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AFRICAN SOCIETY FOR LABORATORY MEDICINE

ADVANCING THE LABORATORY PROFESSION AND NETWORKS IN AFRICA

Unlocking the power of the tiered laboratory network through laboratory mapping

RESOLVE TO SAVE LIVES

African Union

AFRICA CDC
Centres for Disease Control and Prevention
Safeguarding Africa's Health

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InSTEDD

IRESSEF

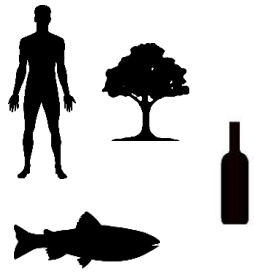
Mapping laboratory networks: Why?

- Where are the laboratories ?
- What can they do?
- How much population is covered by the laboratory services?

→ Use the information to improve the functions of the laboratory network

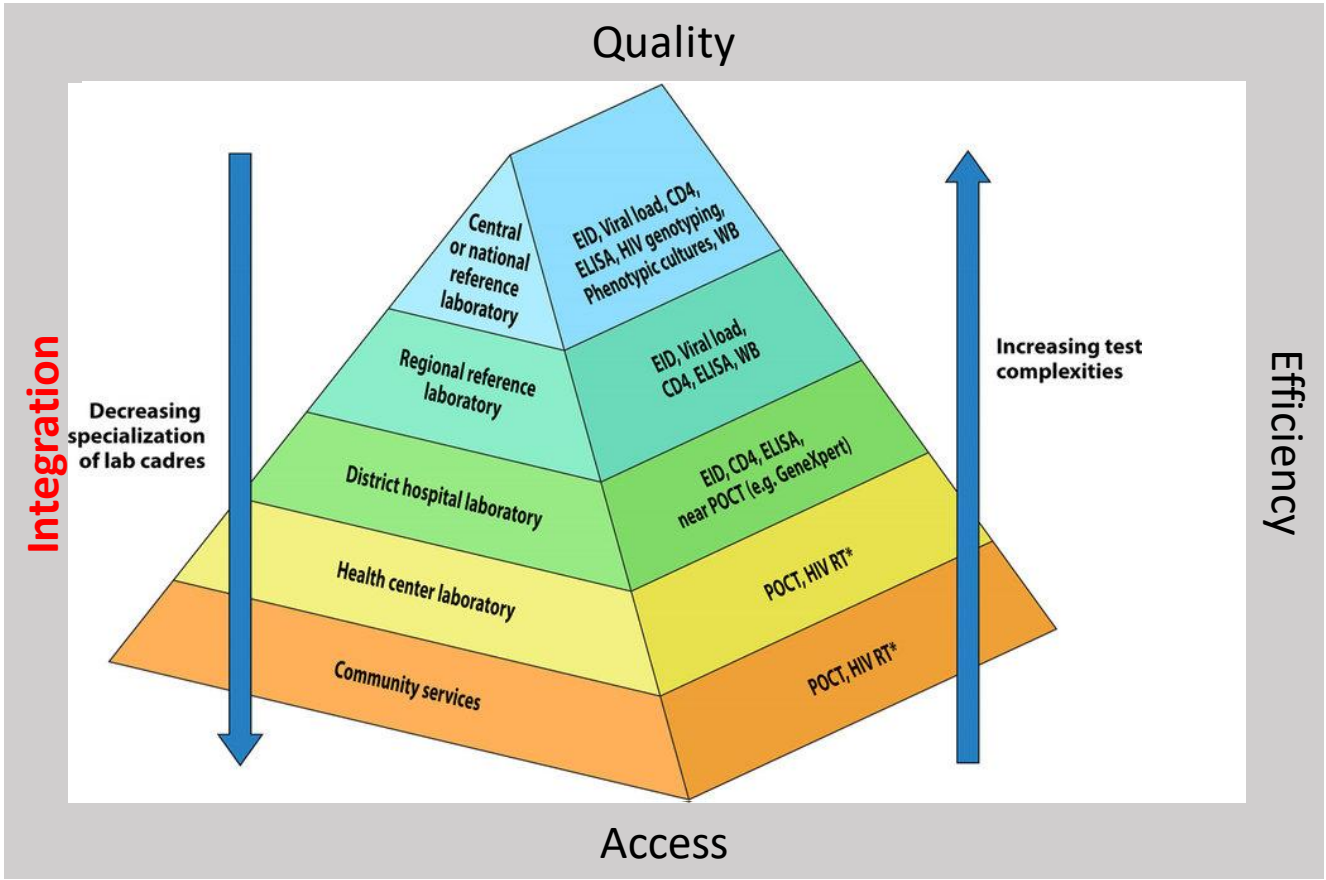
→ Strengthen the capacity of the laboratory technical working group (TWG) to manage the laboratory network

