# Diagnostic Network Optimization & Laboratory Information Management Systems in Cameroon

## Integrated Diagnostic Consortium Meeting
## Washington D.C
## September 12-13 2019

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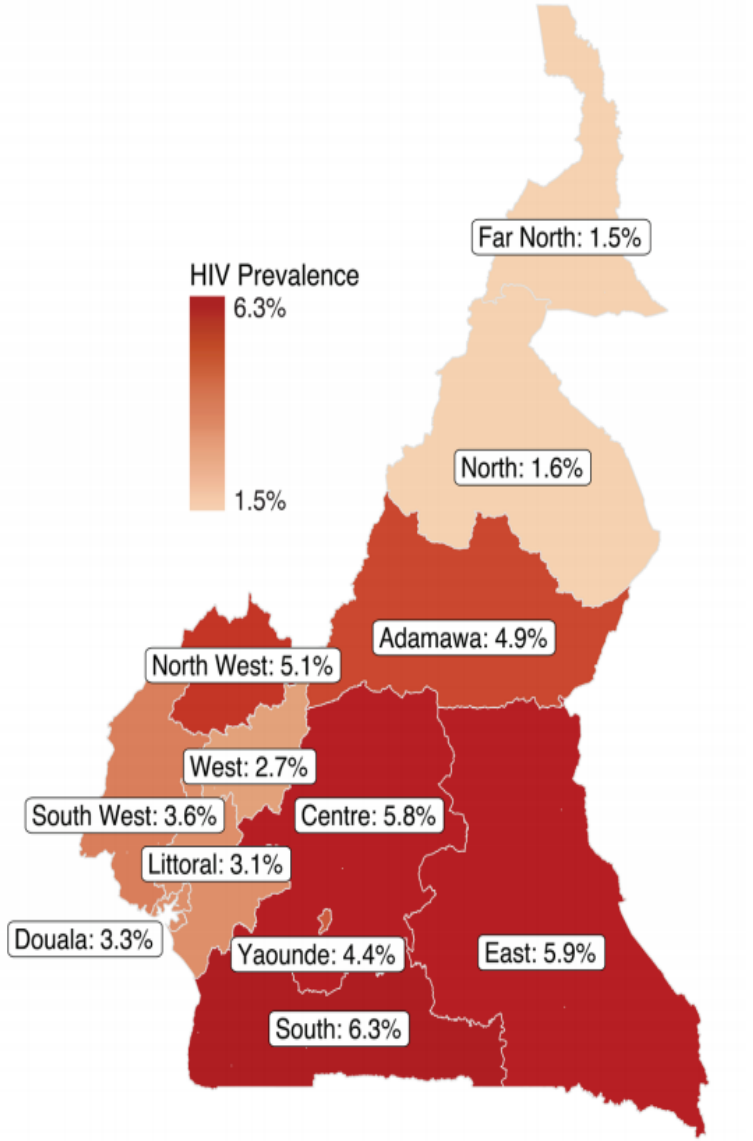
*Laboratory Director*
*CDC-Cameroon*

# HIV Prevalence, Burden and Unmet Need by Region

## HIV Prevalence by Region

Among adults ages 15-64 years, HIV prevalence among adults varies by region, ranging from 6.3 percent in the South Region to 1.5 percent in the Far North Region.

| Region | HIV Prevalence (%) | 95% CI |
|---|---|---|
| Adamawa | 4.9 | 3.1-6.7 |
| Centre | 5.8 | 4.8-6.8 |
| Douala | 3.3 | 2.5-4.0 |
| East | 5.9 | 4.5-7.3 |
| Far North | 1.5 | 1.0-2.1 |
| Littoral | 3.1 | 1.2-4.9 |
| North | 1.6 | 1.0-2.1 |
| North West | 5.1 | 3.4-6.7 |
| South | 6.3 | 5.4-7.3 |
| South West | 3.6 | 2.4-4.9 |
| West | 2.7 | 1.8-3.6 |
| Yaounde | 4.4 | 3.2-5.6 |



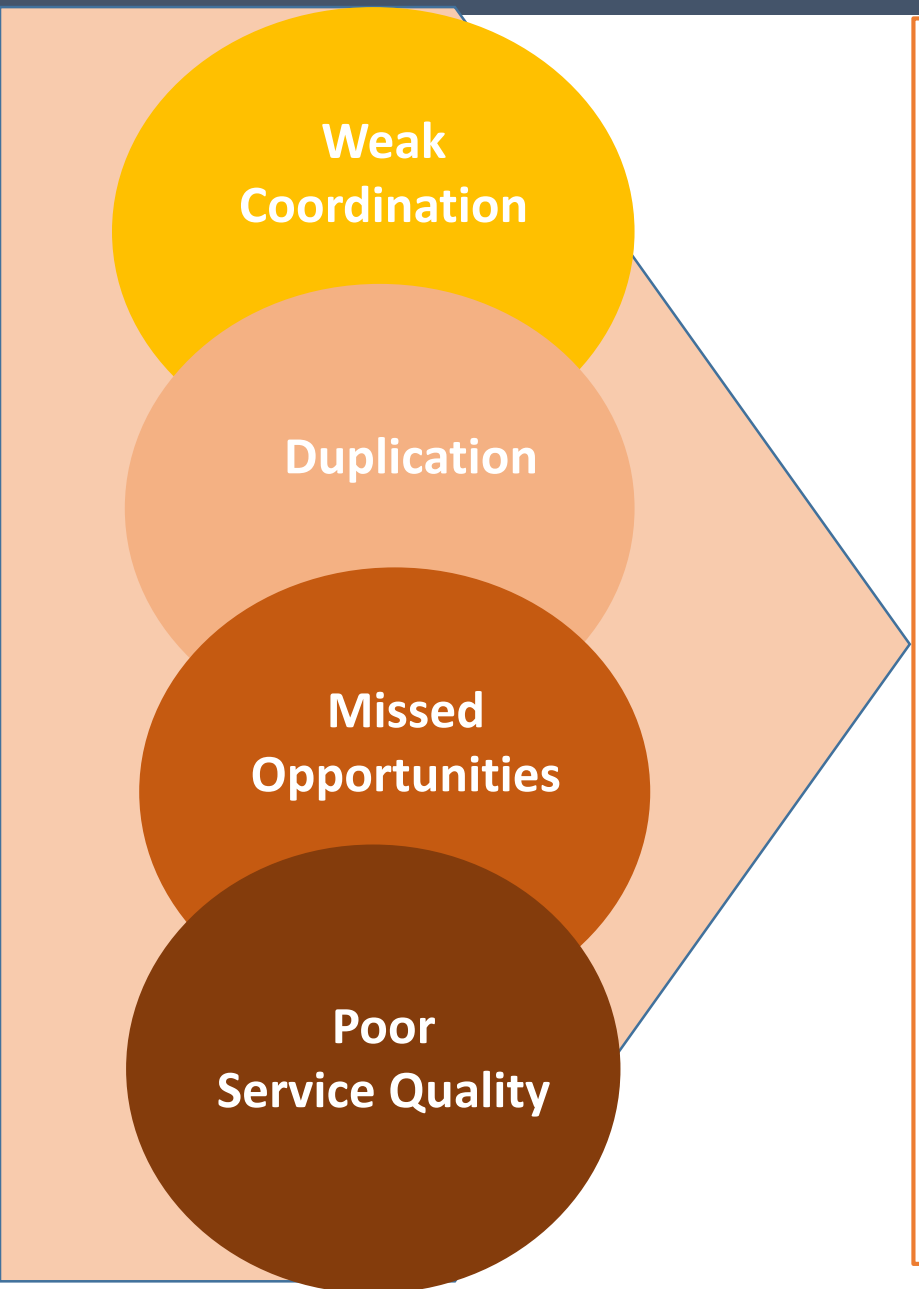

## HIV Burden and Unmet Need by Region

| Region | PLHIV * | Current on Treatment | Current Coverage | Gap to 100% Coverage | Gap to 91% Coverage |
|---|---|---|---|---|---|
| Adamawa | 23,043 | 14,174 | 62% | 8,869 | 6,795 |
| Centre | 133,157 | 77,149 | 58% | 56,008 | 44,024 |
| East | 35,971 | 20,498 | 57% | 15,473 | 12,236 |
| Far North | 27,979 | 16,882 | 60% | 11,097 | 8,579 |
| Littoral | 101,529 | 57,772 | 57% | 43,757 | 34,619 |
| North | 29,816 | 16,236 | 54% | 13,580 | 10,897 |
| North West | 62,661 | 36,626 | 58% | 26,035 | 20,396 |
| South | 26,851 | 13,260 | 49% | 13,591 | 11,174 |
| South West | 60,590 | 25,289 | 42% | 35,301 | 29,848 |
| West *** | 26,893 | 22,075 | 82% | 4,818 | 2,398 |
| Total | 528,490 | 299,961 | 57% | 228,529 | 180,965 |

*All numbers in the table are both adults and children; the prevalence rates in the map are adults only

# PART I: DIAGNOSTIC NETWORK OPTIMIZATION UPDATES

# Why the Need for EID/Viral Load Diagnostic Optimization?




**Main Objectives**

1) Ensure existing and newly procured devices are strategically placed to optimize utilization

2) Optimize the referral network to reduce TAT and improve efficiencies in testing.

