Exploring New Distribution Models for Vaccines and other Health Commodities Adapted to the on the Ground Realities of the Equateur and Tshuapa Provinces, Democratic Republic of Congo

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Acronyms

- AIDS: Acquired Immunodeficiency Syndrome
- ATV: All-Terrain Vehicle
- BCAF: Bureau de Coordination des Achats de la Santé FEDECAME
- BCIZ: Bureau de Coordination Interzionale
- BCZS: Bureau Central de la Zone de Santé
- CCE: Cold Chain Equipment
- CDR: Centrale de Distribution Régionale
- DHIS2: District Health Information System 2
- DPS: Direction Provinciale de la Santé
- DRC: Democratic Republic of the Congo
- EPI: Expanded Program on Immunization
- FEDECAME: Fédération des Centrales d’Achat en Médicaments Essentiels
- FLC: Field Logistics Coordinator
- FLO: Fondation Lucie Otaenga
- GEV: Gestion Efficace des Vaccins (Effective Vaccine Management)
- HIV: Human Immunodeficiency Virus
- HGR: Hôpital Général de Référence
- HMIS: Health Management Information System
- KPA: Key Performance Areas
- KPI: Key Performance Indicator
- LMU: Logistics Management Unit
- PLMT: Provincial Logistic Management Team
- MoH: Ministry of Health
- NGO: Non-governmental Organization
- OTIF: On-time and In-full deliveries
- ORS: Oral Rehydration Solution
- PARSS: Projet d’appui au renforcement du secteur de santé
- PDSS: Projet de développement du secteur de santé
- PNAM: Programme National d’Approvisionnement en Médicaments essentiels
- PSE: Private Sector Engagement
- PSI: Population Services International
- RUMER: Registre d’utilisation des médicaments essentiels et des recettes
- RMNCH: Reproductive, Maternal, Newborn, and Child Health
- SANRU: Soins de Santé primaires en milieu Rural
- SNAME: Système National d’Approvisionnement en Médicaments Essentiels
- SNIS: Système Nationale d’Information Sanitaire
• TB : Tuberculosis
• UNFPA : United Nations Population Fund
• USAID : United States Agency for International Development
• WFP : World Food Program
• WHO : World Health Organisation
• ZS : Health Zone
• 3PL : Third Party Logistics
Executive Summary

This report documents the results of medicines supply chains assessment in Equateur and Tshuapa, two provinces in northeastern DRC, divided by the Congo River. Due to the geography and lack of infrastructure in this region, delivery of medical commodities and services to the last mile is extremely difficult and numerous studies of the supply performance have shown it to be poor. In order to gain insights into the nature of the weaknesses in the supply chain and identify feasible solutions, an assessment was conducted to identify root causes of supply chain inefficiencies and ineffectiveness. Then, solutions to these challenges were developed through an iterative, collaborative process with stakeholders at the provincials and central levels, conducted in a workshop setting.

Data were collected and results were analyzed using a framework based on eight “Key Performance Areas,” and findings are summarized below:

1. **Supply Chain Processes**: Ordering and receiving processes are difficult for health facilities
2. **Financing**: Health facility allocations and fee recovery are insufficient for the purchase of health commodities and for transportation from the CDR, leading to purchase of products of questionable quality from the private sector; Little visibility in true costs recovered and insufficient capital for CDRs
3. **Stock Management and Cold Chain**: Poor inventory, storeroom, and cold chain management, and frequent stock shortages; High rate of non-functional cold chain equipment, no cold chain inventory
4. **Data for Management**: Poor record-keeping, data quality, and data availability at the facility level, as a result facility level logistics data are not used for decision making, including for quantification and forecasting, at the provincial level, there is a general lack of analysis and use of logistics data.
5. **Distribution**: Inefficient distribution and limited/expensive transportation infrastructure, limiting the availability of commodities; No mechanism for reverse logistics for expired or overstocked medicines, or for laboratory samples
6. **Planning and Coordination**: Poor coordination of logistics planning and processes, resulting in inefficiencies and duplication of efforts
7. **Human Resources**: Insufficient human resources with logistics specialization; Lack of human resources with capacity to provide preventive and corrective cold chain maintenance in Equateur and Tshuapa
8. **Private Sector Engagement**: Equateur and Tshuapa have a decent private sector for logistics services and the public health supply chain should capitalize on this capacity and extend it to fill gaps in transport at the district level

To address these challenges, the assessment team developed two Core Recommendations, which were validated in a workshop with key stakeholders from the central, provincial, zonal, and facility levels.

**Core Recommendation One** shifts to a more efficient supply chain model for vaccines and other health commodities in Equateur and Tshuapa, with an emphasis on streamlining **distribution systems**, strengthening **quantification**, and increasing the quality and availability of **data for management**. Specifically this shift will be accomplished by transforming six supply chain components that draw from applicable best practices for supply chain strengthening, as outlined below:

**Distribution systems:**
- Component 1: Implement direct delivery to health facilities with Field Logistics Coordinators
- Component 2: Integrate and homogenize vertical supply chains for increased efficiencies
- Component 3: Develop and implement robust systems for reverse logistics

**Quantification:**
- Component 4: Improve quantification at the provincial level, based on more accurate data

**Data for Management:**
- Component 5: Improve data collection and management through direct data collection at health facilities and supportive supervision by Field Logistics Coordinators
- Component 6: Rigorously apply key performance indicators (KPI) with structured, regular review

**Core Recommendation Two** is to use six key management strategies, listed below, to strengthen supply chain management in Equateur and Tshuapa, and to achieve and sustain the implementation of the components of Core Recommendation One.

- Management Strategy 1: Conduct a supply chain modeling exercise to inform decision-making
- Management Strategy 2: Develop a robust cold chain strategy based on the results of the modeling exercise with an emphasis on increased capacity for maintenance
- Management Strategy 3: Integrate supply chain improvements with PDSS and its performance-based financing approach
- Management Strategy 4: Seek out opportunities for Private Sector Engagement
- Management Strategy 5: Prioritize the professionalization of human resources for logistics management
- Management Strategy 6: Increase the viability of cost recovery

In order to move the recommendations forward, a comprehensive implementation plan needs to be developed. Although the development of a complete implementation plan is outside the scope of this assessment, this report identifies key priority actions for the first 100 days of implementation including:

1. Conducting a landscape overview of partners
2. Generating buy-in for the recommended distribution model
3. Collecting data for a supply chain modeling exercise
4. Building a computer model of the medical supply chain in Equateur and Tshuapa
5. Conducting a feasibility and cost assessment
6. Increasing the capacity (infrastructure and human resources) of the CAMESE, the regional distribution center (CDR).

The immediate next step in this plan is to vet these priority actions with local stakeholders, and specify timelines and define clear directives for their implementation.
Introduction

The Democratic Republic of the Congo (DRC) is the second largest and the fourth most populous country in Africa with a population of more than 75 million people. As such, it is a very vast country with poor infrastructure resulting in difficult access to many places. Many of the typical supply chain challenges found in low and middle-income countries are exacerbated in the DRC, including a limited supply chain workforce; insufficient storage cold chain at provincial, health zone, and health facility levels including cold chain equipment; poor quality and insufficient data being collected and used; challenging transport systems and insufficient equipment for roads and waterways. These and other issues are true for the supply chains for both vaccines as well as other commodities.

The DRC Ministry of Health (MoH) and its partners recently conducted a situational analysis of the supply chain for all health commodities to gather more specifics on the landscape and details on challenges the supply chain faces. It found that the supply chain is characterized by a high level of complexity with weak coordination from the central government; there are at least 50 supply chains functioning in the DRC managed by 50 different actors. Additionally, the DRC supply chain underperforms due to a weak financial system, inefficient procurement practices at the national and sub-national levels, lack of capacity for storage and transport of medical commodities, low-quality or insufficient data for performance monitoring and quantification activities, and a lack of qualified and motivated human resources, particularly for logistics management. Together, these weaknesses in supply chain contribute to low availability of medical commodities, especially vaccines (only 15% of tracer commodities available on average) and essential and generic medicines (only 20% available on average). It is important to note that there is wide variability between commodities (malaria and family planning commodities tend to be more widely available) and between regions (the provinces of Equateur and Orientale have consistently lower availability of all commodities).

These challenges are also reflected in an external EPI review in 2012, which found that 40% of health zones and 32% of health facilities had to interrupt immunization services during the six month preceding the review due to limited stock availability of vaccines and issues with the cold chain. Results showed that outreach efforts were also not implemented due to lack of transport, lack of fuel for both transport and refrigerators, and the lack of vaccines. More recently, the “Évaluation de la Gestion Efficace des Vaccins (GEV) en République Démocratique du Congo” performed in 2014 showed major gaps in the immunization supply chain (iSC) at all levels (national, sub-national, zonal and facility-level). For example, weakness were identified around cold chain and warehouse storage capacity, cold chain temperature monitoring, infrastructure maintenance (warehouse, cold chain equipment, transportation resources, etc.), and data management, visualisation, and use for decision making.

As a response to the evaluation, the Expanded Program on Immunization (EPI) has developed an improvement plan to start responding to these gaps in the next few years (2015-2020). While some of the activities in the improvement plan impact the lower levels of the supply chain, it mainly focuses on strengthening resources and capacities of the national and sub-national levels. In addition, the improvement plan tends to be specific for the immunization supply chain and minimally address supply chain integration or homogenization across health commodities (vaccines, essential and generic medicines, laboratory commodities, family planning commodities, etc.). A national supply chain strategy is tentatively being developed to address these challenges nation-wide. However, it is likely that it will
provide high level guidance, and will require some adaptation for the complex and varying environments found across the 26 provinces of the country.

The provinces of Equateur and of Tshuapa are among the most isolated areas of the country. They are divided by the Congo River and its many tributaries, with a very rural, dispersed population. As such, there are unique supply chain and logistics challenges in these provinces. In its continued support to strengthen the supply chain in this area, the World Bank contracted VillageReach to assess needs and to propose solutions adapted to the on-the-ground realities of the context of these two provinces, with a particular focus on conditions at the last mile.

There have been many supply chain assessments at the national and provincial levels, however, less is known about conditions under the provincial level down to the health facilities. To fill that gap, VillageReach completed an assessment of the supply chain to the health facility level in Equateur and Tshuapa provinces to identify systemic issues that could be addressed by introducing new distribution models or system changes. The assessment addressed the various vertical supply chains, using a few tracer commodities (vaccines, amoxicillin, family planning commodities, and Oral Rehydration Solution (ORS) with zinc) to explore the possibility of supply chain integration.

This report presents the findings of the assessment and proposes a number of potential solutions to strengthen province, health zone and facility-level access to medical commodities and vaccines. The findings in this report build on other assessments previously conducted at the national level but bring the last mile perspective to ground an implementation plan in solutions that will work at the lower levels of the supply chain specifically in Equateur and Tshuapa.
Methodology

The assessment was conducted in four phases: a desk review, key informant interviews, facility visits with interviews of provincial and facility level informants, and a national and provincial stakeholder workshop to present and discuss potential implementation solutions and define priority actions.

Desk Review

The desk review was completed by VillageReach staff and focused on reviewing existing assessments and background information on the DRC and its supply chains. Many assessments have already been completed in-country, any many strategies are already in place by the MoH, the Gavi Alliance, UNICEF, the World Bank, as well as other partners. The National Supply Chain Situational Analysis, Strategy, and Implementation Plan that are under development were also reviewed.

Key Informant Interviews and Facility Visits

From August 24 to September 8, the assessment team, composed of Wendy Prosser and Olivier Defawe (VillageReach), and Gabriel Kaleka Bukasa (World Bank), traveled to the DRC to conduct the key informant interviews and facility visits. During the key informant interviews and facility visits, VillageReach employed four primary data collection methods. The variety of data collection methods allows for data triangulation to eliminate problems of bias, hidden information, or accuracy. The data collection methods are shown in the table below along with the Key Performance Areas (KPAs) that they will be used to evaluate.

