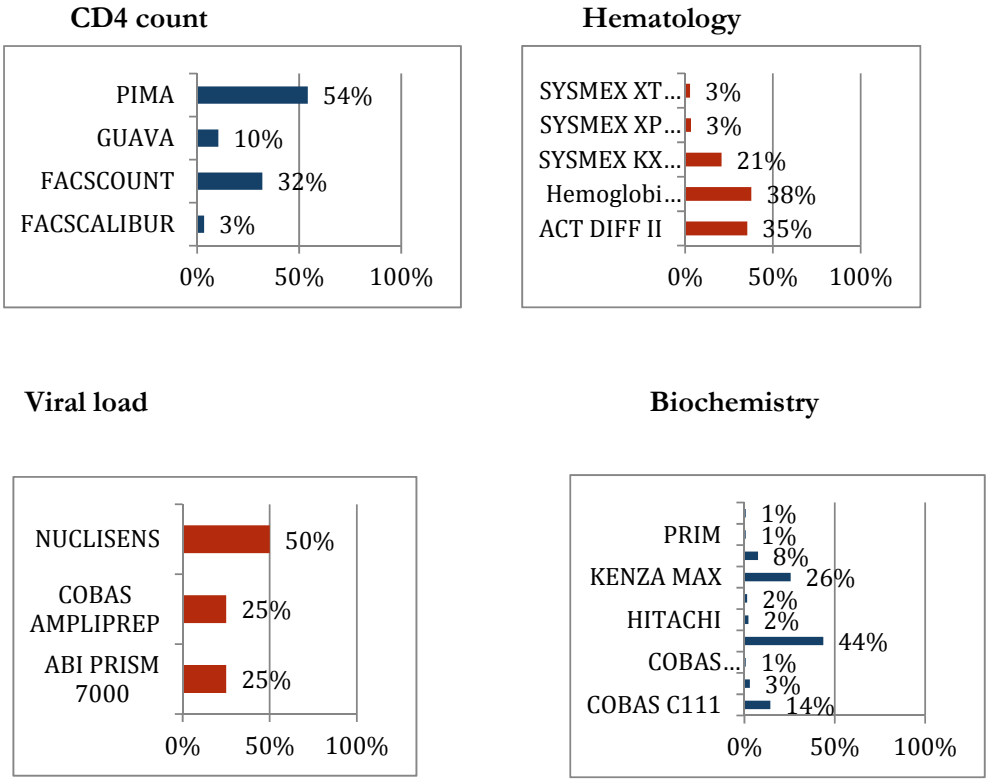


Figure 50. Equipment utilization, by laboratory specialty area

Source: 2014 DIEM list of instruments

Recommendations

- Develop and disseminate, at all levels of the healthcare system, SOPs for logistics management of laboratory commodities, including logistic information, stock management, risk management, and security.
- Establish a process for competency evaluation and training of laboratory personnel.
- Assess the lower levels' capacities to store and manage hazardous products and develop a risk management plan.
- Improve supervision of laboratory activities.
- Develop and disseminate an SOP related to laboratory activities for the peripheral level.
- Improve storage conditions and management of dangerous products.
- Develop an efficient strategy for the maintenance and removal of outdated equipment.

6 MAIN RECOMMENDATIONS

6.1 Recommendations related to the Supply Chain of Essential Medicines and Revolving Drug Fund Consumables

- Product selection
    - Establish a new mechanism that would allow for a biannual revision of the LNME and ensure efficient dissemination to all levels of the healthcare pyramid.
    - Establish a new mechanism that would allow for an annual revision of the STGs and ensure their efficient dissemination to all levels of the healthcare pyramid.

- Forecasting and supply planning
    - Support the establishement of the CNCAM-CI to improve the coordination and monitoring of supplies.
    - Develop a national integrated LMIS, preferably automated, by clearly identifying the agencyt hat will be in charge as well as sustainable financial resources for the LMIS tools.

- Procurement process
    - Improve management processes for product request and delivery.
    - Strengthen suppliers' performance management by instituting rigorous performance review procedures and a transparent process for communicating results to suppliers.

- Storage and stock management
    - Develop and implement a performance contract (agreement) between the NPSP and health programs specifying the level of service and associated costs.
    - Bring up to standards all the district pharmacies (82) in terms of storage guidelines related to health commodities.
    - Strengthen service operational capacities of health district pharmacies, which have more resources, in order to improve ESPC performance.

- Distribution
    - Improve NPSP distribution operations by performing an analysis of root causes of low performance related to deliveries, which will identify and resolve bottlenecks.
    - Strengthen districts' operational capacities related to distribution (distribution plan, monitoring, reverse logistics, cold chain management, vehicle maintenance, fuel allocation, etc.)
    - Establish a harmonized distribution system for medicines across health districts, which would be financed by 8% of the NPSP deferred transportation funds.