**Specific objectives**

- Identify and map all the existing laboratories (conventional platforms and POC devices) for the 10 Regions;
- Strengthen integrated testing on existing platforms for HIV (EID/VL), TB and Hepatitis
- Provide guidance to MOH for deployment of new devices
- Improve on the existing quality assurance network

# OUR OPPORTUNITIES?

# Strengthening Efficiencies in EID/Viral Load Diagnostics

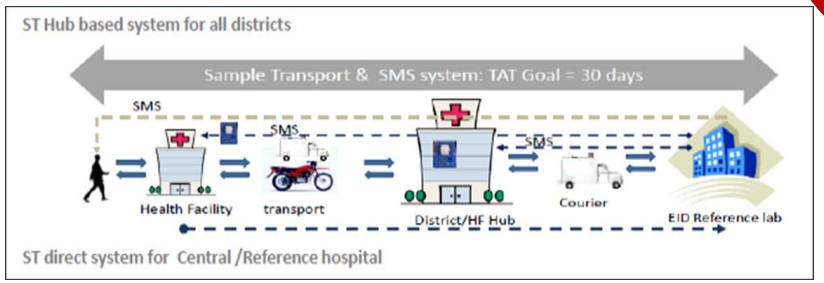




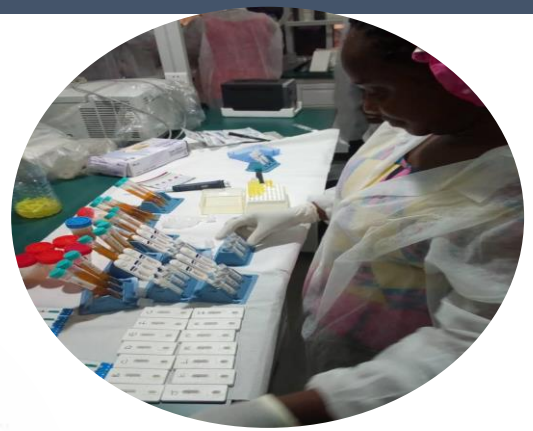
LAB TASK FORCE

MOH ENGAGEMENT

dhis2



# Laboratory Health Systems Strengthening



EQA/PT

QMS/QA

Lab Audits


BLIS

**Provide Services**

Training & Mentorship

**Strengthen Systems**

EMC

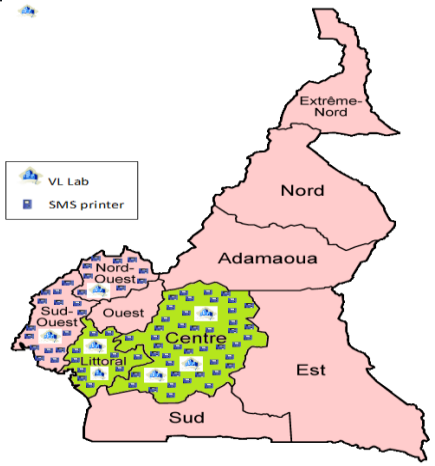

Personnel & Site certification

**Engage MOH Ownership & Sustainability**


STS

# Network of Viral Load Reference Laboratories

**Currently 14 National VL Ref labs.**
**Others not shown include:**
**CHE(CNPS); CRESAR & HR Bertoua**




- Laboratoire National de Santé Publique / National Public Health Lab
  - CIRCB, CPC, CSC Nkolodom, **HCY**
    - Sud
      - HR Ebolowa
    - Centre
    - Est
      - HR Bertoua
  - Laboratoire de l'Hôpital Laquintine, **HG Douala**
    - Littotal
  - Laboratoire de Réference TB de bamenda, HC St Vincent de Dschang
    - Nord Ouest
    - Ouest
      - HR Bafoussam
  - Laboratoire de Mutengene
    - Sud Ouest
  - Centre Pasteur Annexe de Garoua
    - Adamaoua
      - HR Ngaoundere
    - Nord
    - Extrême Nord
      - HR Maroua

# EID, VL & TB Diagnosis-Conventional and Point of Care

| Region | Conventional Platform | | | | Point of care platform | | | |
|---|---|---|---|---|---|---|---|---|
| | Type of platform (Number) | Positioning and fuctioning (F or NF)* | Type of test carried out | Potential tests | Type of platform (#) | Positioning and fuctioning (F or NF)* | Type of test carried out | Type of potential tests |
| Adamaoua | | | | | Alere-Q (1) | HR Ngaoundere (F) | EID | EID |
| | | | | | GeneXpert (1) | HR Ngaoundere (NF) | TB | EID, TB, VL |
| Centre | Abbott m2000rt (7) | CPC (F), CIRCB (F), HGOPY (F) Nkolondom (F), CHE (NF), CRESAR (F) LNSP (F) | EID, VL | EID, VL | GeneXpert (5) | CPC (F) et HMY (F)<br>CME (F), CHE (F), HGOPY (F) | TB-RIF<br>EID | EID, TB, VL<br>EID, TB, VL |
| | Quiagen (3) | CHU (NF), HGOPY (NF), CHE (NF) | | EID, VL | TB-Lamp (4) | HJY (F), CPC (F), HD Bafia (F), Mbalmayo (F) | TB | TB |
| | Biocentric-Diasorin (2)<br>Applied Biosystem (2) | CPC (F), CRESAR (F), LNSP (F) | EID, VL | EID, VL | Alere-Q (5) | HD Cite Verte (F), CASS Nkoldongo (F), Obala, Biyem-Assi, Efoulan, Mbalmay | EID | EID |
| Est | | | | | GeneXpert (1) | DRSP-Est (F) | TB-RIF | EID, TB, VL |
| Extreme-North | | | | | GeneXpert (1) | HR Maroua | TB-RIF | EID, TB, VL |
| Littoral | Abbott m2000rt (2) | HLD (F), Lab Tag (F) | | EID, VL | GeneXpert (4) | DRSP-Litt (F)<br>HD Nylon (F), HLD (F), Mboppi (F) | TB-RIF<br>EID | TB-RIF<br>EID, TB, VL |
| | LC 96 (Roche) (2)<br>Sysmex | HLD (F), HGD (NF)<br>Litto Labo (F) | <br>VL | VL<br>VL | Alere-Q (3) | Deido DH, Nkongsamba RH, Bonassama DH, | EID | EID |
| | Qiagen | Biopharma Douala (F) | VL | VL | | | | |
| North | LC 96 (Roche) | CPCAG (F) | VL | VL | GeneXpert (1) | CPCAG (F) | TB-RIF | EID, TB, VL |
| | ABI 7500 | CPCAG (F) | VL | VL | Alere-Q | RH Ngaoundere | EID | |
| North West | Abbott m2000rt (1) | TB-Ref Lab (F) | EID, VL | EID, VL | GeneXpert (8) | TBRL (F), H. Njinikom (F), BBH (F), H. Shisong (F), HD Nkambe (F), H. Mbingo (F), HD Wum (F) et HD Ndop | TB-RIF<br>EID (some) | EID, TB, VL |
| | Biocentric-Diasorin (1) | TB-Ref Lab (F) | EID, VL | EID, VL | Alere-Q (3) | Nkwen Baptist (F), Shisong, Azire | EID | EID |
| West | Abbott m2000rt (1) | St Vincent Dschang (F) | VL | EID, VL | GeneXpert (1) | HR Bafoussam (NF) | TB-RIF | EID, TB, VL |
| South | | | | | TB-Lamp (1)<br>Alere-Q | HR Ebolowa (F)<br>HR Ebolowa | TB<br>EID | TB, EID, VL<br>EID |
| South West | Abbott m2000rt (1) | EID Lab Mutengene (F) | EID, VL | EID, VL | GeneXpert (1)<br>Alere-Q (2) | HR Limbe (F)<br>HR Buea, PGH-Kumba | EID, TB<br>EID | EID, TB, VL<br>EID |

# Estimated Viral Load Equipment Utilization Rate - 2017

| Instrument Platform-FY 17 | QTY (A) | Specimen Type | # of Staff | Est. Max. Throughput /8hrs (B) | Est. # Days/yr (250 dys-WHO rec.) (C) | Estimated Capacity |
|---|---|---|---|---|---|---|
| Abbott sp/rt | 6 | Plasma | 2 | 138 | 240 | 198720 |
| Abbott rt/manual | 3 | Plasma | 2 | 93 | 240 | 66960 |
| roch fluoro 96 | 4 | Plasma | 2 | 126 | 240 | 120960 |
| ABI | 3 | Plasma | 2 | 126 | 240 | 90720 |

Estimated Annual Capacity for Viral Load Testing (A x B x C) **= 477,360**

Est. % Utilization Capacity= FY17 VL tested/Capacity = 47,397/477,360 **= 9.9%**

**Est. Un-Utilized Capacity = 90.1%**

# Viral Load and EID Equipment Utilization Rate - 2018

| Test Sites (Reference Laboratories) | | Projected testing per year based on current average testing/day | Total Testing Potential per year based on potential capacity (throughput of machine) | Current equipment utilization rate for VL Testing |
|---|---|---|---|---|
| 1 | CIRCB | 12096 | 26784 | 45.16%* |
| 2 | CPC (Abbott)/OPP | 18756 | 108960 | 17.21% |
| 3 | Nkolondom (Abbott) | 2568 | 44640 | 5.75% |
| 4 | Laquintinie (Abbott)/OPP | 12396 | 64320 | 19.27% |
| 5 | CPCAG (OPP) | 5796 | 19680 | 29.45% |
| 6 | TBRL B'da (Abbott)/OPP | 22596 | 21792 | 103.69%* |
| 7 | NEIDRLabm Mut. (Abbott) | 33300 | 35712 | 93.25%* |
| 8 | Dschang (Abbott) | 3468 | 44640 | 7.77% |
| 9 | LNSP / CHEssos (Abbott)*** | 0 | 44640 | 0.00% |
| 10 | CRESAR (Abbott) | 4428 | 44640 | 9.92%* |
| 11 | Hôpital Regional Bertoua** | 0 | 0 | 0.00% |
| 12 | Hôpital Central Yaounde** | 0 | 0 | 0.00% |
| | ***Sub-Total*** | ***115404*** | ***455808*** | ***25.32%*** |
| **POC Test sites** | | | | |
| 1 | Hôpital Regionale de Bafoussam | 396 | 1920 | 20.63% |
| 2 | Hôpital Regionale de Ngaoundere | 396 | 1920 | 20.63% |
| 3 | Hôpital de District d'Ambam | 396 | 1920 | 20.63% |
| 4 | Hôpital Regionale Annexe de Yagoua** | 0 | 1920 | 0.00% |
| | ***Sub-Total*** | ***1188*** | ***7680*** | ***15.47%*** |
| | **Grand-Total** | **116592** | **463488** | **25.16%** |