Re-introducing national tiered laboratory networks



Communicable diseases

Non-communicable diseases



Limited Resources

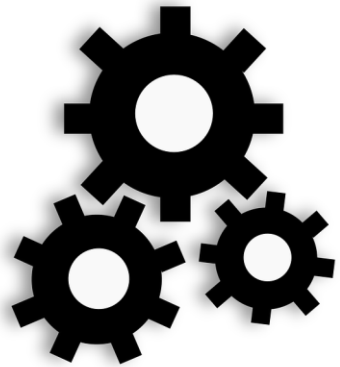
Routine — Emergencies

Individual patient health — **Public health** — **Global health**

If the laboratory network was a computer…

Laboratory systems

The hardware



- Infrastructure & supplies
- equipment
- Workforce
- Quality
- Data
- Etc.

Tiered Laboratory network

The software

- Mutualize resources
- Synergize functions
- Creates cost effectiveness
- Cover population need

Governance

The administrator

TWG

MoH Laboratory directorate
Administrative leadership
Laws & regulation

National Public Health Laboratory
Technical arm

Disease programmes

Private sector

Research, Academia

Partners

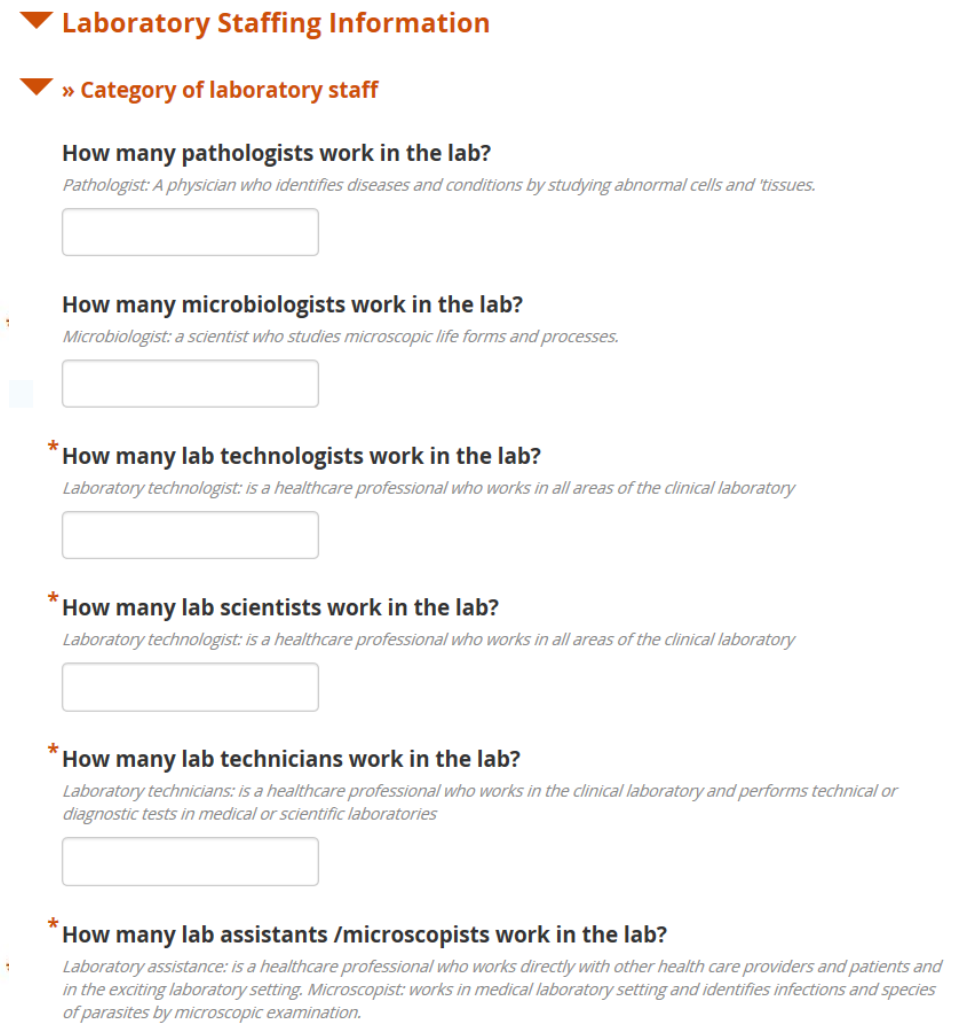
The guiding principles of the network functions