- Waste management

    - Identify, within each facility, a dedicated secured place for storing PPI. For sites with limited space, a sealed cage would be a simple solution.
    - Develop SOPs (financing, EPI procurement, reverse logistics, destruction) and a module on waste management, and incorporate them into a training video on storage and inventory management.
    - Establish a decentralized process for the destruction of PPI.

- Laboratory

    - Develop and disseminate, at all levels of the health pyramid, SOPs related to laboratory products: LMIS, stock management, and risk and security management.
    - Establish a competency evaluation system and laboratory personnel training.
    - Improve laboratory supervisory activities.
    - Develop and disseminate a SOP related to laboratory activities for the peripheral level.

While the results for the supply chain of vaccines and the supply chain of blood safety products were not discussed in this document, the main recommendations for these two supply chains are shown below for information.

6.2 Recommendations Related to the Vaccines Supply Chain

- Product selection

    - Ensure a larger dissemination of EPI stock cards at the lower levels of the supply chain, with a particular focus on primary care health facilities.
    - Ensure that data on EPI technical specifications is updated annually in order to provide medical personnel with current information necessary for service provision and monitoring of immunization activities.

- Forecasting and supply planning

    - Formalize the development, updating, and monitoring process of supply planning by creating a quantification committee.
    - Use different methods for estimating vaccine needs, especially for EPI vaccines.

- Procurement process

    - Request assistance from UNICEF and the Global Alliance for Vaccines and Immunization (GAVI) for procuring non-EPI vaccines, given that the vaccine market is a niche market and only a few suppliers answered the international tender offer.
    - Establish a performance monitoring system for procurement agents to improve performance.

- Storage and stock management

    - Establish a vaccines logistics system, which includes min-max stock levels, request vouchers, etc.
    - Assess the cold chain (cold rooms) at all INHP sites and refurbish equipment.
    - Revise the SOPs for public sector pharmacies, incorporating cold chain requirements.

- Distribution

    - Establish a joint distribution plan for both EPI and non-EPI products.
    - Implement a management process for transportation service providers, meaning a performance contract that is evaluated at least quarterly, a transportation cost analysis, and proof of delivery validation.
    - Establish a quarterly standardized performance management system for regional sites.

- Waste management

    - Define indicators for vaccine waste management based on the experience of the Daloa's INHP site.

6.3 Recommendations Related to the Supply Chain of Blood Transfusion Products

- Product selection

    - Create a section for blood transfusion products in the LNME.
    - Develop and disseminate national guidelines to all facilities involved in the management of blood transfusion products.

- Forecasting and supply planning

    - Make the forecasting and supply planning committee functional.
    - Establish a LMIS, preferably automated, related to blood transfusion products at blood transfusion sites (ATS), the Blood Transfusion Center (CTS), blood donation centers (SP), and central levels.

- Procurement processes

    - Develop SOPs that detail the different procurement processes.
    - Implement a procurement strategy to guide the decision-making process and reinforce interaction between procurement and the other CNTS logistic functions.
    - Establish a monitoring and evaluation system for the procurement KPIs.

- Storage and stock management

    - Identify the main bottlenecks (physical and systemic) throughout the system and their root causes, from suppliers and procurement to order fulfillment, taking into

account the central warehouse's performance in terms of order fulfillment and stock-outs.
  - Develop a reference list of products as well as standardized request vouchers for use by centers.
  - Strengthen the knowledge of stock managers in logistics management of blood transfusion products.
  - Improve storage space by using appropriate shelves for product arrangement and designate an adequate place for storing expiries.

- Distribution

  - Revise current operational processes in light of the SOPs: Vehicle management and maintenance, management of proof of delivery, and suppliers' monitoring related to delivery. Train all personnel on the revised SOPs.
  - Review the cold chain process, including temperature monitoring and package validation.

- Waste management

  - Ensure that expired and damaged blood bags are sent to the nearest healthcare facility equipped with a government-approved incinerator for disposal as infectious waste.
  - Establish a formal monitoring and reporting system for expired and non-usable pharmaceutical products.

- Laboratory

  - Increase storage capacity and provide adequate equipment for storing laboratory products.
  - Harmonize processes and tools across all laboratories, using the CTS Abidjan's quality assurance laboratory as a reference.
  - Develop an effective maintenance strategy, which will cover 100% of laboratory equipment.

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ANNEX. COORDINATION AND EVALUATION REPORT TEAMS AND DATA COLLECTORS

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