<table>
<thead>
<tr>
<th>Key Performance Area</th>
<th>Methods</th>
<th>Document Review</th>
<th>Trace Key Commodities</th>
<th>Visual Verification</th>
</tr>
</thead>
<tbody>
<tr>
<td>KPA 1. Processes and Policies</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
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<tr>
<td>KPA 2. Financial Management</td>
<td>X</td>
<td>X</td>
<td></td>
<td></td>
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<tr>
<td>KPA 3. Stock Management</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
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<tr>
<td>KPA 4. Data for Management</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
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<tr>
<td>KPA 5. Distribution Management</td>
<td>X</td>
<td>X</td>
<td></td>
<td>X</td>
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<tr>
<td>KPA 6. Planning and Coordination</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td></td>
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<tr>
<td>KPA 7. Human Resources</td>
<td>X</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>KPA 8. Private Sector Engagement</td>
<td>X</td>
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</tbody>
</table>

To gather information from key informants, the team met with leadership from governmental institutions and program partners at the national and provincial levels, as well as with the staff at a sample of health facilities, warehouses at the provincial and health zone levels. (See Annex 1 for full list). At the national level, VillageReach conducted interviews with health program managers and key departments linked to health (EPI/PEV, PNAM, DPM, PDSS, TB, blood transfusion, central medical stores, and logisticians...). Additional interviews were conducted with key staff from partners from the World Bank, UNICEF, USAID, SANRU, and Cordaid to ensure their buy-in to this process and to incorporate their perspectives on logistics system bottlenecks and potential solutions for addressing health commodity supply needs.
Key health program staff were also interviewed at the provincial level in both Mbandaka (provincial capital of Equateur) and Boende (provincial capital of Tshuapa), as well as one private transporter in Mbandaka. These interviews provided an overview of the successes and challenges of the supply chain in the province and opportunities for key players to express their pain points, dependencies, and suggestions.

At the health zone and health center levels, interviews were conducted with staff responsible for logistics activities and transport. This included pharmacy, laboratory, and clinical staff, which, at peripheral levels, are roles often filled by a single person. The goal of these interviews was to include the last mile perspective on the impact of logistics challenges in the provision of health care and to ground recommendations in the reality of how they would impact those working at the lowest levels. As the table above shows, key informant interviews are the largest data source as it is used for each of the key performance areas.

In addition to conducting informational interviews, the team evaluated the state of the supply chain by observing physical stocks of vaccines and related commodities. The team also assessed storeroom and cold chain conditions. Family planning commodities, oral rehydration salts (ORS) + zinc, and amoxicillin were also surveyed as tracer commodities to evaluate opportunities for supply chain integration. Tracking commodities allows for linking the various pieces of the supply chain, clearly seeing performance in select key cases, and identifying weak and strong elements of the supply chain.

The assessment also included a document review at the facility level, including stock cards, requisition forms, vaccine related patient registers, service reports, receipt books, supervision registers, and transport use and maintenance records. It is important to review documents to verify information provided in key informant interviews and also to correlate data across forms. In many cases, such documents were not available for review, which is an assessment finding in itself.

Finally, the team used visual verification throughout the field visits to physically see what was discussed and reported. This included observing the vehicles/boats, information systems, storerooms, record books, security mechanisms, policy manuals, and job aids. This method was primarily used for data triangulation and fact checking.

**Stakeholders Workshop**

The assessment report and recommendations were presented to the World Bank both as a written document and in presentation format for sharing with in-country staff and partners the week of October 19, 2015. VillageReach facilitated the initial presentation of the report and potential supply chain solutions to stakeholders for discussion. The objectives of the workshop are:

1. To present the strengths and weaknesses of the supply chain as discovered in the assessment, specific to Equateur and Tshuapa provinces;
2. To validate the potential solutions recommended by VillageReach to key stakeholders and decision-makers;
3. To assess the feasibility of the recommendations; and
4. To outline activities necessary to develop and realize an implementation plan for the final set of solutions.
During this visit, the VillageReach team participated in a smaller meeting with financial, technical, and implementing partners to get additional feedback from stakeholders. Based on this feedback from stakeholders collected during the workshop and the meeting, VillageReach revised the recommended solutions to provide input to the World Bank on possible implementation scenarios for the chosen model(s).
Findings
This assessment included only a small sample of a few health facilities and health zone storerooms and so is not exhaustively representative of every situation. Facilities were selected to represent a range of different levels of capacity, skills and understanding of supply chain management practices. However, the results are generalizable to a broader view of system strengthening and areas that need improvement across the supply chain and provinces.

Overview of Findings
Findings demonstrate that the issues and challenges documented in other studies are exacerbated at the last mile in the Equateur and Tshuapa provinces. Highlights of the findings are included here:

a. Infrastructure Conditions
• Travel within Equateur and Tshuapa provinces is extremely difficult. Examples observed include the absence of proper roads, rather ground infrastructure was often limited to trails, sometimes in extreme condition requiring a 4x4 to traverse; some broken bridges that had to be repaired in order to cross; need for multiple transportation options (motorcycle, boat, or canoe). These extreme conditions made any travel time consuming.
• Distances are significant, both for some community members to reach health facilities as well as for health facilities to reach health zones to restock commodities (e.g., 40 km up to 145 km) and for health zones to reach the provincial capital for restocking.
• The two provinces have no access to the electrical grid. The use of solar panel or generator is very sporadic at the provincial or health zone level and mostly inexistent at the community level.
• Communication networks are also sporadic at the provincial or health zone level and mostly inexistent at the community level.

b. Performance of the Supply Chain
• Stockouts of many commodities (vaccines, family planning, malaria and HIV treatment, essential medicines) were systematic at health facilities and warehouses at all levels, resulting in health workers having to travel up to 170 km to the provincial main town to purchase commodities of questionable quality from private pharmacies.
• The supply chains for vertical health programs work independently and with little coordination, resulting in duplication of effort and resources.
• Cursory reviews of health facility documentation show poor data quality and lack of supervision from higher levels.
• At all levels of the health system, human resource capacity for managing logistics activities (cold chain, warehouse, transport, distribution, data collection/validation and use, etc.) is highly questionable.
• Supervision and activity monitoring from the higher level down is mostly inexistent.
• It is worth noting that during the implementation of a recent World Bank project (PARSS), the delivery of essential medicines to the health facilities strengthened the capacity of health facility staff to collect orders directly from the health zone warehouses. A monetary compensation (about 5 USD) was distributed to health facilities independent of the distance covered to collect the supplies. Since PARSS ended in 2014, the supplies of essential medicines and of anti-malaria medicines have been interrupted resulting in systematic stockouts at the health zone and health facility levels. In provincial warehouses, large stocks of undistributed medicines remaining from the project were observed.
c. Reliability of the Cold Chain
   - Cold chain issues are pervasive with non-functioning equipment or unavailability of fuel for fuel-operated equipment. As a result, health workers have to travel long distances every week to fetch vaccines from health zone warehouses using transportable cool boxes, threatening the potency of the vaccines.

d. Private Sector Engagement
   - There is a viable private sector with transporters already working in the public health sector through partners in Mbandaka and Tshuapa. The private drug sellers are reputed to have questionable quality of drugs, yet many health zones depend on the private sector for stock.

_Detailed Findings across Key Performance Areas_

The assessment was organized around a framework of key performance areas (KPAs) that cover aspects of the supply chain from general system design to human resources. Details related to each KPA are included in the table below.

*Table 2. Assessment findings by key performance area*

<table>
<thead>
<tr>
<th>KPA</th>
<th>Key Findings</th>
</tr>
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<tbody>
<tr>
<td>KPA 1. Supply Chain Processes</td>
<td>In general, there are three main supply chain mechanisms:</td>
</tr>
<tr>
<td></td>
<td>1) A public supply chain managed by the SNAME (National Essential Medicines System) is responsible for public procurement of essential and generic products. It is under the supervision of PNAM (National Drug Supply Program) and its funding depends on cost recovery for some drugs, as well as donations and financial support from external partners. The FEDECAME (Federation of Essential Medicines Supply buyers) is the not-for-profit entity in charge of buying and distributing essential medicines at the national level; it includes two BCAF (sub-national coordination bodies for procurement) and 16 provincial warehouses (CDR) at the provincial level scattered across the country. Drugs are purchased by BCAF, which is responsible for delivery to CDR at the provincial capital. The CDR is then responsible for delivery to the health zone, which then must ensure availability at General Reference Hospitals (HGR) and other health facilities for dispensation to the final consumer. This last leg often falls on the health worker from the facility level to go and fetch from the health zone.</td>
</tr>
<tr>
<td></td>
<td>2) The supply chain for health products for specific programs (malaria, HIV/AIDS, immunization, etc.) ensures the procurement and distribution of certain products, primarily through implementers and partners (e.g., CARITAS, SANRU, CORDAID), integrating these products into the supply chain at the provincial level and down.</td>
</tr>
<tr>
<td></td>
<td>3) The private sector supply chain has limited purchasing and distribution capacities (often used by health facilities, in case of stockouts).</td>
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<tr>
<td></td>
<td>The separate supply chains are used to fill commodity needs at the health facility and health zone level, typically on a monthly basis with supplemental or emergency orders when necessary. These supply chains are subject to a number of challenges, inefficiencies, and delays that lead to reduced commodity availability at the service delivery point.</td>
</tr>
</tbody>
</table>
### 1.1 Ordering

- The paper-based ordering process for essential medicines is complicated, data intensive, and unmanageable for the capacity available. These challenges lead to errors in ordering and inefficient use of time taking staff away from clinical care. In this pull system, paper forms are completed by health facility staff for consumption reports and requisitions, and delivered to the health zone. The health zone fills the requisitions as much as possible, and sends aggregated reports on paper forms to the province.
- Order requests are delivered by hand and depend on the capacity of staff to physically go to the health zone, due to the limited communication network.
- The process for supplemental or emergency orders is inconsistent and not properly documented by health facilities or the health zone, leading to minimal opportunity to ensure sufficient levels of supplies are available or to understand true stock needs at each level of the system.

### 1.2 Receiving

- Health zones should receive their essential medicines from the CDR. However, neither Equateur nor Tshuapa have a CDR at this time, resulting in an inconsistent and unreliable delivery process and frequent stockouts.
- The supply of specific program products such as malaria treatment and vaccines to health zones and health facilities is coordinated and financed by the programs themselves. However, at the time of the assessment, anti-malaria medicines and vaccines were being delivered, though inconsistently.
- Lead times from the health zone level are long (e.g. up to two days) mainly due to the long distance between the health zone and many of the health facilities, the lack of access to transport, and the difficult road conditions. The long lead time reduces the availability of stock and presents a particular risk to vaccines that are dependent on the cold chain.
- Staff do not know when an order is available at the health zone. This makes it difficult for staff to determine if they should place a supplemental order to the health zone and or purchase the medicine from private suppliers.
- Stockouts at the health zone and provincial warehouses result in common use of private suppliers.

### KPA 2. Financing

Challenges in financing, including insufficient funding allocations and delayed disbursements, are some of the greatest drivers of poor availability of medicines and related supplies at the health zone level and down.

The health system is based on a cost recovery approach, with clients paying a minimum amount for essential commodities and services; partner donated commodities (malaria treatment, vaccines, family planning) are available for free although there may be a minimum cost associated with the service to receive the drug. Health facilities then use collected fees to pay for transport and for the purchase of drugs from the health zone (or provincial level, or private sector if there is a stockout at the health zone level). The health zone level then uses collected fees to purchase drugs from the CDR at the provincial level. However, this process is not closely managed or regulated, and fees recovered are insufficient for true operational costs at the facility.