- **Maputo declaration**: Integrated & quality laboratory services at all levels of health system/network
- **UHC**: access to health services for all, without causing financial hardship
- **IHR**: collective and coordinated prevention, detection and response to disease threat.
- **Freetown declaration**: clinical and surveillance functions conducted through a single integrated national network
- Others…

The laboratory mapping data can provide the evidence to shape the network according to these guiding principles

Collect Laboratory Data

- Use pre-configured, customizable and reusable digital forms via Ona.io that allow to collect data offline
- Collect GPS coordinates and service data via onsite assessments
- Integration to a facility registry (database) for curation & use,
- The data collection tool covers test menu (including AMR), QMS, staffing, linkage to networks, infrastructure, etc…



Mapping laboratories in Burkina Faso: the process

Upload the data
Tablets

Data cleaning
ASLM IT

Visualizations
Web

Analysis
ASLM analyst
↓
country team

Triangulate layers of informations
(***Planwise***)

- GIS data (location)
- Population (coverage, demand)
- Road network (access)

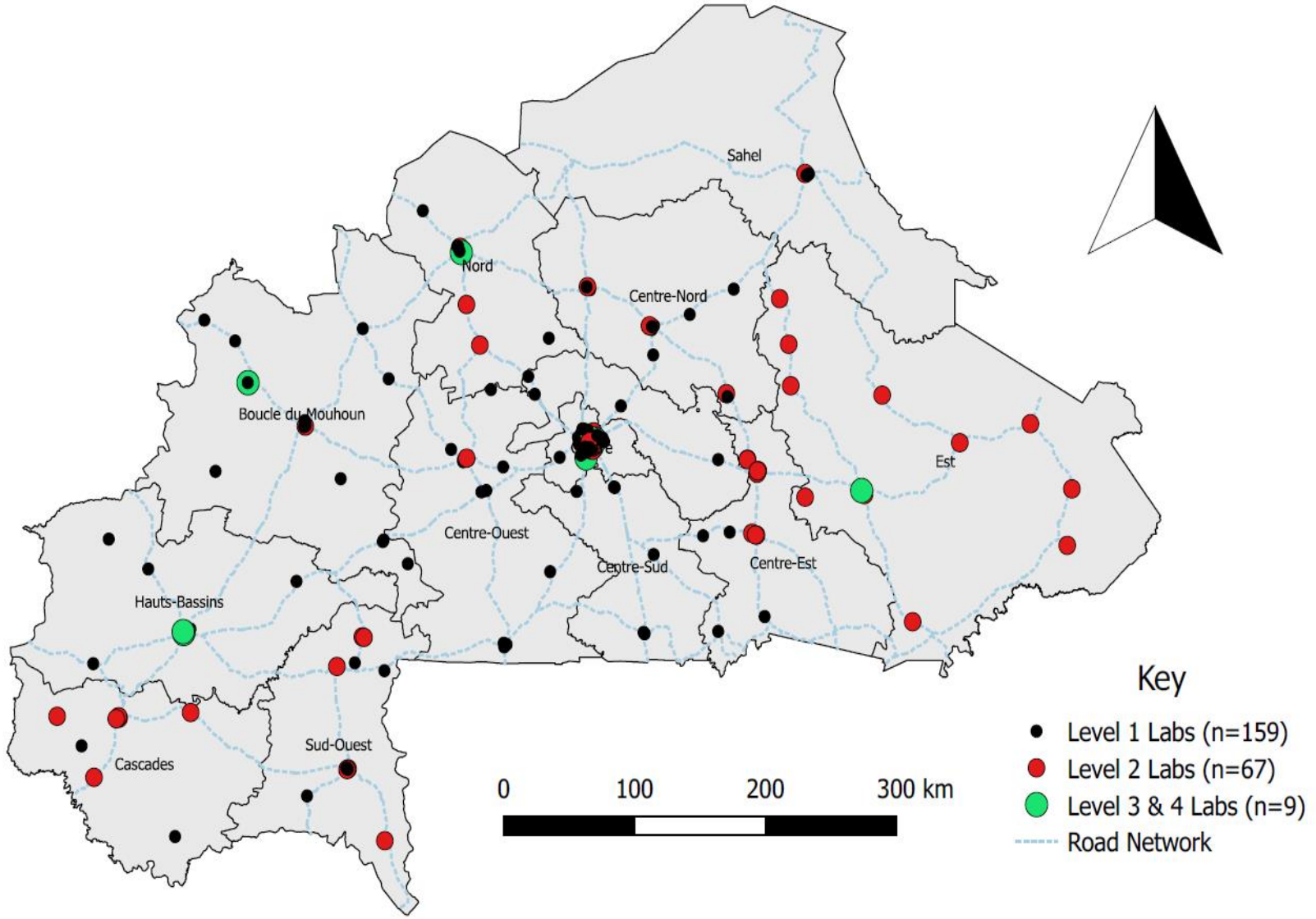
InSTEDD

Preliminary analysis from Burkina Faso

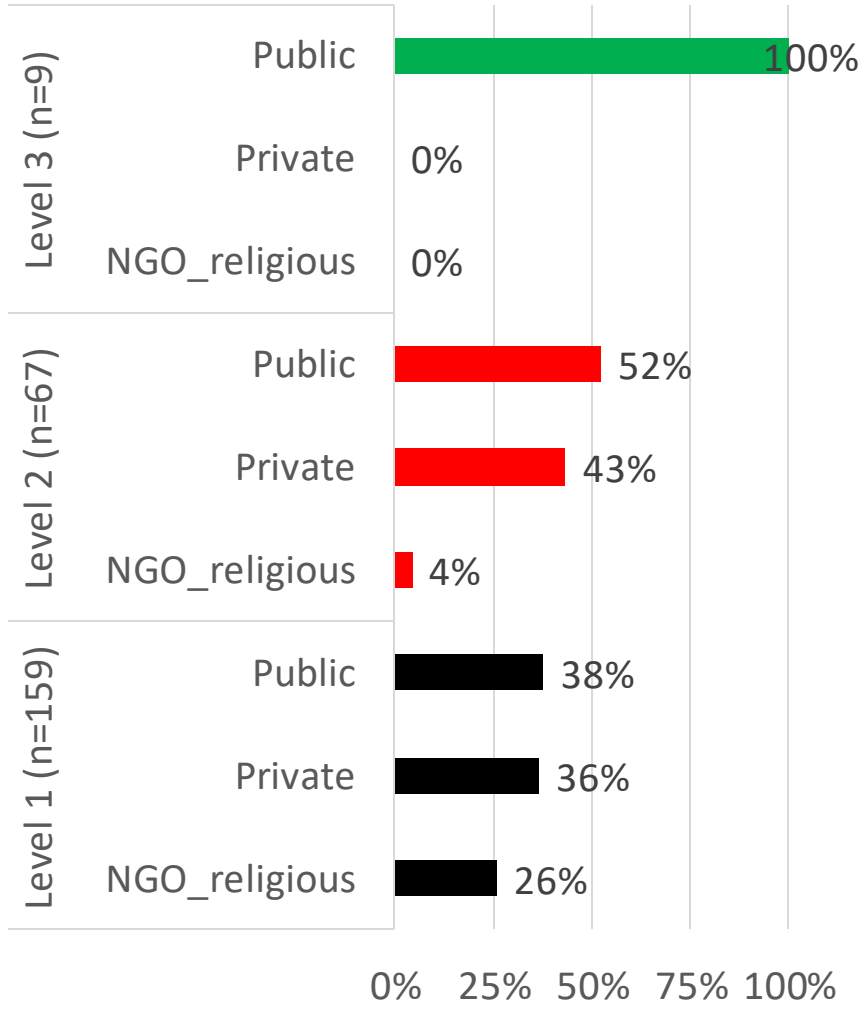
Ministère de la Santé

Distribution of the 235 Laboratories that are mapped