- As of August 31, 2018, the current VL test trend shows, only 25.32% (115404 tests) and 15.47% (1188 tests) of the potential throughput (capacity) of the conventional test platforms (reference laboratories) and POC sites respectively will be used by December 31, 2018, despite the platforms having a potential (based on maximum throughput) to test 463,488 tests.
- The 2018 ART population (PLHIV) stands at 283,471 while the VL test target (49% of the PLHIV) is137,584 tests

* ***These labs equally test for EID on the same platform, and the final utilization rate of the equipment for VL and EID testing will be a combination of the testing rate and testing potential for both tests, as this sums up to the monthly coverage of 22 working days. This is summarized in Table 3 below.***

** ***Sites to begin testing by close of FY2018***

*** ***NPHL and CHEssos are separate labs, but with CHEssos to take over the commodity allocation and test volumes/targets of NPHL***

# Effective Collaboration With Parters and Stakeholders














Elizabeth Glaser
Pediatric AIDS
Foundation





**METABIOTA**

**Expertise France**

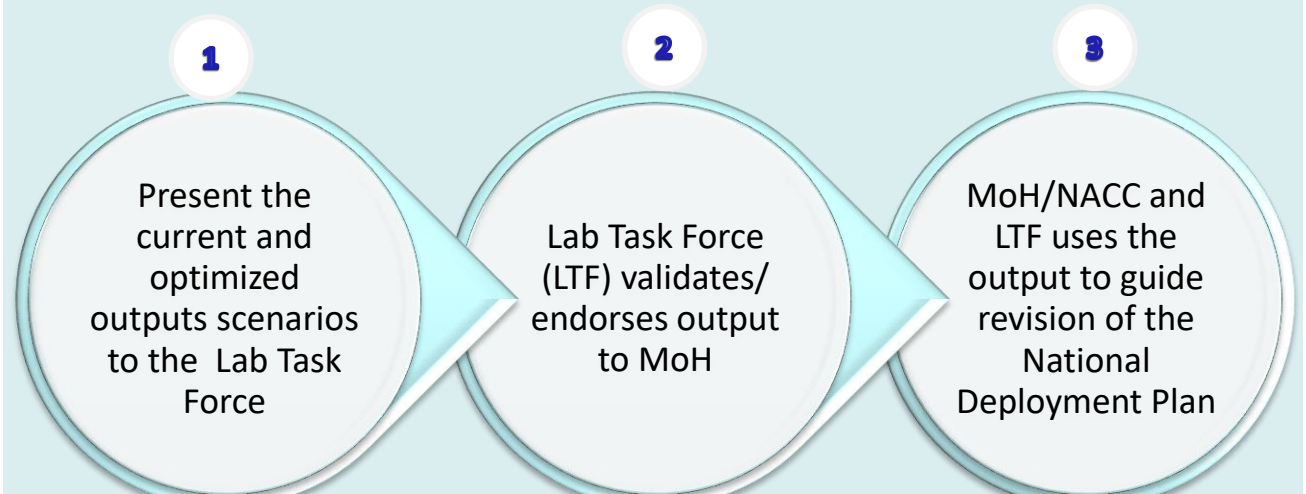
# WHAT DID WE DO?

# Processes for Diagnostic Network Optimization

## Who is involved in the process

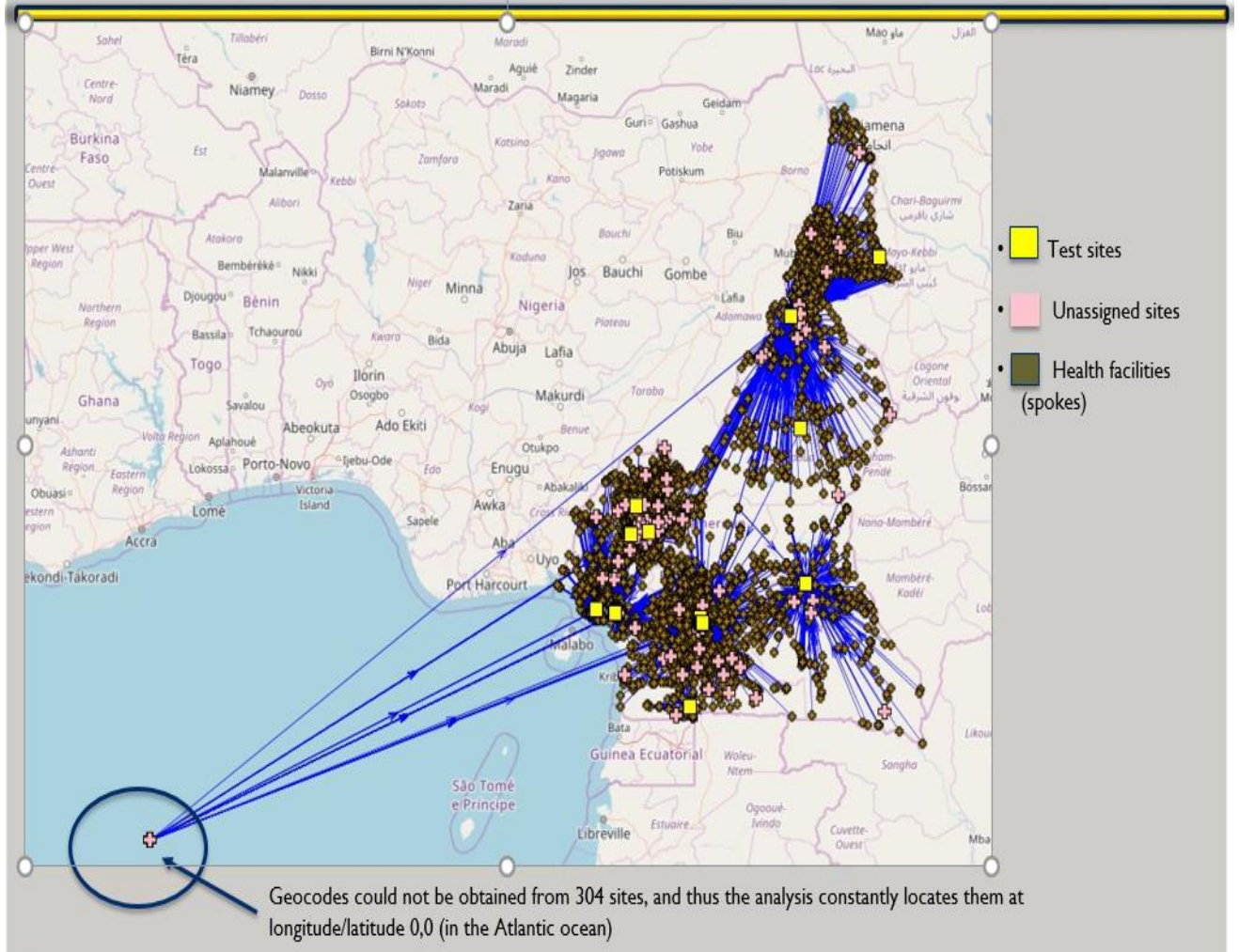
| Tasks | Lead | Verification | Notes | Coordination |
|---|---|---|---|---|
| Master Data Compilation | GHSC-PSM | CHAI & EGPAF | Components for the data have been contributed by NACC, GHSC-PSM, CHAI, EGPAF, CIS | NACC/ NPHL/DLMEP/CDC |
| Master Data Cleaning | EGPAF | GHSC-PSM & CHAI | | |
| Visualization from cleaned data | CHAI | GHSC-PSM & EGPAF | | |