### 2.1 Funding availability

- Health facility allocations and fee recovery are insufficient for the purchase of health commodities and for transportations.
2.2 Financial management

- Health facilities are not aware of their current account balance; there have been situations where the provincial level has been accused of misuse of these health facility funds.
- Financial management is not included in supportive supervision of health facilities.

KPA 3. Stock Management and Cold Chain

There are significant challenges in the management of stock at the health zone and facility levels, including a lack of capacity, a lack of awareness and adherence to policies, and insufficient storage space in some situations. Each place visited during the assessment had different levels of performance of stock management practices. One health facility had recently received a supervision and in-service training visit from WHO on stock management; the stock cards and monthly report form were impressively completed (with only a few minor errors to correct). This makes the case for improved supervision at the health facility level.

The cold chain is an area that needs significant investment. There is no inventory of current equipment; more than half of the equipment seen during the assessment was not functioning; and the provinces do not have a technician available for preventive or corrective maintenance.

3.1 Stock levels

- Stock levels of the tracer commodities (vaccines, amoxicillin, ORS + zinc, family planning products) are insufficient for patient care at the health facilities. Availability of essential medicines was insufficient.
- Inadequate ordering practices and low fill rates compound the stock shortage issues.

3.2 Inventory management

- In provincial and health zone warehouses, the person in-charge does not have a sense of how much stock they have in their facility. Review of stock levels and physical inventory happens irregularly, if at all. At the health center level, management of the inventory is inconsistent.
- There are no clear processes for who should be notified if facilities are overstocked or understocked.
- There are no clear processes or documentation procedures when stock is redistributed between facilities.

3.3 Store room and cold chain management

- Storage conditions are variable between facilities. For example, the nurse at one facility with particularly poor infrastructure was using a single cardboard box to store all medicines in his house next door to the facility. Other facilities had better organized shelves in the pharmacy, but often with incomplete stock cards.
- More than half of the cold chain equipment available at health facilities and health zone levels visited during the assessment was not working, partly due to simply old and out-of-date equipment and partly due to lack of repair or maintenance. In multiple instances, including at a health zone warehouse and at an EPI antenna, health personnel were using icepacks to keep the temperature of the non-functioning solar refrigerator low but not using a temperature monitoring device.
- In facilities with functioning cold chain equipment, the health workers were vigilant about maintaining twice daily temperature records.
- There is no inventory of cold chain equipment available.
- For facilities without cold chain equipment, health workers fetch vaccines weekly or
bi-monthly from nearby facilities with a cold chain for immunization days; proper handling practices of vaccines using cold boxes during transport could not be documented but are assumed to be below optimal practices.

### KPA 4. Data for Management

Health facilities complete monthly consumption reports of all commodities together with the ordering of new stock of commodities. The limited availability of historical records and the lack of updated stock records limit the ability of facilities and the health zone warehouse to understand true stock needs of the health facilities; this limited visibility of true need is passed up to the provincial level.

#### 4.1 Record keeping
- Stock records are infrequently used and when in use, are not kept up-to-date. Basic forms and registry books are also scarce; often health workers will create their own forms to keep track of data.

#### 4.2 Data quality
- The quality of data is poor, in part due to the complexity and variety of data required on a monthly basis. Errors in the RUMER (*Registre d’utilisation des medicaments et recettes*) were observed, particularly in the consumption and stock-out fields.

#### 4.3 Data availability
- Availability of historical records was limited at the provincial and health zone levels. Without access to prior records, it is difficult to anticipate future stock needs.

#### 4.4 Data analysis
- Consumption data, in general, are likely to be incorrect as few facilities keep up to date records. In addition, health facilities often estimate consumption and stock needs based on their own “understanding” of the population. Without accurate consumption data, facilities may under- or over-estimate demand for their facility and unintentionally contribute to stock-outs at their facility or others through inaccurate orders.
- Facility level data are not used for decision-making. Restock decisions and completion of requisitions are based mainly on availability of commodities either at health zone or provincial level.

### KPA 5. Distribution

In the context of essential medicines distribution, facilities generally use public transportation to the health zone warehouse to submit and fill orders, submit reports, or receive feedback; and health zone level does the same to the provincial level. For the distribution of donated commodities (e.g., vaccines and anti-malaria medicines), distribution sometimes benefit from specific distribution means such as local NGO or specific national program infrastructures and resources (e.g., SANRU and EPI). Limited transportation infrastructure and financial capacity reduces the ability of health zone and health facility staff to complete logistics responsibilities or fill supplemental orders.

#### 5.1 Distribution planning
- Health facilities mainly depend on their capacity (financial, human resources, transportation) to travel to the health zone to collect orders, using funds from fee recovery or personal funds to cover the costs.
- The distribution process from the province to the health zone level is inconsistent, resulting in long delays and exacerbating stock shortages and stockouts at health zone and health facility levels.

#### 5.2 Access to and availability of
- Availability of vehicles (e.g. bicycle, ATV, motorcycle, motorboat, or canoe) at all levels of the system, for any purpose, is limited, unpredictable, and somewhat
| transport | expensive.  
| | • The type of vehicle used for transport is sometimes not appropriate (e.g. use of expensive 4x4 instead of motorcycle or ATVs).
| | • Frequent travel by health facility staff to the health zone to submit and collect orders or submit reports limits their ability to provide care and oversight of the facilities. |
| KPA 6. Planning and Coordination | Logistics and overall pharmaceutical supply planning at all levels (provincial, health zone and facility levels) is limited and is not conducted in a systematic or coordinated manner within the health system. The private sector operates independently. |
| 6.1 Planning | • Coordination challenges exist at all levels of the supply chain. These challenges affect the timely release of funds for purchasing commodities, limit the ability of health facilities to plan for stock needs, and reduce the health zone’s ability to respond to health facility demands.
| | • Communication between health facilities and health zone or provincial levels is limited, leading to inaccurate estimates of upcoming stock, stock availabilities and stock needs. |
| 6.2 Coordination | • There is limited capacity to facilitate proper integration and coordination of the supply chain for health commodities. This leads to major duplication of efforts, miscommunication, and wasted resources.
| | • The provincial commission of medicines for coordination of supply chain activities is not functioning in Equateur and Tshuapa (contrary to other DPS in the country)
| | • There is no established process for redistribution of commodities between health facilities in the case of over- or under-stock. |
| KPA 7. Human Resources | In health facilities without a pharmacist, stock management and logistics activities typically become the responsibility of the primary or secondary nurse. Often, these staff are not trained specifically on logistics and also takes them away from providing clinical care.  
At the DPS and BCZS, as well as at larger facilities such as reference health centers and health zone warehouses, the teams are usually composed of either a trained pharmacist or a staff member who has received logistics training to manage logistics tasks. |
| 7.1 Qualifications and specialization | • At the DPS, BCZS and in larger facilities (health zone, reference hospital), pharmacists with logistics training staff complete logistics tasks. In smaller facilities (health centers), clinical staff typically fill these roles. Limited understanding of logistics affects the ability of clinical staff to complete them correctly (e.g. misuses of indicators, error in the RUMER).
| | • Little or no funding is available for logistics training for health facility staff, yet often this responsibility falls on them. |
| 7.2 Logistics staff availability | • Clinical responsibilities may limit the ability of facility staff to adequately manage logistics activities, reducing the amount of time spent on stock management, record keeping, and inventories.
| | • Health zone logistics staff, typically not clinicians, have a variety of areas that they are responsible for supervising and may not sufficiently cover ordering and stock
### 7.3 Logistics supervision

- Supervision of health facilities, in particular regarding inventory management, does not occur on a regular basis due to transportation issues, the high number of facilities in the health zone, and the large size of the health zone. Infrequent supervision limits monitoring of facility needs and management practices, perpetuating existing inefficiencies, mistakes, and neglected policies. Additionally, the irregular supervision is not sufficient to support health facility staff in building capacity to improve medicines management and inventory practices.
- One example of the proven benefit of on-site supervision was observed at one health facility resulting in the correct use of the RUME.
- There is no system of accountability or follow-up for the items noted during supervision. Feedback is provided at the time of the supervision, but intentional review of these issues is not conducted during subsequent supervision visits. Without accountability or follow-up, there is little incentive or motivation for facility staff to enact recommended changes.
- Health zone logistics staff will sometimes collaborate with partners to jointly conduct supervision, which helps to address transportation gaps. Varying priorities of the partners may affect the frequency and content of the visits, and projects do not operate indefinitely.
- The health zone is irregularly supervised by the provincial level. Insufficient supervision is likely to lead to a diminished understanding of how health zone policies and practices contribute to stock availability and inadequate communication of policy or practice changes.

### KPA 8: Private Sector Engagement

Equateur and Tshuapa have a decent private sector for logistics services with a couple of private sector transporters already involved in the public health supply chain from the provincial to the health zone level.

### 8.1 Availability

- Private sector transporters are available both in Equateur and Tshuapa. In discussions with one private sector entity (Fondation Lucie Otaenga – FLO) indicated they already deliver health commodities for UNICEF and PSI to the health zone level. SANRU is another NGO which already provides logistics services (among others) to Global Fund. The World Food Program (WFP), a worldwide partner with logistics expertise also very present in Equateur (e.g., one warehouse in Mbandaka), has expressed its interest in branching out from their food programs to apply its logistics capabilities to the health sector, specifically to improve health commodities availability in DRC.
- Fewer private sector transporters were available at the health zone level.

### 8.2 Willingness

- The private sector is very willing to be contracted for health commodity distribution. The one transporter interviewed also expressed interest in working with local transporters at the health zone level to build their capacity for efficient and dependable distribution to the last mile.
- The DPS also expressed interest in seeing more engagement with private sector transporters, although current capacity for managing 3PLs and contracts at the provincial level (CDR or elsewhere...) is insufficient.
Recommended Solutions

Based on results of the assessment, the assessment team has developed two core recommendations detailed in six components and six management strategies for Equateur and Tshuapa. These recommendations were validated and revised during a workshop with stakeholders from the national, provincial, zonal, and facility levels. It is important to see these recommendations as opportunities to build up on existing improvement activities (e.g. EPI improvement plan) and as part of the national effort for strengthening and integrating the supply chain for all commodities. The value added of this evaluation and of the proposed solutions comes from the last mile characteristics of the solutions that are adapted to the on the ground realities of these two provinces.

**Core Recommendation One** shifts to a more efficient supply chain model in Equateur and Tshuapa, with an emphasis on streamlining distribution systems, strengthening quantification, and increasing the quality and availability of data for management. Specifically this shift will be accomplished by transforming six supply chain components that draw from applicable best practices for supply chain strengthening, as outlined below:

**Distribution systems:**
- Component 1: Implement direct delivery to health facilities with Field Logistics Coordinators
- Component 2: Integrate and homogenize vertical supply chains for increased efficiencies
- Component 3: Develop and implement robust systems for reverse logistics

**Quantification:**
- Component 4: Improve quantification at the provincial level, based on more accurate data

**Data for Management:**
- Component 5: Improve data collection and management through direct data collection at health facilities and supportive supervision by Field Logistics Coordinators
- Component 6: Rigorously apply key performance indicators (KPI) with structured, regular review

**Core Recommendation Two** is to use six key management strategies, listed below, to strengthen supply chain management in Equateur and Tshuapa, and to achieve and sustain the implementation of the components of Core Recommendation One.

- Management Strategy 1: Conduct a supply chain modeling exercise to inform decision-making
- Management Strategy 2: Develop a robust cold chain strategy based on the results of the modeling exercise with an emphasis on increased capacity for maintenance
- Management Strategy 3: Integrate supply chain improvements with PDSS and its performance-based financing approach
- Management Strategy 4: Seek out opportunities for Private Sector Engagement for logistics services
- Management Strategy 5: Prioritize the professionalization of human resources for logistics management
- Management Strategy 6: Increase the viability of cost recovery
The following pages detail each recommendation, component, and management strategy, all of which are based on evidence and experience from other countries and align with best practices adapted to the context and needs of Equateur and Tshuapa.