Geographical distribution



Distribution by affiliation



Case study 1:

Assessing the implementation of the tier-specific minimum testing package in Burkina Faso

National norm for medical laboratory testing in Burkina Faso guides the recommended minimum testing at each tier of the network (2009)

Population in Burkina Faso: 20,853,837 (WHO population database)

Coverage: access to care within a radius of maximum 2 hour travel (by car or on foot)

Using the labmap data to compare the norm and the practice

Exhaustive list aimed at capturing every possible diagnostics

ONA

Test menu (> 120 diagnostics)

- HIV diagnostics
- Hepatitis
- EHF
- Bacteriology
- Tuberculosis
- Parasitology
- Immuno-Hematology
- Blood banking
- Histology

Priorities of Burkina Faso MoH

Actual availability of tests at each tier

- Tier 1
- Tier 2
- Tier 3

Gaps between policy and practices

The case of HIV and tuberculosis diagnostic

What do national norms recommend in terms of HIV and tuberculosis testing?

HIV

Diagnostics captured in the labMap data collection tool (ONA)	In the norm Y/N?
Genotypic ARV resistance testing	
Viral load (HIV)	✓
Human Immunodeficiency Virus (HIV) Polymerase chain reaction(PCR) for…	
Early Infant diagnosis (EID); preparation of dried blood spot (DBS) for Early…	
Line immunoassay (LIA) / western blot (WB)	
HIV serology (enzyme-linked immunosorbent assay (ELISA) linked…	✓
Rapid HIV antibody tests	✓