## Decision making process

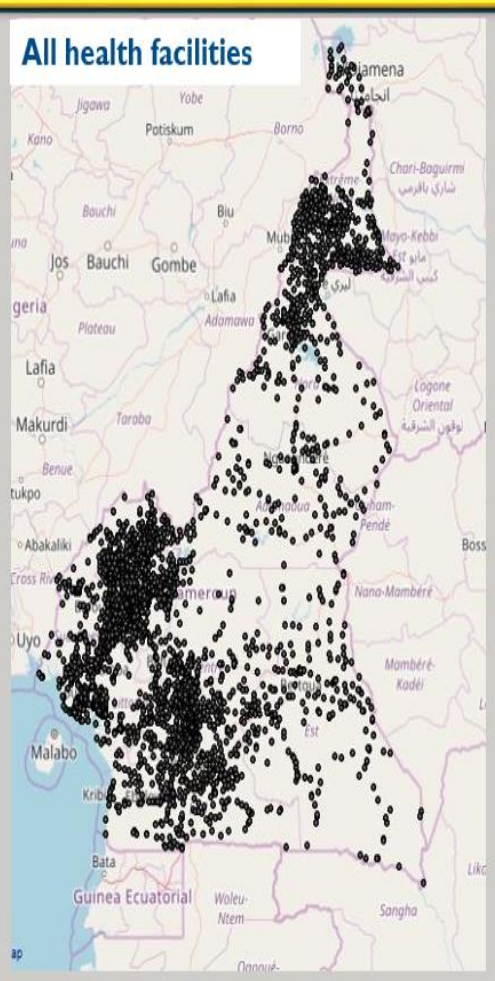


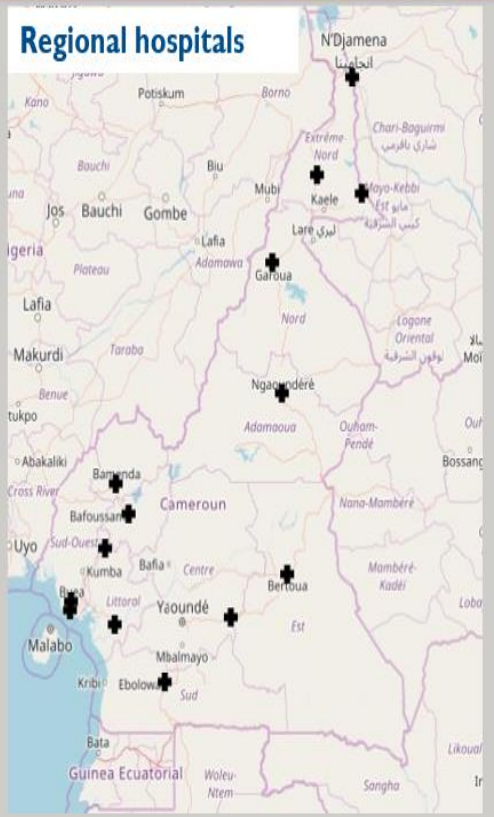
# Network of Viral Load Reference Laboratories

## Current Referral Network Viral Load




## Distribution of health facilities (referral sites/spokes)




- The Regional hospitals are amongst the sites receiving the highest volume of patients on ART

# Outcome of 2018 DNO exercise- Impact on Laboratory Network and Supply Chain

**CAMEROON HIV Viral Load SUPPLY PLAN** *Q3 2019* Date: June 04, 2019

Period: Jan - Dec 2019

| |
|---|
| Government of Cameroon |
| Global Fund (through NACC) |
| PEPFAR (USAID GHSC-PSM Procurement) |
| Expertise France (project OPP-ERA of UNITAID) |
| CHAI/UNICEF |
| EGPAF |

*RDD: Requested Delivery Date*

*EDD: Estimated Delivery Date*

*ADD: Agreed Delivery Date*

**For Inquiries**

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| *Equipment/Technology* | | | | | | | | FY19 Orders from GHSC-PSM | | | | | | Gap to be filled for FY19 | | Proposed Procurement Plan for | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Catalogue no. | **Abbott RealTime HIV-1 assay** | Unit of Measure (UoM) | Pack Size (No. of tests/UoM) | Total Needs (forecast) for 2019 | Stock on Hand on 31 Jan 2019 | AMC (Data of Aug 2018 - Jan 2019) | MOS | Quantity (Order 1) | Status | Date Received | Quantity (Order 2) | Status | EDD | Remaining Quantity to Order | Final Adjusted Gap to cover | Quantity (Order 1) | Status | EDD | |

- DNO has also generated information to complete an in-depth mapping of Health facilities -> reference labs and ref. labs -> ref. labs defining back up labs
- We have determine the actual utilization rates of platforms and through this we continuously optimize our national quantification and supply plan

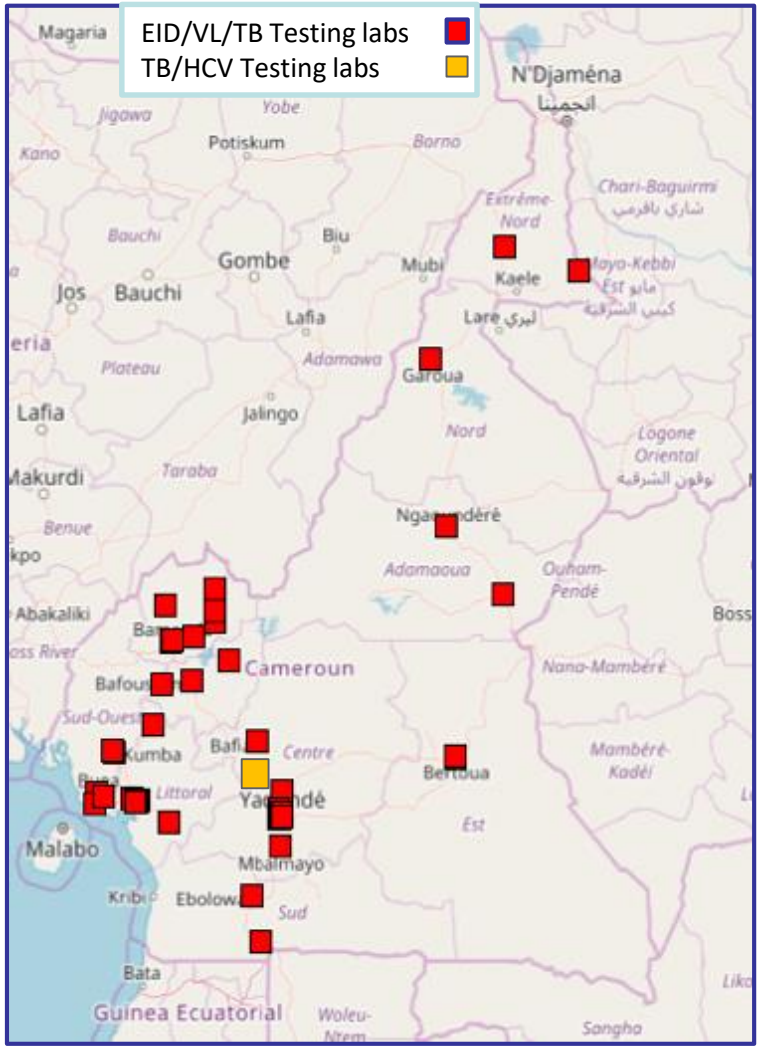
**DNO next steps**

1. Organize a workshop in September 2019 to endorse scenario mix for both conventional and POC arrangements
2. Develop framework to inform scale up of additional devices for continuous

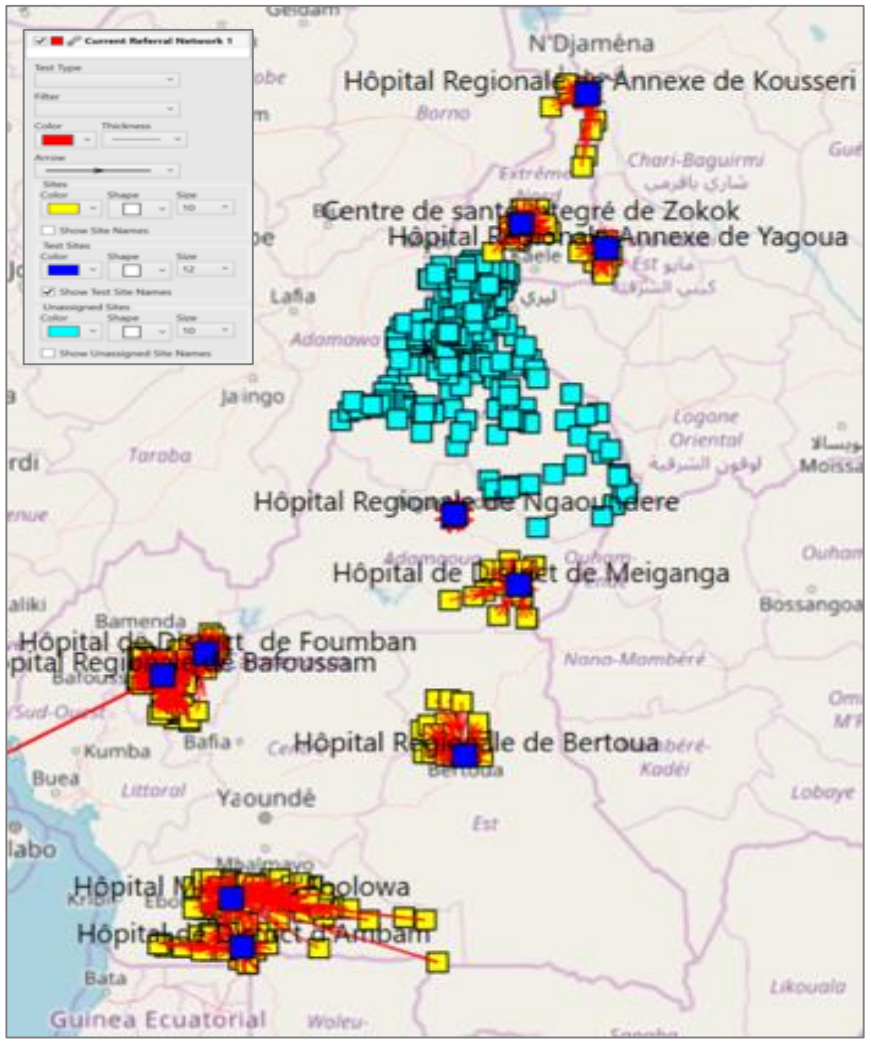
# EID and VL Testing Footprint

| Number of Platforms | | | | |
|---|---|---|---|---|
| **Abbott** | **OPP** | **m-Pima** | **GX-4** | **TB-Lamp** |
| 10 | 05 | 25 | 29 | 27 |

| Number of Testing Labs | | |
|---|---|---|
| **EID** | **VL** | **TB** |
| 04 | 10 | 254* |




**EID/VL/TB/HCV device footprint in the country – both POC/near POC and Conventional systems**

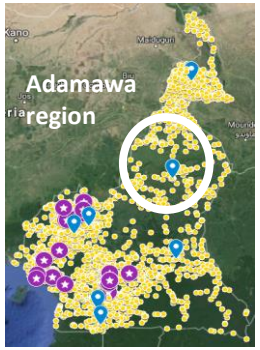



**CHAI has successfully mapped out and defined a mini hub and spoke referral network for 10 hubs covering 183 spokes**

*Source: National molecular mapping for integrated diagnostics 2018 (pending validation), maps developed from labEQIP; CHAI EID TAT analysis Jan2016—Feb 2017, * There are 254 diagnosis (including microscopy) and treatment centers in the country, 10 of which are MDR TB centers*

# Region Snapshot: Adamawa Region

## Brief Overview




Situated in the Grand North along side the Far North and North regions respectively. There are approx. **179** health facilities in the region of which **150** offer PMTCT services, and EID has expanded from < **20** sites in 2012 to **68** sites in 2017. The region has no conventional testing capacity and relies solely on CIRCB for EID testing services and CPCAG for VL. In 2017 MOH procured and installed a GeneXpert device at the RH used at the time only for TB testing. Following MOH approval in 2018 the Xpert device was fully integrated to include EID/VL testing. In addition an Alere q device was installed in Meiganga DH used for EID. There is a great need to further expand access to testing via POC diagnostics in the region.