### Core Recommendation I: Shift to a more efficient supply chain model

1. **Implement direct delivery to health facilities with Field Logistics Coordinators**

#### KPA1: Ordering and receiving processes are difficult for health facilities

#### KPA3: Poor inventory, storeroom, and cold chain management and stock shortages

#### KPA4: Poor record keeping and data quality at health facilities

#### KPA5: Inconsistent and inefficient distribution processes

#### KPA7: Insufficient HR with logistics specialization and lack of supervision at facility level

<table>
<thead>
<tr>
<th>Pain Points</th>
<th>Recommended Solutions</th>
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<tbody>
<tr>
<td>• The CDR, which has financial autonomy, is responsible for distribution.</td>
<td>• Collection of rigorous data to model distribution systems</td>
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<tr>
<td>• Field Logistics Coordinators provide direct delivery to health facilities, via optimized transport loops.</td>
<td>• Develop a profile for Field Logistics Coordinator candidates</td>
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<tr>
<td>• Field Logistics Coordinators also 1) provide supervision to healthcare workers at the facility level and 2) gather logistics data (eg. consumption, stock levels, etc.)</td>
<td>• Assess and strengthen the supply chain management capacity (quantification, monitoring and evaluation, etc.) of the DPSs and CDRs</td>
</tr>
<tr>
<td>• Field logistics coordinators work together with the BCZS on routine monitoring and evaluation of health facilities</td>
<td>• Assess and strengthen the storage and stock management capacity of the BCZS</td>
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<tr>
<td>• BCZS provide « cross-docking » and maintain buffer stocks</td>
<td>• Develop and document the roles and responsibilities of the actors involved</td>
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<td></td>
<td>• Develop and document the coordination mechanism between 1) the CDR and the BCZS and 2) the programs and the CDR</td>
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<td></td>
<td>• Conduct a study to quantify the costs necessary to employ Field Logistics Coordinators, strengthen the capacity of the CDR and BCZS, and implement any related activities.</td>
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#### Priority Actions

- Shift away from district-level and increased responsibility at province requires political williness to change
- Loss of current monthly supervision meeting for health facilities at zone level
- Loss of opportunity for health facility workers to travel to zone (i.e., personal benefit)

**Figure 1. Component 1: Implement direct delivery with Field Logistics Coordinators**

**Recommended Solutions**

To increase the efficiency of the distribution system, commodities would be delivered directly to health facilities using an informed push model also called “top up” model. A Provincial Logistics Management Team (PLMT), composed of logistics-trained staff from the DPS, from the BCZS, from CDR, and from specific programs (e.g. EPI antenna) and a Field Logistics Coordinator (FLC) leading activities for each transport loop that directly report to the DPS, would be responsible for the operationalization of the delivery of all health commodities directly to health facilities.

The FLC would be stationed at a newly identified Inter-zonal Coordination Office (BCIZ), which could be housed within already existing BCZS that has been strengthened for commodities storage and
management capacity. The FLC, who could be accompanied by other members of the PLMT depending on the needs, would be responsible for the distribution directly to health facilities across several zones according to an optimized transport loop. Figure 1 illustrates the concepts of transport loop and of Inter-zonal Coordination Office.

The development of these transport loops, in blue in Figure 1, would be informed by a supply chain modeling exercise (more information below), and would be flexible and take geography into account so that, when appropriate, some distributions may be made directly from the CDR to the facility en route to a BCIZ, for example, or ignore administrative boundaries for efficient transport routes. A variety of transport options will be required (4x4, canoe, motorcycle, ATV four-wheel drive) and can be determined and defined during the modeling activity. The frequency of delivery can also be determined to make the best use of scarce resources.

Since a single transport loop may serve multiple zones, and facilities in the same zone may be served by different transport loop, BCZS personnel will play a key role in monitoring and evaluation of the health facility performances. To gain efficiency, BCZS personnel will not necessarily need to accompany the FLC on every distribution but will play a critical role for compiling and analyzing the logistics data collected by the FLC for individual zones, since the FLC will be concerned with transport loops that cover multiple zones.

In addition to being responsible for the direct delivery of commodities to health centers, the FLCs will also provide supervision to health workers in terms of stock management during distribution. Moreover, the FLC will contribute to consumption and logistics data collection directly at the health facilities. This direct
engagement of the FLC in data management at the health facilities will help with improving data quality, a key element for strengthening quantification.

This distribution model would be managed by the DPS but operationalized by the CDR that is in the process of being built in Equateur (CAMESE), either through their own transport means or through the private sector. In Tshuapa, as there is no CDR, a relay warehouse will be managed by the CAMESE with limited permanent personnel. This relay warehouse will also be able to take responsibility for distribution of commodities to the health facility level.

Overall, this distribution model is a shift from the current system, which places responsibility on 1) the health zone level to go and fetch commodities from the provincial level (CDR, EPI antenna…), and 2) the health facilities to go and fetch commodities at the BCZS. This shift will require strengthening the storage and management capacity at the provincial level (CAMESE and secondary warehouse), as well as some upgrades to infrastructure at the BCZS. With this model, the DPS will play a coordination role in both the distribution system and the information system.

Additionally, this model includes the use of a hybrid cross-docking approach at the BCIZ. Under this approach, the BCIZ would act as a temporary storage unit, but with emphasis on having the orders pre-packed at the provincial warehouse (e.g. CAMESE) to facilitate a simple and easily manageable distribution to the health zone and on to the health facilities. With this approach, the stock management

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**Case study I: The Dedicated Logistics System in Mozambique**

In 2002, the Foundation for Community Development, VillageReach, and the Mozambican Ministry of Health launched the Dedicated Logistics System (DLS) for vaccines and related supplies to improve the availability of vaccines in Northern Mozambique. The DLS is run by the Provincial Health Departments. It is organized around provincial-level logistics teams of three to four people, called Field Coordinators, who manage the informed push distribution system and are responsible for delivering vaccines to all health centers in a delivery zone. Delivery teams transport vaccines, and other essential commodities directly to health facilities. During the delivery, field coordinators collect data on vaccine supplies, stock-outs, vaccines administered, and cold chain maintenance to inform forecasting and logistics management. The DLS now operates in five provinces of Mozambique, serving a population of over eight million people, and is staffed and managed by provincial government personnel.

An independent impact evaluation and complementary costing study revealed the following results of the Dedicated Logistics System (DLS) as compared to a controlled province:

- DPT-HepB3 vaccine coverage rates increased from 68.9% to 95.4%.
- All other vaccines had similar increases resulting in an average coverage rate of 92.8%.
- The reported monthly incidence of stock outs in rural health centers decreased from 80% to 1%.
- Up-time of the cold chain increased from approximately 40% before the project to 96% over a year after the conclusion of the project.
- The model was 17% more cost-effective and cost 21% less expensive per vaccine dose delivered.

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2 Source: Baseline studies for the 2011 average and SELV (LMIS) data for 2014 average.
responsibility at the BCZS will be diminished. However, BCZS will play a key role in maintaining communications between health facilities and CDR (or secondary warehouse), as well as monitoring and evaluation and data management at the zonal level.

**Expected benefits**

This model brings efficiencies to the system by placing the responsibility for distribution at the provincial level, which, in principle, should have more capacity to manage and finance these activities than the lower levels (e.g. BCZS and health facilities). The health zone level in the current system is poorly functioning with little availability of commodities and minimum capacity to manage. Using Field Logistics Coordinators also streamlines the system and reduces the number of personnel required for logistics-related work, reducing training expenses and freeing up time of health workers to instead focus on providing health care. Establishing a regular distribution system will also reduce stockouts and guarantee commodity availability at the last mile and build a more agile system that can respond to changing demands.

**Priority Actions for Implementation**

In order to implement this solution, rigorous data (on distances, transport condition, product specificities for transport and storage, etc.) should be collected to determine optimal transport loops and strategies to strengthen storage and stock management capacity at the zone level. Additionally, the Field Logistics Coordinators are the engine that will support this recommendation, and their deployment will require a number of steps to ensure coordination and define roles of the actors involved, specifically the CDR, DPS and the programs, and specify the exact roles and responsibilities of the Field Logistics Coordinators themselves.

**General Considerations**

One challenge to implementing this model is the shift away from the dependence on the health zone level and placing more responsibility on the provincial level for distribution and financial responsibility. That will require change management and a willingness to take on the responsibility. The use of Field Logistics Coordinators to implement this solution may also require the development of a new cadre of health care worker to be inserted into the health system. In addition, regular and reliable financing is required and will need to be identified to support the costs of routine distributions such as fuel and per diems. The other notable aspect of the current system that will be lost is the monthly supervision meeting when those responsible for health facilities travel to the health zones to turn in monthly consumption reports, review results as a group, and pick up needed commodities. Health workers may react adversely to this model, as it takes away the opportunity for them to travel to the health zone level to pick commodities, which can also provide a break from the routine and a chance to address other personal issues. The benefit, though, is the on-site supervision that the Field Logistics Coordinators can provide at both health zone and health facilities to immediately correct problems in stock and data management and improved stock availability at the last mile.
Considerations for Improving Access to Vaccines

EPI has been actively working on strengthening the vaccines supply chain in DRC. We believe that, in order to favor the integration of distribution systems for all health commodities, it is important to 1) take into consideration the efforts that the different partners and parties involved have and are currently developing or implementing, and to 2) build up the capacities that already exist. With the proposed integrated solution, the CDR (e.g. CAMESE in Equateur) will be responsible for the operationalization of the delivery of vaccines to the health zone level and on to health facilities through the Field Logistics Coordinators who will be working closely with the EPI logistician located at the provincial Antenna.

For delivery of vaccines and of other commodities dependent on the cold chain (e.g. laboratory reagents) to the health zone level and on to health facilities, we endorse following the EPI approach to use health centers that have functioning cold chain equipment as cold chain relay sites. Health centers without cold chain equipment will continue to go and fetch vaccines from the cold chain relay sites every week or every other week (as is currently the practice) for periodic vaccine days. An additional recommendation, addressed in detail later in this document, is to optimize the placement of cold chain equipment (both current and new being purchased by UNICEF) at strategically identified relay sites to facilitate this process and reduce the time and distance required for health workers to pick up not only the vaccines but also the other cold chain dependent-commodities from the cold chain relay site.
2. Integrate/homogenize vertical supply chains

Figure 3. Component 2: Integrate and homogenize vertical supply chains to increase efficiency

**Recommended Solutions**

As the road and waterway networks and transport options are quite complicated in these two provinces, it makes logical sense to integrate and homogenize the supply chain as much as possible to reduce the level of effort required for commodity distribution. Modeling results can identify the optimal integration of the different commodities based on storage and transport capacity, need at the health facility level, and characteristics of the commodities to determine the most suitable and beneficial distribution system. The appropriate commodity mix will be informed by priority of the commodities according to the DPS, health workers, and donors. Segmentation of commodities should be done based on three criteria: physical criteria and complexity of the product; the urgency/priority of the product; and the financial margins of the product and its ability to attract additional funding. These decisions can be informed through the modeling activity.

A few commodities should be prioritized to be included in the integrated approach based on need, demand, and functioning of their individual supply chain to date. Vaccines, as a priority, will be integrated with other commodities as much as possible using optimized placement of cold chain equipment to facilitate the weekly or bi-monthly vaccination days. Family planning products have a high demand, high impact on health, and currently are only minimally available. Malaria treatment and accompanying drugs such as fever reducers should also be prioritized due to the high risk of malaria; anecdotal evidence gathered during interviews suggests that previous supply chain project in Equateur (PARSS, financed by the World Bank) was successful at ensuring availability of these commodities, and it would be remiss to backtrack on that progress. Similarly, based on observation and interviews we performed on the ground,
the supply chain for tuberculosis (TB) treatment seems to be performing relatively well and should not be allowed to backtrack, as TB is a significant health problem in this area.