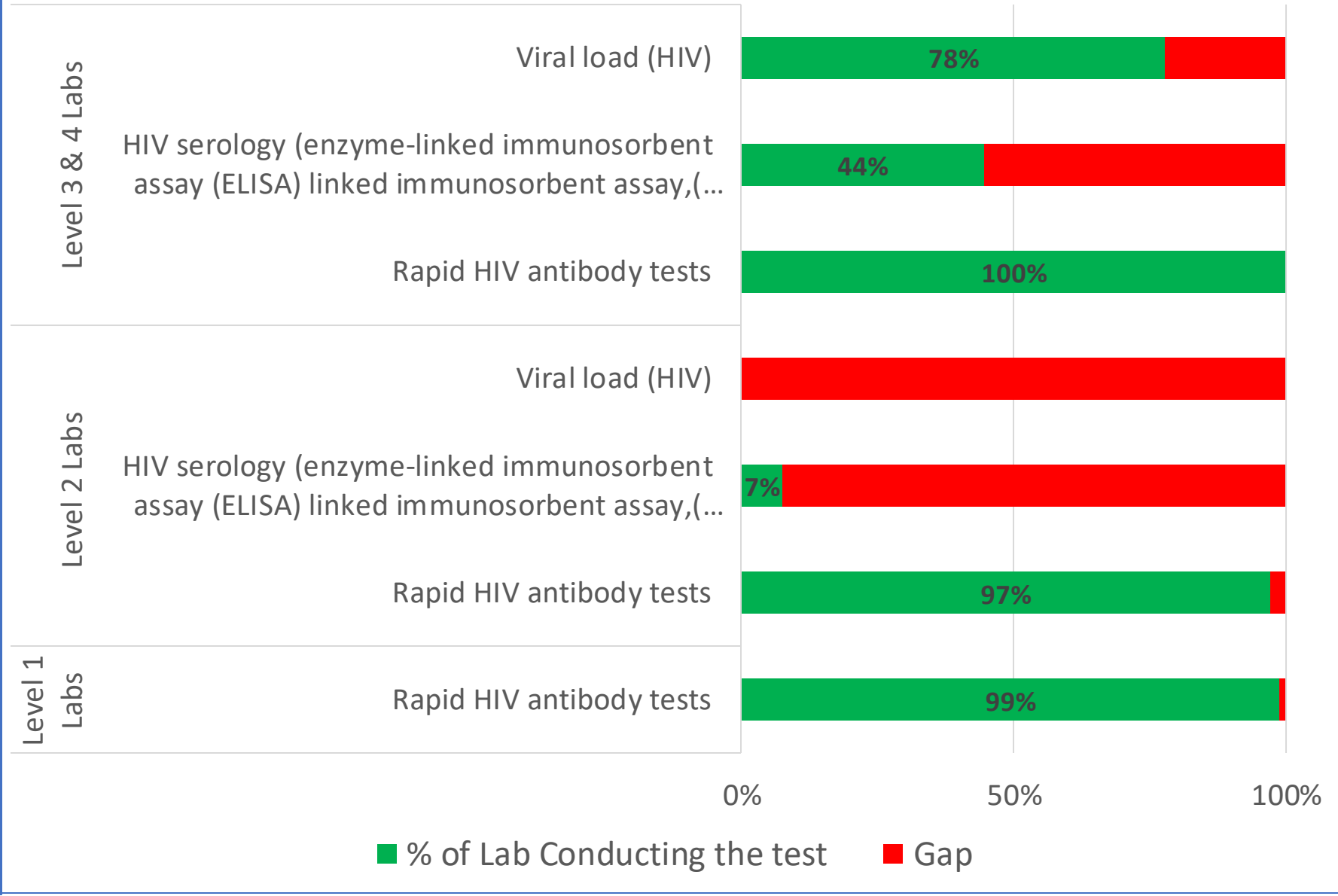
Tuberculosis

Diagnostics captured in the labMap data collection tool (ONA)	In the norm Y/N?
DST second-line	
DST first-line	
MTBDR Plus Probe assay	
GeneXpert MTB	
Tuberculosis PCR	
Culture liquid media MGIT	
Culture solid media	
Lateral flow urine assay (LAM)	
TB LAMP	
Light emitting Diode (LED) fluorescent microscopy	
AFB smear Ziehl Neelsen	✓

Is the minimum testing package for HIV (the norm) implemented?