## Priority Areas

- Improve access to diagnostics using POC
- Operationalize TB/HIV integration
- Optimize the lab network

## Current Challenges

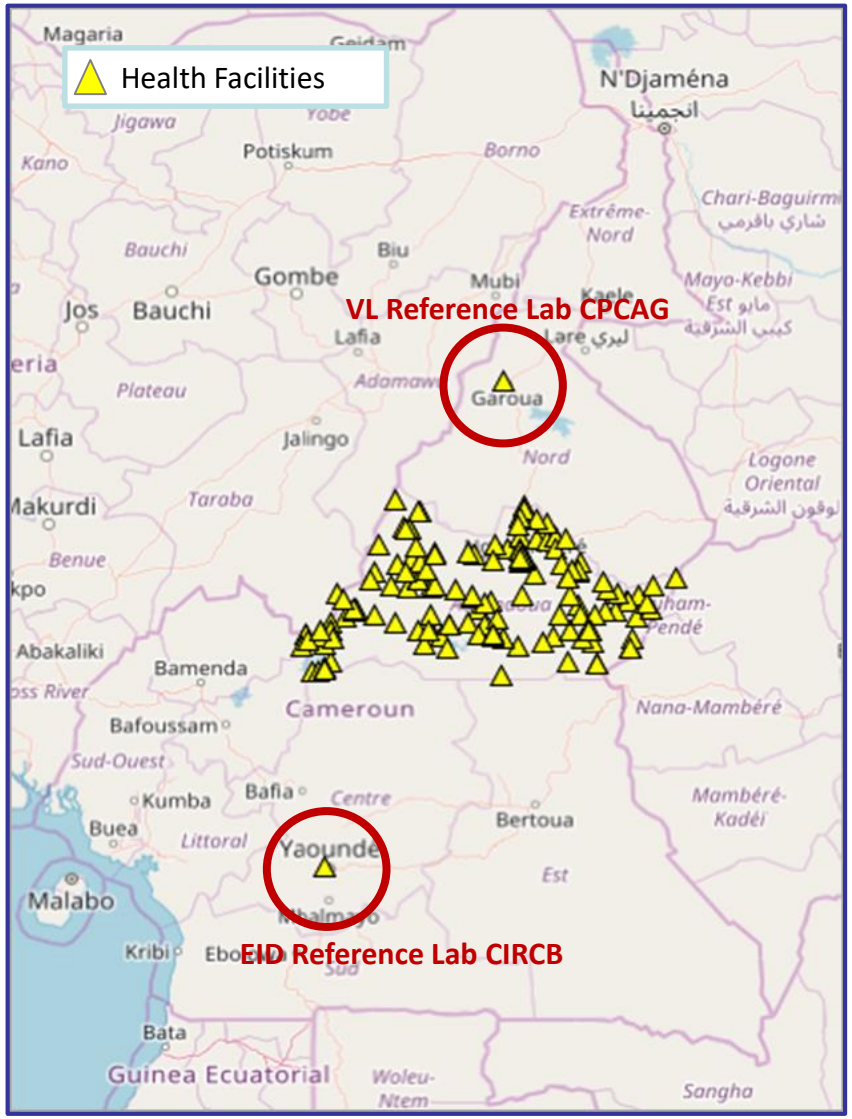
- Currently underserved in terms of devices
- Adhoc ST system, which is inefficient overlong distances

| Health Facilities | |
|---|---|
| Sites collecting EID samples | 68 |
| PMTCT sites | 150 |

| Number of Platforms | | | | |
|---|---|---|---|---|
| Abbott | OPP | GX-4 | Alere Q | Samba |
| 00 | 00 | 01 | 01 | 00 |

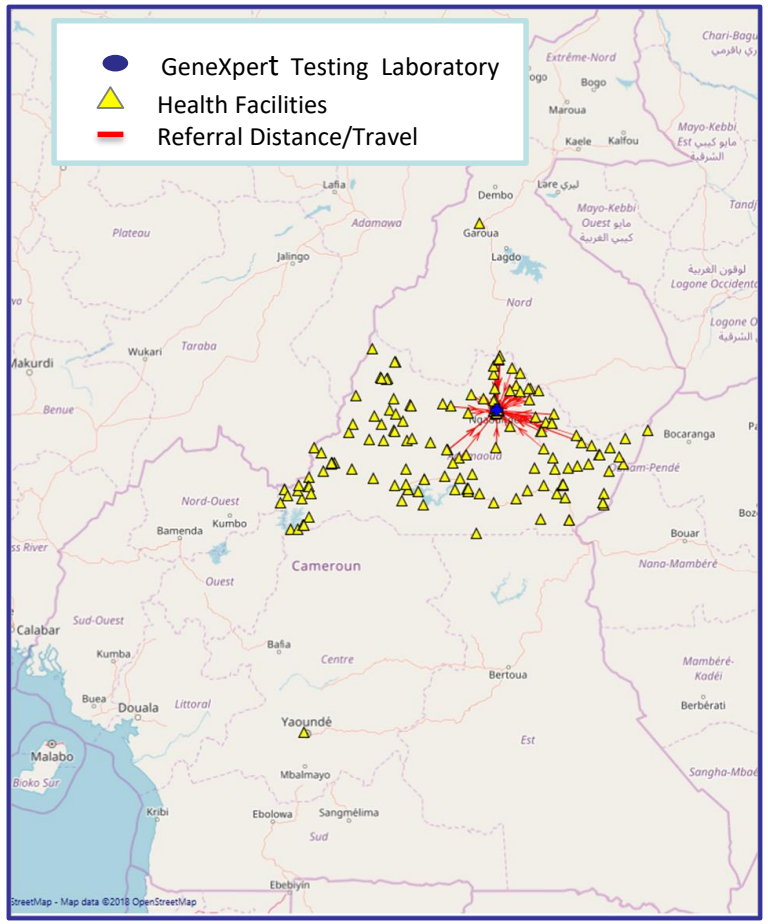
| | |
|---|---|
| Funding | GF for conventional, Unitaid and GF for POC and near POC PEPFAR for EQA |

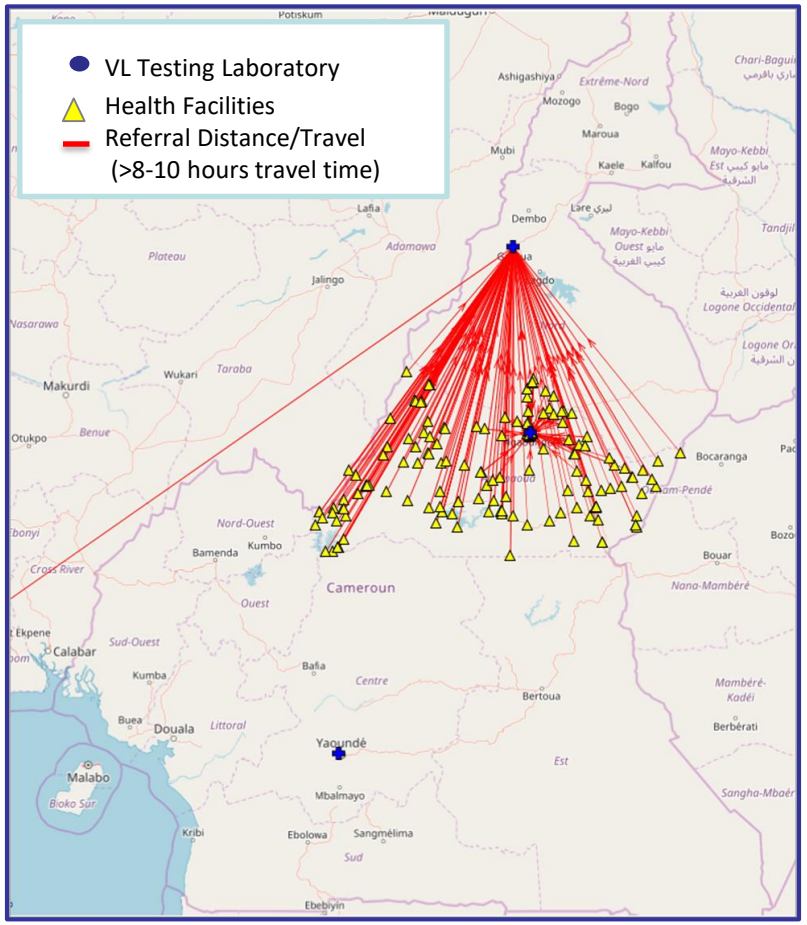
*Source: PMTCT Progress report No 12; NACC 2017 Annual report*