PDSS has identified a number of RMNCH tracer commodities to guarantee availability at the last mile, and product segmentation could initially prioritize these commodities. This approach can be replicated for Equateur starting with these identified priority commodities, with the remaining commodities to be determined together with the DPS and its partners and with a phased approach to integration and homogenization.

**Priority Actions for Implementation**

Determining which commodities to integrate requires gathering detailed information on the characteristics of the commodities, as well as on the transport loops. The modeling exercise will be the first critical step toward introducing this recommendation. The modeling exercise will collect this information and provide a number of potential scenarios to inform decision makers. The political landscape should also be taken into account, and the CDR and programs that manage commodities will have to develop appropriate agreements and mechanisms to move integration and homogenization policies forward.

**General Considerations**

Besides the challenge of space issues during transport in an integrated supply chain, one other challenge will be coordinating all partners in the provinces to support a single supply chain. Currently, partners and programs are very siloed and individualistic. The local NGO SANRU is presently involved in distribution of malaria commodities; integration of other commodities could be explored with this organization. Any change to this system will need to be well coordinated and planned out.

**Considerations for Improving Access to Vaccines**

The EPI has developed an improvement plan to start responding to the gaps identified in the GEV evaluation performed in 2014. It is important to take into consideration the solutions and activities defined in the EPI improvement plan when thinking about defining a homogenized supply chain model for all health commodities (vaccines, essential and generic medicines, laboratory commodities, family planning commodities, etc.).
3. Strengthen reverse logistics management

<table>
<thead>
<tr>
<th>Pain Points</th>
<th>KPA 5: There is currently no mechanism for reverse logistics for expired or overstocked medicines, or for laboratory samples (for example, Ebola tests) that need to be processed at the district or provincial levels</th>
</tr>
</thead>
</table>
| Recommended Solutions | • Use the Field Logistics Coordinators’ return trip to bring back overstocked or expired medicines and lab samples to the BCZS or the provincial level to ensure organized delivery and proper handling  
• Train the Field Logistics Coordinators in handing expired medicines and lab samples |
| Priority Actions | • Develop and document procedures for 1) redistribution of products between health facilities, 2) management of expired products, and 3) handling of lab samples (transport, storage, etc.)  
• Develop and document a framework for coordination between the programs and the CDR for management of lab samples  
• Organize training for Field Logistics Coordinators on lab sample handling and protocols |
| Considerations | • Requires close coordination among all partners and clear standard operating procedures to clarify roles, responsibilities and expectations. |

Figure 4. Component 3: Develop and implement robust systems for reverse logistics

**Recommended Solution**

Currently there is no mechanism for reverse logistics, neither to bringing expired or overstocked medicines back from the last mile health facilities to health zone storeroom or provincial warehouse for proper disposition or re-distribution, nor for bringing laboratory samples collected at health facilities to reference laboratories at the health zone or provincial levels where more advance tests can be conducted, particularly important for the HIV and tuberculosis programs. These reverse logistics activities will benefit from a direct delivery model. The delivery team will use the return trip to bring back commodities or samples to health zone or provincial level facilities, ensuring delivery and proper handling. The Field Logistics Coordinators will be trained on handling biological samples and expired medicines, and a proper documentation system will be designed.

**Priority Actions for Implementation**

Implementing this solution will require significant work to coordinate partners and document formal procedures both for redistribution of commodities during distribution trip but the FLCs, and ensure proper retrieval of expired commodities and laboratory samples. When recruiting and training FLCs, these requirements should be taken into account.

**General Consideration**

This will require close coordination among all partners and clear standard operating procedures to clarify roles, responsibilities, and expectations.
4. Improve quantification of commodities at the provincial level

**Pain Points**

- KPA1: Ordering is difficult and complicated for health facilities
- KPA2: Government budget allocations and fee recovery for health facilities are insufficient for purchasing adequate quantities of commodities
- KPA3: Inadequate stock levels
- KPA4: Data quality and analysis for quantification for orders by facilities are poor

**Recommended Solutions**

- The DPS is responsible for monthly quantification, disaggregated by transport loop, based on consumption reports and stock records collected by distribution teams, as well as population estimates
- BCZS maintains buffer stock
- The BCZS retain responsibility for quantification for the health facilities they manage

**Priority Actions**

- Identify a sample of products and transport loop for a pilot
- For each product, specify the quantification calculations based on existing algorithms and verify that existing tools collect the necessary data to make the calculations
- Define the roles of the DPS and the CDR in quantification activities, and train the actors involved appropriately

**Considerations**

- For some products, such as vaccines, national policies encourage quantification using only demographic data. Advocacy may be necessary to put new calculations in place at the provincial level
- Health facilities may not have sufficient funds to purchase their required commodities

*Figure 5. Component 4: Improve quantification based on more accurate data*

**Recommended Solution**

At both provinces, the DPS, and specifically the existing “Provincial Medicines Commission”, in collaboration with the BCZS, the CAMESE and the specialized programs, will be responsible for quantification of all commodities for each of the health zone areas based on monthly consumption reports and stock records from the aggregated district reports, as well as population estimates, as is currently the practice. The health zone (BCZS and the proposed BCIZ) will continue to maintain a buffer stock. Consumption and stock data will be collected by the Field Logistics Coordinators during distribution, so the level of accuracy is expected to improve over time.

Notably, in this recommended supply chain model, using a Field Logistics Coordinator for direct delivery reduces the dependency on requisitions that are often inaccurate and out of date by the time distribution occurs. However, the current system uses a pull model in which these requisitions, in principle, provide the basis for the quantities distributed to facilities (although in reality quantities distributed are often based on stock levels available at the zone and province). The availability of high-quality data will increase the range of distribution models that are feasible in the provinces of Equateur and Tshuapa, and allow for the distribution model to suit the characteristics of the commodities, rather than be limited by data constraints. For example, most commodities could be distributed using an informed push model, or “top up” model. In this model, an approximate quantification of the transport loop would be done at the DPS, but the Field Logistics Coordinators would finalize quantification when they arrive at the facility level and collect real-time stock data. Other commodities may be better suited for a “pull” or requisition-based system, as is currently in place. Additionally, improved data might make a “push” system, where facility-
level quantification is done prior to distribution feasible for a sub-set of commodities. Decisions about supply chain integration/homogenization should explore using innovative quantification approaches for distribution of different groups of commodities.

**Priority Actions for Implementation**

Since there are a number of innovative options for quantification, it would be useful to identify a subset of commodities or a specific transportation loop to pilot options like informed push. In order for the quantification to be accurate, decision-makers will have to specify their assumptions based on local conditions, and build those assumptions into the quantification algorithms for the pilot commodities. Once decisions about quantification methods are made, actors at the DPS and CDR must be trained to put new methods in place.

**General Considerations**

For this approach, the cost recovery aspect of the DRC health system and each level purchasing commodities from the next level up must be taken into account. To manage that, distribution teams will take quantities of each commodities based on the quantification calculation; each health zone and health facility will then purchase their required commodities. However, a mechanism must be put in place for cases when health facilities do not have funds available to purchase the full amount. Distribution will also include the health zone level to provide an emergency stock for health facilities; an additional consideration for this is the potentially reduced need for the health zone level emergency stock as distribution to health facilities is improved, reducing the operational funds available to the health zone. Any remaining commodities at the end of the distribution cycle will be returned to the CDR.

**Considerations for Improving Access to Vaccines**

Quantification is an activity that requires close collaboration between all the parties involved at all levels. In the context of integration/homogenization of the supply chains, it is important to define clearly the governance structure at the provincial level between the DPS, CDR, partners, and specialized programs such as EPI and leverage as much as possible the existing structures, even if they are not always functional to the optimal capacity. EPI has devoted a lot of effort and capacity to strengthen its

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**Case Study II: Delivery Team Topping Up in Zimbabwe**

In 2002, USAID (through the USAID | DELIVER PROJECT) conducted an assessment to determine why HIV and AIDS-related commodities were unavailable at rural SDPs despite adequate stock in central warehouses. After concluding that the problem derived from the health system’s inability to successfully carry out necessary supply chain functions, the USAID | DELIVER PROJECT recommended implementing a “Delivery Team Topping Up” (DTTU) system. Under the system, delivery trucks are filled with a fixed quantity of commodities, usually based on past consumption data, which are delivered directly to the SDP. The drivers, or other staff members, use on-site data to determine resupply quantities and help reconcile inventories. They then top-up stock at each SDP to meet demand until the next scheduled delivery. A 2007 evaluation showed that the DTTU system had achieved 95% coverage of all SDPs for condoms and contraceptives, with stock-out rates below 5% for these products.³

quantification for better predicting vaccine delivery and it will be important to build up from what was already done for vaccine delivery and integrate it for a homogenized quantification process.
5. Improve data collection and management

**Pain Points**

KPA4: Poor record-keeping, data quality, and data availability, leading to weak data analysis

**Recommended Solutions**

- Collection of consumption and stock data by Field Logistics Coordinators directly from health facilities and BCZS.
- Explore options for streamlining data collection using tools like ODK Scan and OpenLMIS.

**Priority Actions**

- Work with Gavi to install VSAT (planned) in all BCZS and to develop and implement a maintenance plan for the equipment
- Gather user requirement for an electronic LMIS, and suggest a menu of options for tools adapted to Tshuapa and Equateur

**Considerations**

- Gavi is planning to install VSAT in all BCZS, so using a web-based tool with offline capacity is feasible, but there is not currently a maintainence plan for the equipment
- National level information management system is still being defined; the provinces will need to be flexible to build on and adapt information management systems that are put in place

*Figure 6. Component 5: Improve data collection and management*

**Recommended Solution**

The Field Logistics Coordinators will be responsible for collecting consumption and stock data for all commodities directly from the health facilities and health zones during the delivery. While the FLC will be responsible for bringing back the data for all commodities collected at the BCZS and health facilities to the provincial level, the process of collecting data during the delivery visit will be a collaborative effort among all team members of the logistics management team visiting the sites. Consumption data will be collected using the monthly forms that the health facilities already produce; this also facilitates the required reporting of HMIS data. Stock on hand and stock delivered will be collected through a streamlined process at the health facility level. Data collection using tablets or an application like ODK Scan to digitize paper records is another option to explore for streamlining the data collection.

For vaccines, health facilities with cold chain equipment and serving as relay sites for other facilities will aggregate stock information from those other sites and serve as a mini warehouse. Consumption and availability data from the other sites will be reported in their normal monthly reporting.

Data will be managed by existing information systems (e.g. SMT, DVD/MT) and will be migrated to any new system established by the national level at the DPS level. Currently, a logistic module built in DHIS2 is being piloted in a few areas in the country (not Equateur or Tshuapa provinces) as an alternative to using a stand-alone logistics management information system such as OpenLMIS. Addressing the performance of the overall distribution system in these two provinces provides a perfect opportunity to also introduce DHIS2, as well as a logistics management information system such as OpenLMIS.
**Priority Actions for Implementation**

Installation of VSAT for internet connectivity is currently in process at all the BCZS in Equateur and Tshuapa. Roll out of a web-based data management tool should be coordinated with the installation of this infrastructure, and plans for support and maintenance of the tool should include a maintenance plan for the VSAT equipment as well.

The selection of a logistics management information system should also be done with care and should take into account the requirements of the users of the system and environment constraints. An in-depth assessment of the current LMIS workflows, as well as infrastructure and environmental conditions, should be conducted. Based on these results, user analysis and use cases will be defined, and a high level design can be planned. This will lead to a formal process, such as an RFP, for selection of a system.

**General Considerations**

It is strongly recommended to build on the national level data management system and improvements made there in order to be consistent through all levels of the supply chain. In addition, it has been demonstrated that using a logistic module within DHIS2 to manage logistic information at the scale required for the DRC does not align with best practices. It is important to start planning on implementing a stand-alone logistics management information system such as OpenLMIS.