Diagnostic test expected at each tier level according to the norms of BF

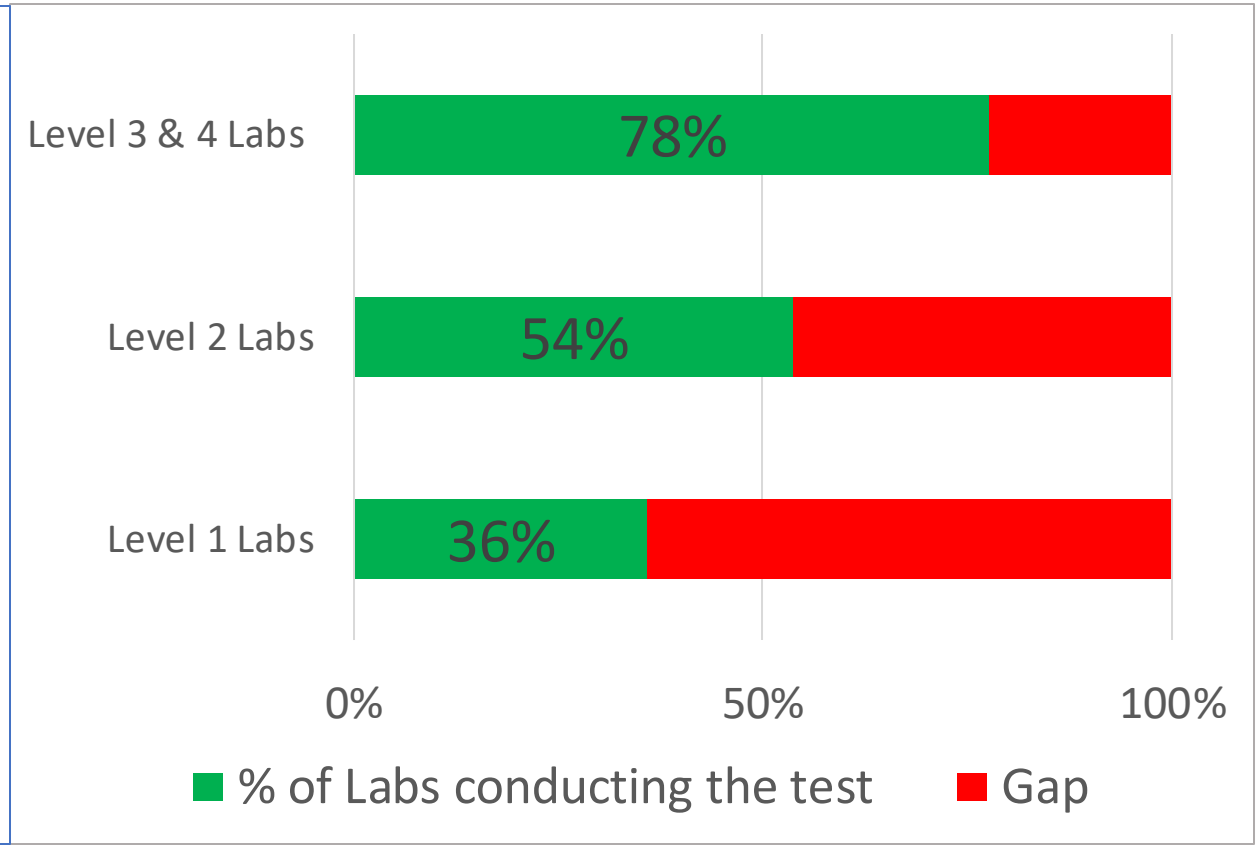
- **Tier 1**
  - -Rapid antibody tests HIV
- **Tier 2**
  - - Rapid antibody tests HIV
  - - HIV Serology(ELISA)