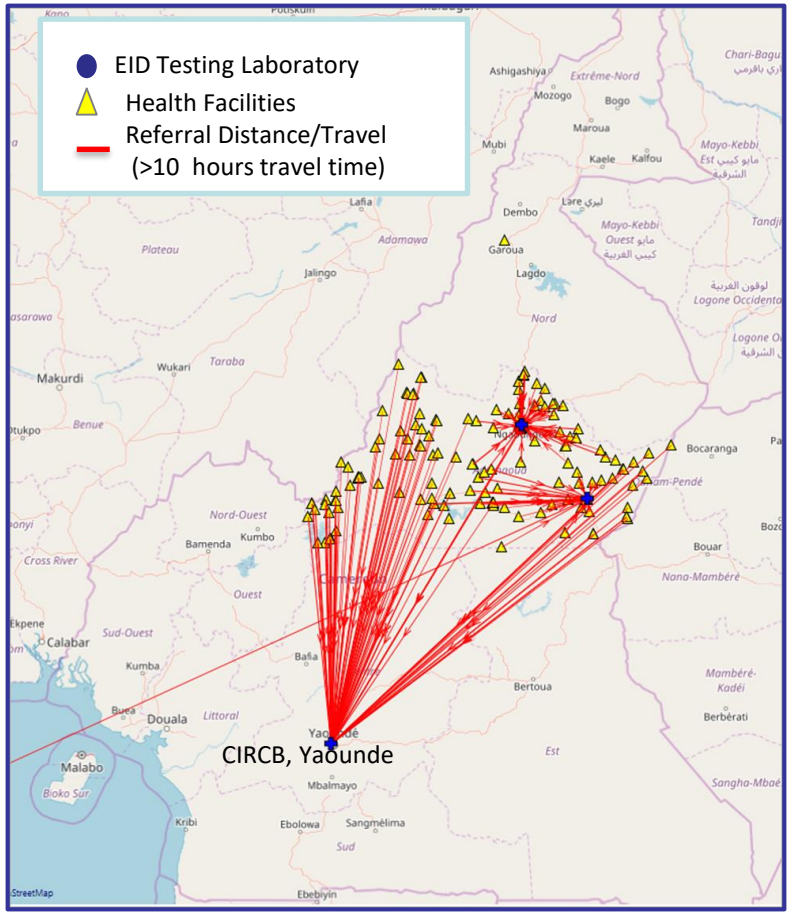



*Source: National molecular mapping for integrated diagnostics 2018 (pending validation), maps developed from labEQIP*

# Current Scenario of TB,EID and VL Lab referral network: Adamawa Region




**TB referral network**. Map showing sites referring samples to HD Ngaoundere for processing on GeneXpert. Only portion of sites are currently collecting and referring TB samples to Testing lab

**VL referral network.** Currently most sites continue to send samples to CPCAG in Garoua for processing apart from the RH Ngaoundere which provides onsite POC VL testing on the GeneXpert device

**EID referral network.** majority of sites send DBS samples to CIRCB (approx. > 1000km away) for processing. Major challenge is long TAT for result return. In 2018 CHAI/UNICEF introduced POC testing on the POC (Alere q) and near POC (GeneXpert)

*Source: National molecular mapping for integrated diagnostics 2018 (pending validation), maps developed from labEQIP*

**Low Coverage for EID and VL**

- **Long TAT**
- **Limited Access to Testing**
- **Stock Outs of Test Kits**
- **Equipment Down Time**
- **Platform Distribution**

**Situation will continue unless new strategies are**

**Strengthen Data Visualization and integration between Partner and MOH patient databases to optimize program gains**

**DASHBOARD**

# PART II: LIMS UPDATE

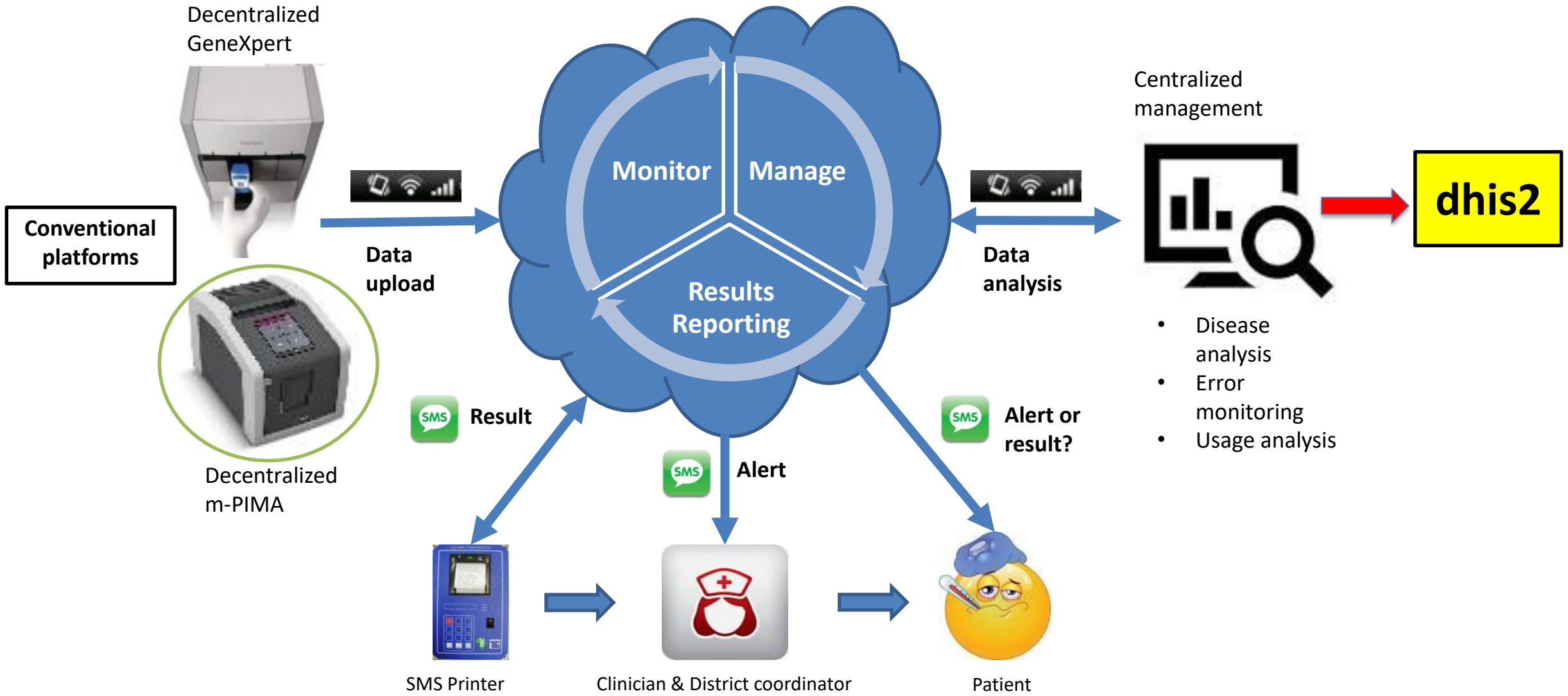
# Objectives of putting in place an EID/VL dashboard

- Data Harmonization and coordination at the National Level for Timely Interventions and Decision Making

- To provide real time visibility of key laboratory and treatment indicators as captured in the requisition forms received by the laboratories to generate harmonized reports and provide timely corrective actions and mitigations

- To Enhance Inter- and Intra-Laboratory Sample Tracking From Collection to Return of Results

# LIMS? - Flexible, Scalable, Multifunctional and low Cost



# Updates of LIMS in Cameroon

- **2012 – 2014**
  - ✓ CDC/PEPFAR support to NACC to setup a national LIMS
  - ✓ First round of indicators selection and validation
  - ✓ EID and VL Request Forms drafted
  - ✓ LIMS Demo presented to MoH and partners
  - ✓ Failure to implement
- **2014 – 2016**
  - ✓ dhis1 introduced
- **2017 – 2018**
  - ✓ dhis2 introduced
  - ✓ Revised and harmonize EID/VL Request Forms
  - ✓ Validated key indicators to capture on dash board
  - ✓ LIMS survey tool developed
  - ✓ Assessment of LIMS in reference labs completed
- **2019**
  - ✓ Exchange visit to Kenya
  - ✓ Restitution meeting at NACC