**Considerations for Improving Access to Vaccines**

The EPI is already planning specific activities to strengthen the data management for the vaccine supply chain, as described in the improvement plan. One of the major activities is to revise, adapt and homogenize the current electronic management system DVD-MT. In order to align with the integration of
supply chain for all commodities, it is important to develop or reinforce the data exchange capacity between all the electronic health management systems (DHIS2, DVD-MT, etc.). The interoperability between systems is a major component for building a strong national eHealth architecture. As part of this effort, it will important to focus attentions on specific use cases to the vaccine program in DRC, identifying what the current process is and the key indicators that need tracking to determine specific data to collect and the best technology solution for data management. This is also a concern on the global level. For example, VillageReach, through the OpenLMIS community effort, is currently developing the interoperability between DVD-MT and OpenLMIS.
6. **Apply Key Performance Indicators**

<table>
<thead>
<tr>
<th>Pain Points</th>
<th>KPA 4: Facility level data are not used for decision-making at the provincial level, there is a general lack of analysis and use of logistics data. Lack of a defined process based on best practices for data analysis and use for decision making.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Recommended Solutions</td>
<td>• Establish regular, systematic review process of distribution and programmatic data for continuous improvement efforts</td>
</tr>
</tbody>
</table>
| Priority Actions | • Organize workshops at the PNAM to validate KPIs  
• Organize a workshop to implement tools of logistics data management  
• Develop and document a process for collecting and analyzing LMIS data  
• Organize training to strengthen LMIS data management capacity |
| Considerations | • The identification of KPIs will require close coordination among all partners and vertical programs and clear understanding of the goals and expectations, both short terms and long terms  
• EPI is already working on identifying key indicators for its program, need to adjust these indicators to align with the integration of all commodities strategy |

*Figure 7. Component 6: Rigorously apply KPIs with structured, regular review*

**Recommended Solutions**

Any supply chain model that is introduced must be accompanied by KPIs and a data management structure for regular review and utilization. In Equateur and Tshuapa, KPIs need to be defined together with the DPS, partners and specialized programs to represent a set of measures focusing on those aspects of process performance that are the most critical for the current and future success of the system in place. Example of indicators to measure the performance of a supply chain include:

- **Stockout rate**: Number of re-supply cycles where commodities were unavailable for use.
- **Functional Status of Cold Chain Equipment**: Percentage of cold chain equipment (CCE) operable for vaccine storage of the overall number of commissioned CCE devices in a particular area at a point in time or over a particular time period. CCE is defined as all refrigerators, fixed passive storage devices, and walk-in cold rooms and freezers designated for storing vaccines.
- **Temperature Alarms**: Number of times the temperature inside cold chain equipment (CCE) exceeds or drops below a reference range. The indicator is applicable where vaccines are stored and during transportation. CCE is defined as all refrigerators, freezers, fixed passive storage devices, transport vehicles, and walk-in cold rooms and freezers designated for storing vaccines.
- **On-Time and In-Full Deliveries**: Percentage of deliveries delivered on-time and in-full (OTIF) with OTIF defined as follows: order fulfilled=store can fulfil the complete order (i.e. provide all products and quantities requested); on time=order is delivered when expected (e.g. on a specific date or time range); and accurate: orders are delivered in the correct quantities and products (i.e. delivered products and quantities match the delivery note).
• **Stocked According To Plan**: Percentage of health facilities or warehouses stocked according to plan of the total number of health facilities. Stocked according to plan is defined as stock levels between set minimum and maximum stock levels.

The identification of KPIs will require close coordination among all partners and clear understanding of the goals and expectations, both short term and long term. One approach could focus on simply one or two KPIs to ensure data availability, reliability, and utilization. As the supply chain model develops over time, KPIs can be added as different performance aspects warrant more attention.

Additionally, monthly systematic review of data with the distribution and programmatic teams is highly recommended. A structured review guide would facilitate the monthly discussion to identify roadblocks and issues with distribution and drive action for improvement. A review guide could also instill this best practice in the distribution team for continuous improvement in the performance of the supply chain.

**Priority Actions for Implementation**

Determining which KPIs should be used in Equateur and Tshuapa will require decision-makers to come together to validate a list of appropriate indicators. Moreover, effective use of these indicators will be dependent on the availability of good data. Using KPIs for decision-making should go hand-in-hand with an overall strengthening of the LMIS. Without good data, it will be impossible to accurately measure changes in performance of facilities.

**General Considerations**

One consideration is landing on one or two KPIs with which all specialized programs will be satisfied and which are achievable with the available resources. There is a tendency to collect more data than is necessary and with minimum analysis or use of the data. This streamlined approach of a minimum number of KPIs would reduce the data collection burden, improve data quality, and simplify the data use to drive action.

**Considerations for Improving Access to Vaccines**

The Gavi Vaccine Alliance has developed guidance for KPIs for immunization programs and the Interagency Supply Chain Group is currently working on harmonizing the different KPIs used by development partners. As mentioned above, one to two KPIs could be settled on to focus efforts on these aspects of the performance of the supply chain. As the new system is being rolled out, the initial focus could be on deliveries that are on-time and in-full as this information would come directly from the Field Logistics Coordinators. It would also be important to place emphasis on the potency of the vaccine through focusing on a KPI addressing cold chain performance, such as the functional status of the cold chain or temperature alerts. As the system becomes more robust over time, additional KPIs can be included in regular review to encourage continuous improvement of the system.
Core Recommendation 2: Management strengthening for implementing the recommended supply chain model

1. Conduct supply chain modeling

<table>
<thead>
<tr>
<th>Pain Points</th>
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<tbody>
<tr>
<td>KPAS: Inefficient distribution, limited access to transport</td>
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<tr>
<td>KPA6: Poor planning and coordination</td>
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</tbody>
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<table>
<thead>
<tr>
<th>Recommended Solutions</th>
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<tr>
<td>• Conduct a modeling exercise to optimize the distribution system, specifically:</td>
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<tr>
<td>• Transport loops</td>
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<tr>
<td>• Placement of cold chain equipment in health facilities</td>
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<tr>
<td>• Frequency of distributions</td>
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<td>• Options for product integration</td>
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<td>• Investments in transportation equipment</td>
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<tr>
<td>• etc.</td>
</tr>
</tbody>
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<thead>
<tr>
<th>Priority Actions</th>
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<tbody>
<tr>
<td>• In-depth data collection on distances, transportation options and costs, specifics on storage and transportation of each commodity, etc.</td>
</tr>
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<table>
<thead>
<tr>
<th>Considerations</th>
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<tbody>
<tr>
<td>• Unicef, with Gavi’s support, has purchased over 300 refrigerators for Equateur and Tshuapa. The placement of this equipment should be informed by the results on the modeling exercise, and installation should include training on preventative maintenance for healthcare workers.</td>
</tr>
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</table>

*Figure 8. Management Strategy 1: Conduct supply chain modeling activity*

A key recommendation coming out of this assessment is to do a supply chain modeling exercise in order to more thoroughly optimize the supply chain down to the last mile. This would require detailed data collection, in particular GIS data (as is being done in Mai Ndombe health zone in Bandundu for example), and would give guidance to several aspects of the supply chain:

- Feasible and optimal transport delivery routes with the potential to ignore administrative boundaries and remove the health zone servicing rule.
- Current inventory of the cold chain and identification of optimal placement of cold chain equipment to minimize service distances for pick-up of vaccines and other heat-sensitive commodities by health workers.
- Distribution frequency with the option of a mixed approach depending on different commodities and their priorities.
- Integrated supply chain and the optimal mix of commodities considering transport space constraints and commodity priority.
- Vehicle options depending on the segments of the supply chain (ATV, boat, motorcycle, four-wheeler, bicycle). Data collection would identify current equipment available and what would need investment.
- Possible new storage locations for difficult access areas.
The usefulness of a model depends on the quality of the data used to build it. In order for the modeling exercise to be useful, high-quality and complete data will need to be collected on all of the supply chain elements described above. This will require a dedicated data collection team to be deployed to Equateur and Tshuapa for at least one to two months.

As part of the effort to strengthening vaccine distribution, the EPI has developed a plan for distribution/redistribution of new and existing cold chain equipment. It will be important to take this information into account for the modeling exercise. Because of the interest in integrating supply chain for all commodities, the distribution plan developed by the EPI may need to be refined to accommodate other heat-sensitive commodities distribution (e.g. laboratory reagents and samples).

**Case Study IV: Supply Chain Modeling in West Africa with Supply Chain Guru**

The Ministry of Health (MOH) in a West African nation is responsible for the distribution of all the country’s medical goods. Supplies are stored in a central warehouse and MOH delivers them to intermediary facilities, District Pharmacies (DP) and hospitals, while clinics pick up their supplies from the DPs. While the number of facilities serviced by the MOH had increased significantly in the last 60 years, the network's capacity had changed very little, leading to suboptimal results. MOH needed to know if a decentralized network would increase service levels, if DPs could be used as district hubs in such a model, and if so, which locations would be best.

Supply Chain Management System (SCMS), a coalition of 13 private sector, non-governmental and faith-based organizations, called on LLamasoft to help model a new supply chain. Through stakeholder interviews, analysis of previously developed reports, and further data gathering the team was able to build a baseline model in Supply Chain Guru. Multiple scenarios were then created to determine the impact of adding district hubs to the network. The team was able to identify the optimal decentralized network for the distribution of all medical goods.

The analysis showed that existing supply chain issues had to be addressed before decentralization could be considered as stock-outs at the central level will continue to result in low service levels regardless of the network design. Next, if MOH chooses to decentralize its network, no more than three district hubs are needed and the optimal locations were determined. Furthermore, of the three proposed locations, one would have the largest impact and should be scheduled first, for highest return on investment. Finally, due to the sensitive nature of some medicines, it was recommended that these products continue to be shipped from the central warehouse with DPs operating as cross-docks.

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2. Update the cold chain strategy and increase capacity for maintenance

Based on the observations and interviews performed during this assessment in the provinces of Equateur and Tshuapa, it is clear that the cold chain needs to be a priority for the DPS, the Ministry and all partners that are involved in these provinces. Its current state is putting all vaccines at risk of losing potency, leading to more outbreaks of vaccine-preventable diseases, as is currently happening with measles.

In 2014, the “Evaluation de la Gestion Efficace des Vaccins (GEV) en République Démocratique du Congo” performed in 2014 showed major gaps in the immunization supply chain (iSC) at all levels (national, sub-national, zonal and facility-level). For example, weaknesses were identified around cold chain and warehouse storage capacity, cold chain temperature monitoring, maintenance of infrastructure (warehouse, cold chain equipment, transportation resources...), data management, visualisation, and use for decision-making.

As a response to the evaluation, the EPI has developed an improvement plan to start responding to these gaps in the next few years (2015-2020). While some of the activities in the improvement plan impact the lower levels of the supply chain, it mainly focuses on strengthening resources and capacities of the national and sub-national levels. In addition, the improvement plan tends to be specific for the immunization supply chain and does address supply chain integration or homogenization across health commodities (vaccines, essential and generic medicines, laboratory commodities, family planning commodities, etc.).
The strategy and the associated activities discussed here should be seen as opportunities to 1) build on what EPI as already done at the national level, and 2) to expand these solutions to accommodate the intent of integration or homogenization of the supply chains of all commodities, for example, to temperature sensitive commodities such as laboratory reagents and oxytocin.

The modeling activity will collect information on the current cold chain inventory and its functionality in the provinces of Equateur and Tschuapa. It’s possible that some of the currently non-functioning equipment can be repaired; this needs to be coordinated with EPI and UNICEF in Kinshasa to arrange for cold chain technician to travel to Equateur to provide corrective maintenance on the equipment. This should also be done together with on-the-job training of the technician in the Equateur and Tshuapa provinces who needs to be trained on the specific equipment currently available.