  - - Viral load
- **Tiers 3 et 4**
  - - Rapid antibody tests HIV
  - - HIV Serology(ELISA)
  - - Viral load



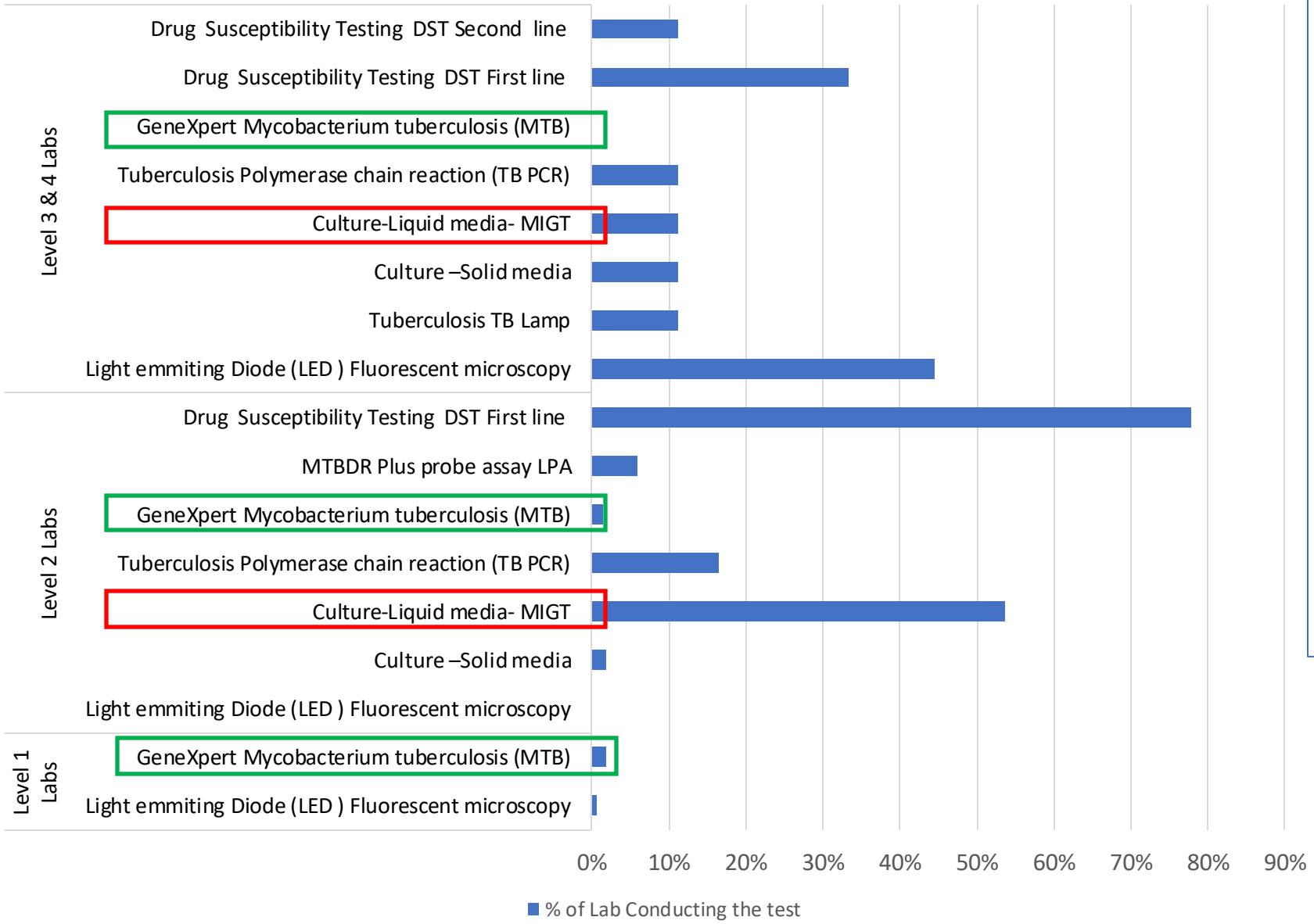
Is microscopy for AFB implemented at all level?