# LIMS Assessment Outcomes

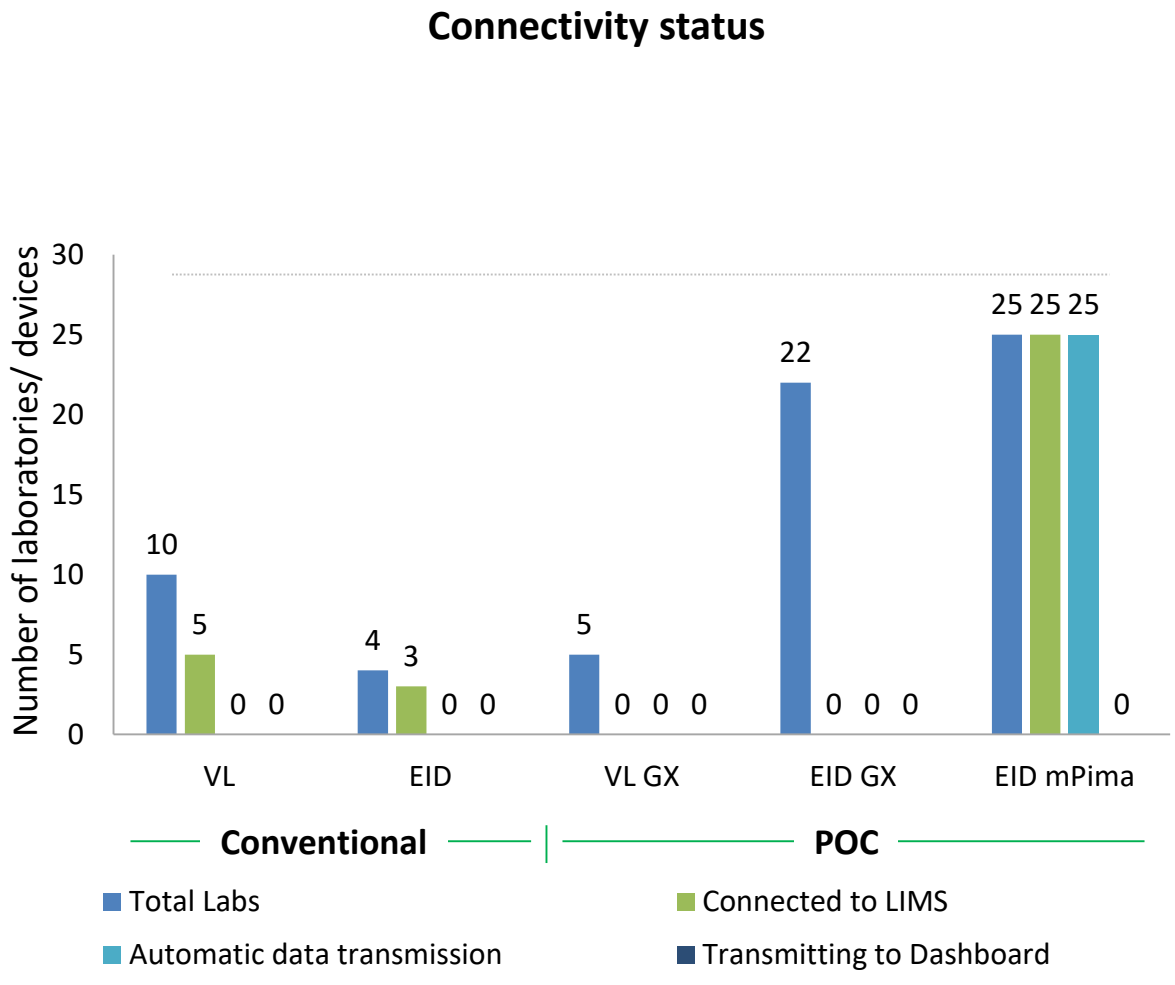
## LIMS

| | |
|---|---|
| **Availability :** | ☑ Yes (Full/Partial) ☐ None |
| **Name :** | DISA at NEID Lab, DREAM LIMS at Nkolondom and Dschang, CIRCB, CRESAR, CPC |
| **Supported assay :** | HIV VL, EID, Others |
| **Interoperability :** | TBD |
| **LIMS Type :** | ☑ Open Source One time payment ☐ Paid-to-service subscription |
| **POC Connectivity:** | EID: Data Point |

## Centralized Dashboard

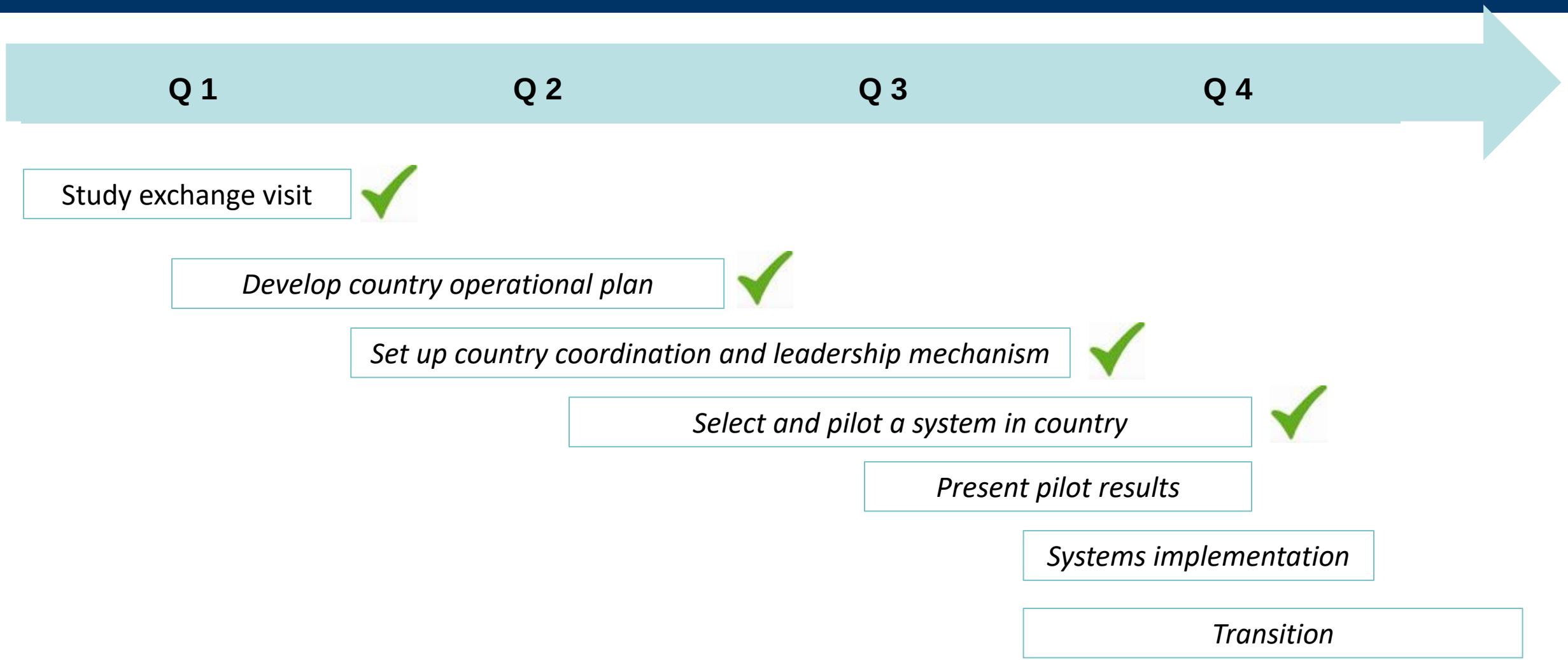
| | |
|---|---|
| **Availability:** | ☐ Yes ☑ No |
| **Timelines:** | Functional Dashboard : **Q4 2019** |
| | 100% VL data visibility on Dashboard : **TBD** |
| | 100% EID data visibility on Dashboard : **TBD** |
| **Public URL:** | N/A |

## Laboratories




**For POC, bar graph shows number of devices and Automatic data transmission represents devices connected to POC Dashboard*

# LIMS Roadmap for Cameroon - 2019



# Study exchange visit to Kenya

# Kenya Benchmarking: Government Ownership and Strong Support From Partners are Critical to Ensure Successful and Sustained Implementation


Meeting with CDC Labs Country Director – Kenya

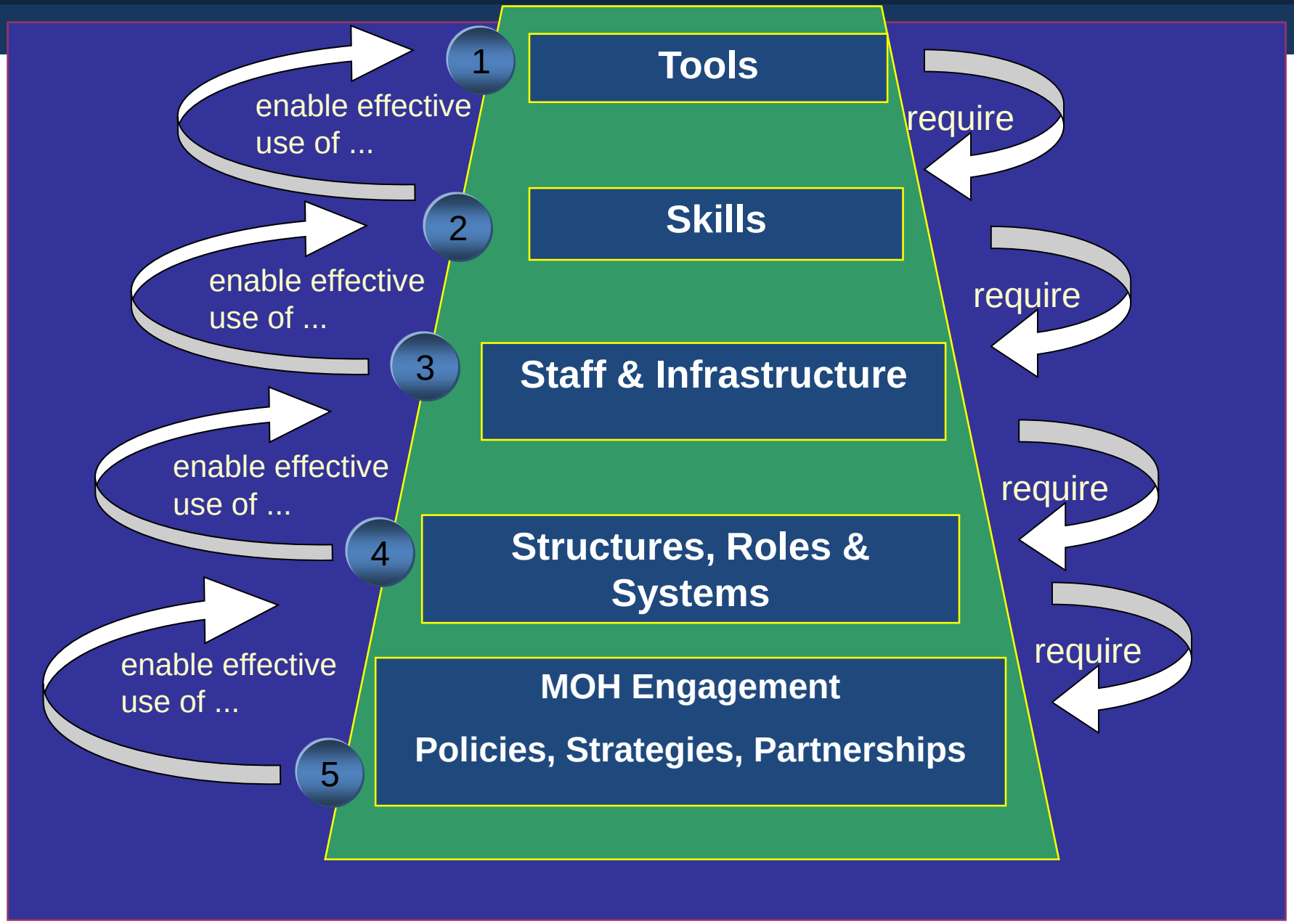
Kenya National Data Center


Server installed at KEMRI

HIV EID and VL Dashboard hosted at NPHRL

PEPFAR supports essentially everything in Kenya
– STS, data management, HR capacity, QA, and recently HIV-DR testing