With support from Gavi, UNICEF is purchasing more than 300 refrigerators for the former Equateur province. This provides a great opportunity to optimally plan for placement of this equipment. This microplanning should be done in conjunction with partners, DPS, and health zone personnel, using the results of the modeling to optimize placement. Location of the equipment should consider all health facilities that should be served by this relay site to ensure space and ease of access. Installation should be combined with basic cold chain preventive maintenance training for health workers where the equipment is placed and a temperature monitoring device.

As the immunization program depends significantly on health workers going to fetch vaccines on a weekly or bi-monthly basis, the options for vaccine transport need to seriously be assessed and upgraded, as well as the health workers’ capacity to follow recommended WHO practices for cold box and ice pack management. There are long range options for cold boxes with a minimum cold life of 96 hours, which would benefit the day-long travel required in many cases to fetch the vaccines.

A cold chain maintenance plan needs to be developed, funded, and then implemented.
3. Integrate supply chain improvements with PDSS and PBF

<table>
<thead>
<tr>
<th>Pain Points</th>
<th>Recommended Solutions</th>
<th>Priority Actions</th>
<th>Considerations</th>
</tr>
</thead>
<tbody>
<tr>
<td>KPA 2: Transport logistics remain under-financed</td>
<td>• Use a Performance-Based Financing approach to finance health facilities, as supported by PDSS</td>
<td>• Define the key processes to place under the performance framework (e.g. warehouse management, distribution, equipment maintenance, etc.)</td>
<td>• This strategy will lead to improved service delivery at health facilities and improved supply chain governance</td>
</tr>
<tr>
<td>KPA 3: Procedures for storage, distribution, and inventory management are inconsistently applied in health facilities</td>
<td>• Provide additional financing for distribution logistics and build the capacity of key actors</td>
<td>• Develop clear directives for the supply chain improvements, in the framework of PDSS and in line with the SNAME and the PBF approach</td>
<td>• Performance assessments will depend on the quality of data collected</td>
</tr>
<tr>
<td>KPA 4: Facility level data are not used for decision-making</td>
<td>• Strengthen capacity for data use for decision making</td>
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Figure 10. Management Strategy 3: Integrate with PDSS and PBF

A key recommendation coming out of this assessment is to increase the allocation of financial resources for distribution logistics (storage, distribution, transport, etc.). One opportunity to accomplish this recommendation would be to integrate the strengthening activities for the supply chain within the Health System Development Project (PDSS) financed by the World Bank, expected to begin in Equateur and Tshuapa provinces in January 2016. The PDSS is a platform that uses performance-based financing (PBF) approach as the funding scheme to improve the quality of services available. With this approach, health facilities are considered self-sustaining structures and therefore are expected to make a profit for the benefit of public health objectives and/or their staff. For example, the profit that a health facility makes could be used for improving the facility storage capacity, medical equipment, management tools (RUMER, electronic management system, etc.), transportation capacity, etc., which ultimately will result in increasing the performance of the health facility. This performance increase will result in more profit, thanks to the PBF mechanism, that could then be invested again for improving further the performance of the facility.

To improve the performance of the management and supply of medicines at all level of the supply chain in the Equateur and Tshuapa provinces (provincial, zonal and health facilities), a performance framework for all the necessary processes will be provided, including warehouse management, distribution management, cold chain management and maintenance, etc. With the PBF approach, health facilities and warehouses will be empowered to improve their internal management systems in terms of availability of health products, equipment, and use of management tools.
The supply chain solutions proposed in this report align with the PDSS and the PBF approach. For example, direct delivery to health facilities will help with the collection of data (e.g. KPIs) for continuous monitoring of performance. Regular gathering of data on On-Time and In-Full Deliveries for example, will provide visibility into many aspect of supply chain, from the warehouse performance at the provincial level (e.g. stockout), the performance of the transportation and distribution process, to the potential financial limitation to purchase medicines at the provincial, health zone or health facility levels.

The solutions presented in this report should be implemented within the framework of the PBF approach to fully capitalize on those benefits.
4. Capitalize on Private Sector Engagement (PSE)

KPA 7: Equateur and Tshuapa have a significant private sector and the public health supply chain should capitalize on this capacity and extend it to fill gaps in transport at the district level

- Engage private sector transporters (for-profit and not-for-profit) for distribution from provincial capital to the BCZS and the facility level, working through district-level transporters to ensure quality, efficiency and capacity building
- Engage the private sector for cold chain maintenance

- Conduct an in-depth study on the capacity of the private sector for distribution of medicines, as well as capacity to ensure the quality of medicine during transportation

- CDR and DPS capacity to manage outsourced transportation to the health facility level may be limited. Any PSE would need to go hand-in-hand with capacity building of managers at the CDR.
- Private transports may not have capacity to transport vaccines or other heat sensitive commodities

Equateur and Tshuapa provinces present an excellent opportunity for private sector engagement. As previously mentioned, there are private sector companies already involved in transport of public health goods, working with UNICEF and PSI (notably, not directly contracted by the DPS or CDR). From the initial conversation with the CEO of the local NGO FLO, they have transport capacity for distribution to the health zone level and are willing and interested in working through local transporters in the health zone to ensure delivery to the health facility level. This would fill the gap of vehicles required by the CDR for transport.

One significant consideration will be the CDR and DPS capacity to manage outsourced transportation to the health facility level. Any PSE would need to go hand-in-hand with capacity building of managers at the CDR. An additional consideration is the typical reticence of private sector entities to engage with contracts directly with the public sector.
Case Study VI: Private Transport and Integrated Distribution in Nigeria

Nigeria is the most populous country in Africa. The country presents one of the most challenging environments for effective distribution due to its population size, lack of infrastructure, and a high proportion of rural and hard-to-reach areas. Prior to July 2012, commodities, HIV rapid test kits and cotrimoxazole were delivered to a local distribution center and each implementing partner (IP) collected and distributed stock through a separate supply chain. The result was a fragmented system that was difficult to manage, expensive to operate, and plagued by high wastage and poor stock availability. In 2012, a pilot was implemented to consolidate the supply chains into a unified system. In this system, warehousing and distribution services from regional zonal warehouse to health facilities were outsourced to several local logistics contractors. As of September 2013, this distribution model has been rolled out to four zonal distribution centers and more than 1,500 service delivery points. The system has been successful in achieving a 95% on-time delivery and order fill rates, and reducing ARV stock-outs from 25% to 7%. The system has also made substantial progress toward coordinated procurement, integrated stock management, and coordinated information management. As a result, the program has been fully endorsed by the Federal Ministry of Health and the Global Fund, with the potential of scaling up the program nationwide.8

5. Professionalize human resources

As mentioned in component one of Core Recommendation One, we recommend the development of a Provincial Logistics Management Team (PLMT). This team would be composed of logistics-trained staff from the DPS, from the BCZSs, from CDR, and from specific programs (e.g. EPI antenna) and a Field Logistics Coordinator (FLC) who will be stationed at the Inter-zonal Coordination Offices (BCIZ) and lead activities for each transport loop. This team will be responsible for the operationalization of the delivery of all health commodities directly to health facilities. Particularly as commodities are integrated in the supply chain, it will be important to coordinate among all programs and the Field Logistics Coordinators (FLC) to confirm quantification and distribution schedules. The PLMT can play a key role in focusing the attention necessary for managing the supply chain. Monthly review meetings are recommended to monitor the functioning of the supply chain.

Using a FLC is another component of professionalization of human resources for supply chain management. This approach concentrates logistics work in the hands of a few, allowing for focused training and capacity building of the logisticians. This builds on the global movement to professionalize human resources, recognizing the importance of the recruitment and retention of a qualified supply chain workforce, a career track for supply chain managers, and a comprehensive approach to health logistics. This new cadre of health professional would need to be inserted in the organizational structure of the health system.

To address human resource strengthening throughout all levels of the supply chain, during direct delivery, the FLC also provides supportive supervision directly at the health facility level, a process that involves helping health workers to continuously improve their own work performance. During distribution, the FLC
can check stock cards, answer questions about logistics forms, and provide better management approaches. With that in mind, capacity building of existing staff or recruitment of new qualified staff will be required.

The health zone level will still be responsible for some stock management for buffer stocks for the health facilities. They will also be responsible for monitoring and evaluation at the zonal level, since FLCs will be concerned with transport loops that cover multiple zones. However, zone personnel will use data collected by the FLCs whenever possible to increase efficiency.

Case Study VII: Professionalization of Logistics Personnel in the DLS in Mozambique

In the Dedicated Logistics System (DLS, see Case Study I) supply chain tasks are consolidated in the hands of two to three field coordinators and drivers who do the job full-time. As trained logisticians, the field coordinators determine the quantities of vaccines to distribute based on actual consumption at the health center, requiring less forecasting skills from a health worker and freeing up time to focus on patient care. As such, training and provision of technology can be focused on these key supply chain personnel. The placement of these personnel at the provincial level also matches the reality of the system as financial resources required for distribution are more likely to be available at the provincial level than the district level. With dedicated personnel at higher levels of the system instead of at every health center, there is more efficient use of human resources.9

6. Improve cost-recovery

<table>
<thead>
<tr>
<th>Pain Points</th>
<th>KPA 2: Health facility allocations and fee recovery are not sufficient to ensure regular supply of essential medicines; The flow of capital to the CDR is not sufficient and leads to procurement of commodities from outside of the public sector</th>
</tr>
</thead>
</table>
| Recommended Solutions | • Put in place a flat-rate fees for services and products at facilities that will reduce total cost for healthcare and will include the cost of medications for patients  
• Implement a system to verify the application of the flat-rate fees in facilities and ensure that the fees collected are managed properly  
• Increase use of tools for medicines management, such as the RUMER |
| Actions Prioritaires | • Implement a process to determine flat-rate fees that are appropriate for local conditions  
• Put in place a mechanisms to examine and control the flow of all fees receives for medicines to the CDR |
| Considerations | • Incentives for improved performance in facilities through a PBF approach  
• Depends on the successful implementation of a direct delivery system, with requires accurate modeling, and significant inputs to build human resource and transportation capacity. |

Figure 13. Management Strategy 6: Increase the viability of cost recovery

In the current health system in the DRC, each level purchases commodities from the next level up in a cost recovery approach. Health facilities use fees for service and cost recovery through sales of commodities, which are used to then purchase commodities from the health zone. The zones then typically purchase commodities from the CDR level, or, in the case of stockouts, from the private sector with questionable quality of drugs. As noted in the National Situational Analysis, this cost recovery model is fraught with challenges, least of which is the little visibility into true costs recovered and insufficient working capital available to support CDRs.

In addition, while the cost recovery for commodities such as vaccine, anti-TB, anti-malaria and family planning commodities that are provided by specialized programs or donors (e.g. EPI and UNFPA) is not applicable, it is important to recognize the need to take into consideration hidden costs related to services, as well as transportation costs. A better visibility of the true cost of supply is necessary in order to support service costs.

The recommended model of direct delivery implemented in the context of performance-based financing will strengthen the cost recovery approach in several ways:

- With the responsibility landing on the CDR for delivery to health zones and health facilities, they will have direct control of downstream margins within the system and costs recovered from the sales of commodities to each level. This should improve the working capital availability at the CDR level, which has been an issue to date, although it will most likely still be insufficient for full support of the CDR.
• The application of a flat rate fees in combination of the use of the PBF approach will favor the cost recovery at the health facility level, which will allow them to purchase health commodities medicines from the CDR.

• The visit of a trained Field Logistics Coordinator at the health facilities will provide an opportunity to strengthen the use of the RUMER, which is a critical tool in regards to managing cost recovery in a flat-rate fees setting.