# Government Ownership



# Challenges in LIMS, Dashboards Implementation

1. Limited technical capacity
2. Fragmented systems for data management at labs – dhis2, BLIS, DISA, DREAM –LIS, Excel-based: Need for a standard system at all labs
3. There is no connectivity between platforms
4. No link between health facilitates and testing laboratories
5. Data is not or partially available at central level to enable real time decision making
6. dhis2 captures aggregated data and cannot process large data sets plus it relies on data input by health care providers

# Next steps: CHAI to Pilot the system across one Ref lab, and CDC/PEPFAR to scale up to the remainder 9 ref labs as well as set up the national server in country to host country data

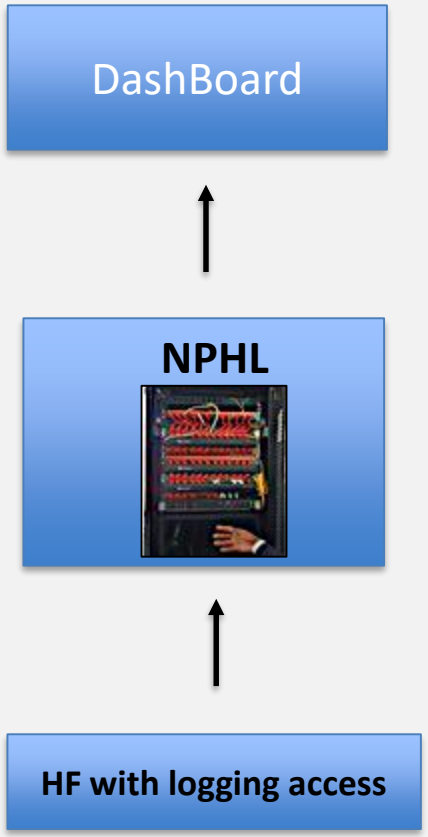
## Phase 1 - LIMS

- Set up a team of developers to build both software and hardware systems
- Ensure the team understands the sample and laboratory work flow in detail
- Customize CHAI's LIMSLITE software to Cameroon context
- Get support from CHAI IT team

http://34.253.117.172/limslite/UserLogin.aspx

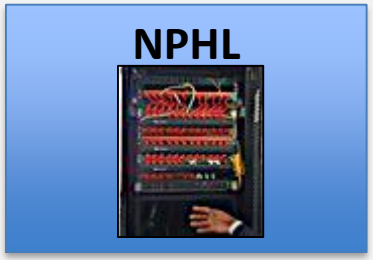
http://34.253.117.172/LISDashboard

## Phase 2 – Pilot 3 months




## Phase 3 Scale up 1st wave

- Present results of the pilot phase
- Replicate similar systems across the remainder labs without an existing LIMS
- Set up individual servers across each lab
- Create individual IP addresses for remote access
- Develop the facility log in interface and test




## Phase 4a Scale up 2nd wave

- Set up the national data center – server (create virtual backups) to host country data
- Develop links for labs with existing LIMS (05) to share agreed on data with the dashboard

## Phase 4b

- Set up PocLABS software and operationalize the system
- Install on all POC devices starting with CHAI/UNICEF focus regions

# Preliminary work to initiate the pilot phase (Phase 1)

**Cameroon Assessment of NPHL Data Center**

Server 1 used for PACS (a system to manage sample sorting)

Server 2 used for surveillance in and around the lab

Running diagnostics at a remote work station computer to test local net work through Ethernet

**LIMSlite** software installed at NPHL after assessment was completed: initial tests runs by CHAI software engineer

Installation completed successfully at server 1

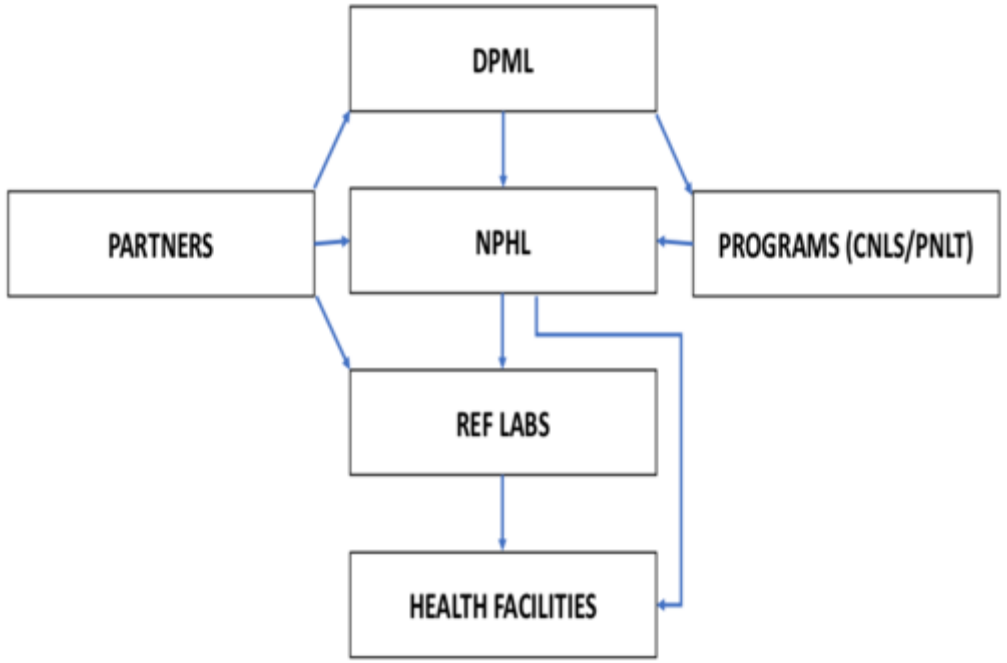
Failure to connect with remote workstation – explaining to NPHL staff error message and possible approach to rectify the error

# IV – Next steps

1. CHAI will customize LIMSlite Software to Cameroon Context
2. Follow up with NPHL to Diagnose local network issues and upload LIMSlite
3. Engage MOH to Endorse Pilot
4. Conduct in-house demo for MOH with CHAI team
5. Train NPHL Team and Start Pilot Effectively
6. Expand to Xpert site 1 month after pilot at NPHL

# Key considerations for developing a road map for Cameroon -1

1. Strong Coordination mechanism
2. Strong Systems for Ref. Labs; Health Facilities & Data Storage




## Resource Mapping and Partners support

| | |
|---|---|
| **USG Team** | Funding support from CDC/OGAC |
| **MOH** | Coordination and infrastructure set-up |
| **CHAI** | Software and dashboard development and installation set up, technical assistance |
| **Other partners** | Global Fund TA |

**Technical and Functional support**

| | |
|---|---|
| **Organization** | CHAI, USG and MOH |
| **Technical staff capacity** | Yes |

# Key considerations for developing a road map for Cameroon – 2

## 2 Infrastructure resource requirement

| | |
|---|---|
| Reference Laboratory | infrastructure:<br>- internet, local network, server, computers<br>Software<br>- document lab workflow<br>- Manual system in the Lab (HFs) |
| National Data center | Infrastructure<br>- Stable power source<br>- cooling system<br>- computer system<br>Software<br>- Web server<br>- Database |

## 3 Outstanding HR and financial resource requirement

- Budget required for staffing
  - ✓ CHAI can support TA for set up in one lab that can be replicated to all labs
  - ✓ IT/technical lead is required for 12 months full time
  - ✓ May require infrastructure (hardware & software)
- Other requirements
  - ✓ Infrastructure for other labs (hardware and software)
  - ✓ Data entry clerks for all labs
  - ✓ Internet connection running cost

# Similar to Kenya, Cameroon has set out to improve and strengthen their national EID and VL systems and put in place a dashboard whose data is hosted in country on a national server

DHIS 2

Dashboard

Summary data from dashboard is pushed into DHIS 2

Software + Database

National data center (synchronize databases from the labs), queries & summaries, reporting to feed the dashboard
Data replicated virtually 3X or more

Virtualize all data and create multiple back ups

LAB1 LAB3 LAB6 LAB8

LAB2 LAB4 LAB5 LAB7

LAB10

LAB9

Software + Database

02 of the 10 ref labs in Kenya already had an existing LIMS

HF with logging access

Offsite login - Local Cyber to log in sample details

HF with no logging access

Each lab has its own server and can operate independently even if the national server system breaks down

# OUR TARGET

**1. Pilot Software – end of September 2019**

**2. Fully Operational Dashboard - end of 2020!**


Hope for the Future
US ANGELS
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THANK YOU!