• The model of direct delivery by a Provincial Logistics Management Team (PLMT) will improve the visibility of true distribution cost.
Immediate priority actions

In order to move the recommendations forward, a comprehensive implementation plan needs to be developed. Identified here are key priority actions for the first 100 days. These need to be vetted with local stakeholders, a process which began during the workshop to validate the results and recommendations, to assess the recommendations and their feasibility.

1. **Landscape overview of partners**

A landscape overview of key partners and stakeholders should be conducted in Equateur and Tshuapa. Outside of the DPS and program-specific actors, a few additional stakeholders have been identified. Clear roles, responsibilities and expectations will need to be defined for each partner.

This landscape overview would provide details on an exhaustive list of actors in the supply chain space in Equateur and Tshuapa, assess their capacities, and recommend ways their resources could be leveraged to implement the recommendations outlined in this report.

<table>
<thead>
<tr>
<th>Equateur</th>
<th>Tshuapa</th>
</tr>
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<tbody>
<tr>
<td>SANRU</td>
<td>SANRU</td>
</tr>
<tr>
<td>UNICEF</td>
<td>UNICEF</td>
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<tr>
<td>FLO, NGO private sector transporter</td>
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*Implementer:* Ideally, the PDSS would have a dedicated person in Equateur and Tshuapa provinces who could complete this process.

2. **Generate buy-in for distribution model**

Stakeholder support for such a dramatic change to the distribution system is an absolute requirement for any change to be embraced, adopted, and advanced. During the assessment visit, each DPS expressed interest in a direct delivery model, but more advocacy is needed to ensure full support. The case will have to be made for the benefits of this type of model and the feasibility of implementing these changes. Evidence from other countries can be used to support the recommendations.

In order to ensure buy-in from the DPS and other provincial-level stakeholders, a comprehensive, participatory process for presenting and collecting feedback on the recommendations and developing detailed implementation steps for each that take local conditions and political considerations into account. To achieve this, key elements from this report should be converted to talking points with associated visual aids.

*Implementer:* A supply chain and system design person should be available in Equateur and/or Tshuapa to help navigate the process of getting buy-in for system design. This person must have a firm understanding of the evidence backing the recommendations and be able to draw on it to ensure buy-in from decision makers. They must also have the proper experience to be able to read the politics at play between the actors and conduct advocacy for this plan effectively.

3. **Data collection for modeling**

Basic data is available on population, distances between province and health zones, and from health zones to health facilities, as well as the transportation means required to travel between points. However, conducting a more thorough modeling exercise to identify the most optimized routes, requires
additional data on cold chain inventory, GIS coordinates (or an estimate of those), realistic costs for different segments of distribution as well as for personnel.

Implementer: This will require one to two months of dedicated time to collect the level of data necessary for a comprehensive modeling activity.

4. Build a computer model of Equateur and Tshuapa
Using a similar approach to what was used in Bandundu province with Llamasoft, data collection will feed into a comprehensive model that can determine optimized transport loops, ideal segmentation of commodities for a homogenized supply chain, and most efficient placement of cold chain equipment.

Implementer: As Llamasoft already works in the DRC, they could expand their model to these two provinces, working with supply chain experts like VillageReach for further feasibility analysis and implementation details.

5. Feasibility and costing assessment
Once the recommendations for these two provinces are approved, a feasibility and costing assessment for the different phases of work and the recommended interventions needs to be developed. This can initially be done with partners at the national level at a high level overview during the October meetings; more details will need to be worked out at the provincial level.

Implementer: An on-the-ground partner working closely with the DPS, CDR, private sector, and partnering organizations.

6. Build up CDR capacity
Equateur is in the process of establishing and strengthening a CDR called CAMESE. This includes the infrastructure of the warehouse, as well as the personnel required to manage it. Whatever recommendations are approved for the distribution system will need to be incorporated into the management structure and guidelines of the CAMESE.

Things are a bit more variable in Tshuapa as they don’t have the physical space or human resource capacity to take on the full responsibilities of a CDR at this point. One solution is for the CAMESE to manage a relay warehouse in Boende with limited personnel.

Implementer: The PNAM, together with the PDSS and technical partners, will lead capacity building activities at the CAMESE.
Appendix

1. List of people interviewed

Note that due to logistics challenges experienced during the return from Mbandaka to Kinshassa, the team was not able to meet with USAID or UNFPA; these will be followed up separately.

Governmental institutions

- Central level (Kinshasa): PNAME, FEDECAME, DPM, PNLT, PARSS, PNTS
- Provincial level (Equateur and Tshuapa): CPTS, CPLT, PARSS

Program partners

- Central level: Unicef, Sanru, Cordaid, SCMS, SIAPS, JSI, EPI
- Provincial level: Unicef, Sanru, EPI, red cross, Adra, Caritas

Provincial Health Directories

- DPS Equateur
- DPS Tshuapa

Warehouses

- Central level: CDR Cameskin
- Provincial level: CDR CAMESE in Mbandaka and secondary warehouse in Boende

Health zone central offices

- BCZ of Bolenge, Lolanga, Mampoko*

Health centers (centre de santé)

- Centre de Santé of Bogondé, Bobala, Lokolia, Boso Asuka, Ikanza*, Boyeka*

Reference health centers

- Reference centre de santé of Djoa
- Reference hospital of Lolanga

Private transporter in Mbandaka

- Fondation Lucie Otaenga “FLO”

* Met and interview the head nurse (infirmié titulaire – “it”) but did not visit the health facility
2. **Distances, time and travel mode**

The figures below illustrate the location of the health zone central offices, the distances and time of travel between health zone central offices and the DPS using recommended transportation modes.

### Equateur Province

<table>
<thead>
<tr>
<th>Equateur Province</th>
<th>Health zone</th>
<th>Distance between DPS and health zone central office (km)</th>
<th>Transportation mode (F: fluvial; R: road)</th>
<th>Journey length</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Basankusu</td>
<td>250</td>
<td>F</td>
<td>2 days</td>
</tr>
<tr>
<td>2</td>
<td>Bikoro</td>
<td>128</td>
<td>R</td>
<td>3 h</td>
</tr>
<tr>
<td>3</td>
<td>Bolenge</td>
<td>9</td>
<td>R</td>
<td>10 minutes</td>
</tr>
<tr>
<td>4</td>
<td>Bolomba</td>
<td>197</td>
<td>F</td>
<td>2 days</td>
</tr>
<tr>
<td>5</td>
<td>Bomongo</td>
<td>461</td>
<td>F</td>
<td>4 days</td>
</tr>
<tr>
<td>6</td>
<td>Djombo</td>
<td>340</td>
<td>F</td>
<td>3 days</td>
</tr>
<tr>
<td>7</td>
<td>Ibako</td>
<td>240</td>
<td>R</td>
<td>6 h</td>
</tr>
<tr>
<td>8</td>
<td>Ingende</td>
<td>180</td>
<td>R</td>
<td>5 h</td>
</tr>
<tr>
<td>9</td>
<td>Irebu</td>
<td>100</td>
<td>F</td>
<td>8 h</td>
</tr>
<tr>
<td>10</td>
<td>Lilanga-Bobangi</td>
<td>221</td>
<td>F</td>
<td>2 days</td>
</tr>
<tr>
<td>11</td>
<td>Lolanga-Mampoko</td>
<td>75</td>
<td>F</td>
<td>6 h</td>
</tr>
<tr>
<td>12</td>
<td>Lotumbe</td>
<td>197</td>
<td>F</td>
<td>2 days</td>
</tr>
<tr>
<td>13</td>
<td>Lukolela</td>
<td>180</td>
<td>F</td>
<td>2 days</td>
</tr>
<tr>
<td>14</td>
<td>Mankanza</td>
<td>219</td>
<td>F</td>
<td>2 days</td>
</tr>
<tr>
<td>15</td>
<td>Mbandaka</td>
<td>6</td>
<td>R</td>
<td>6 minutes</td>
</tr>
<tr>
<td>16</td>
<td>Monieka</td>
<td>275</td>
<td>F</td>
<td>3 days</td>
</tr>
<tr>
<td>17</td>
<td>Ntonto</td>
<td>137</td>
<td>R</td>
<td>3 h</td>
</tr>
<tr>
<td>18</td>
<td>Wangata</td>
<td>1</td>
<td>R</td>
<td>1 minute</td>
</tr>
</tbody>
</table>

### Tshuapa Province

<table>
<thead>
<tr>
<th>Tshuapa Province</th>
<th>Health zone</th>
<th>Distance between DPS and health zone central office (km)</th>
<th>Transportation mode (F: fluvial; R: road)</th>
<th>Journey length</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Befale</td>
<td>90</td>
<td>R</td>
<td>1 day</td>
</tr>
<tr>
<td>2</td>
<td>Boende</td>
<td>1</td>
<td>R</td>
<td>1 minute</td>
</tr>
<tr>
<td>3</td>
<td>Bokungu</td>
<td>280 + 2</td>
<td>R + F</td>
<td>2 days</td>
</tr>
<tr>
<td>4</td>
<td>Bosanga</td>
<td>210</td>
<td>R</td>
<td>2 days</td>
</tr>
<tr>
<td>5</td>
<td>Djolu</td>
<td>300</td>
<td>F + R*</td>
<td>2 days</td>
</tr>
<tr>
<td>6</td>
<td>Ikela</td>
<td>475 + 3 or 516</td>
<td>F + R or R</td>
<td>3 days</td>
</tr>
<tr>
<td>7</td>
<td>Lingomo</td>
<td>240</td>
<td>R*</td>
<td>2 days</td>
</tr>
<tr>
<td>8</td>
<td>Mompono</td>
<td>150</td>
<td>R*</td>
<td>1 day</td>
</tr>
<tr>
<td>9</td>
<td>Mondombe</td>
<td>360 + 1</td>
<td>F + R</td>
<td>3 days</td>
</tr>
<tr>
<td>10</td>
<td>Monkoto</td>
<td>235 or 932</td>
<td>R* or F</td>
<td>2 or 3 days</td>
</tr>
<tr>
<td>11</td>
<td>Wema</td>
<td>110</td>
<td>R</td>
<td>1 day</td>
</tr>
<tr>
<td>12</td>
<td>Yalifafo</td>
<td>360</td>
<td>R</td>
<td>3 days</td>
</tr>
</tbody>
</table>

* motorcycle only
An Assessment of Vaccines and other Health Commodities Supply Chains in the Equateur and Tshuapa Provinces, DRC

Equateur Province

Tshuapa Province
### 3. Illustrative costs

<table>
<thead>
<tr>
<th>Journey</th>
<th>Distance (one way)</th>
<th>Transportation mode</th>
<th>Journey length</th>
<th>Expense type</th>
<th>Cost for round trip (USD)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 Mbandaka to Boende</td>
<td>500</td>
<td>Land Cruiser with two ferry crossings</td>
<td>1.5 day</td>
<td>gasoline, ferries, oil</td>
<td>1400</td>
</tr>
<tr>
<td>2 Driver for trip to Boende</td>
<td>n/a</td>
<td>n/a</td>
<td>4 days</td>
<td>driver + aid</td>
<td>300</td>
</tr>
<tr>
<td>3 Boende to Lokolia</td>
<td>60</td>
<td>motorcycle</td>
<td>1 day</td>
<td>driver, gasoline, oil, river crossing</td>
<td>130</td>
</tr>
<tr>
<td>4 Mbandaka to Lolanga - Mampoku</td>
<td>75</td>
<td>motor boat</td>
<td>1 day</td>
<td>gasoline, oil, spark plugs</td>
<td>600</td>
</tr>
<tr>
<td>5 Driver for trip Lolanga - Mampoku</td>
<td>n/a</td>
<td>n/a</td>
<td>1 days</td>
<td>driver</td>
<td>50</td>
</tr>
</tbody>
</table>
4. **Resource list**


• Warehouse in a Box. Imperial Health Sciences. 2015. http://www.ihs.za.com/content/warehouse-in-a-box%E2%84%A2}