Diagnostic tests expected at each tier level according to the norms of BF

- **Level 1**
  - AFB
- **Level 2**
  - AFB
- **Level 3 and 4 labs**
  - AFB



When practice is ahead of the norm



Tests not included in the norms, but which are implemented

— fluorescence microscopy LED
— Test TB Lamp
— Culture –solid medium
— Culture- liquid medium MIGT
— NAAT (PCR) TB
— Test GeneXpert (MTB)
— LPA MTBDR Plus
— DST first-line
— DST second-line

The norms need an update!!

Implication of test implementation in terms of population coverage

Exhaustive list

ONA

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Priorities of Burkina Faso MoH

Actual availability of tests at each tier

- Tier 1
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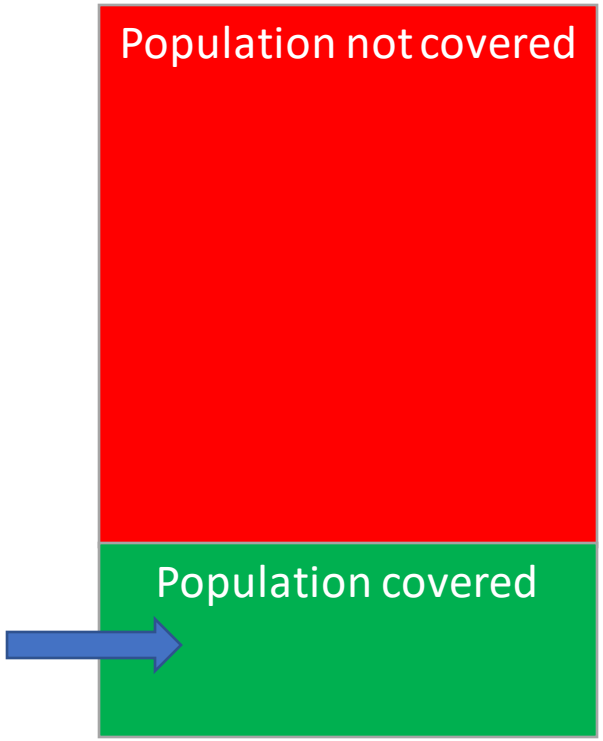
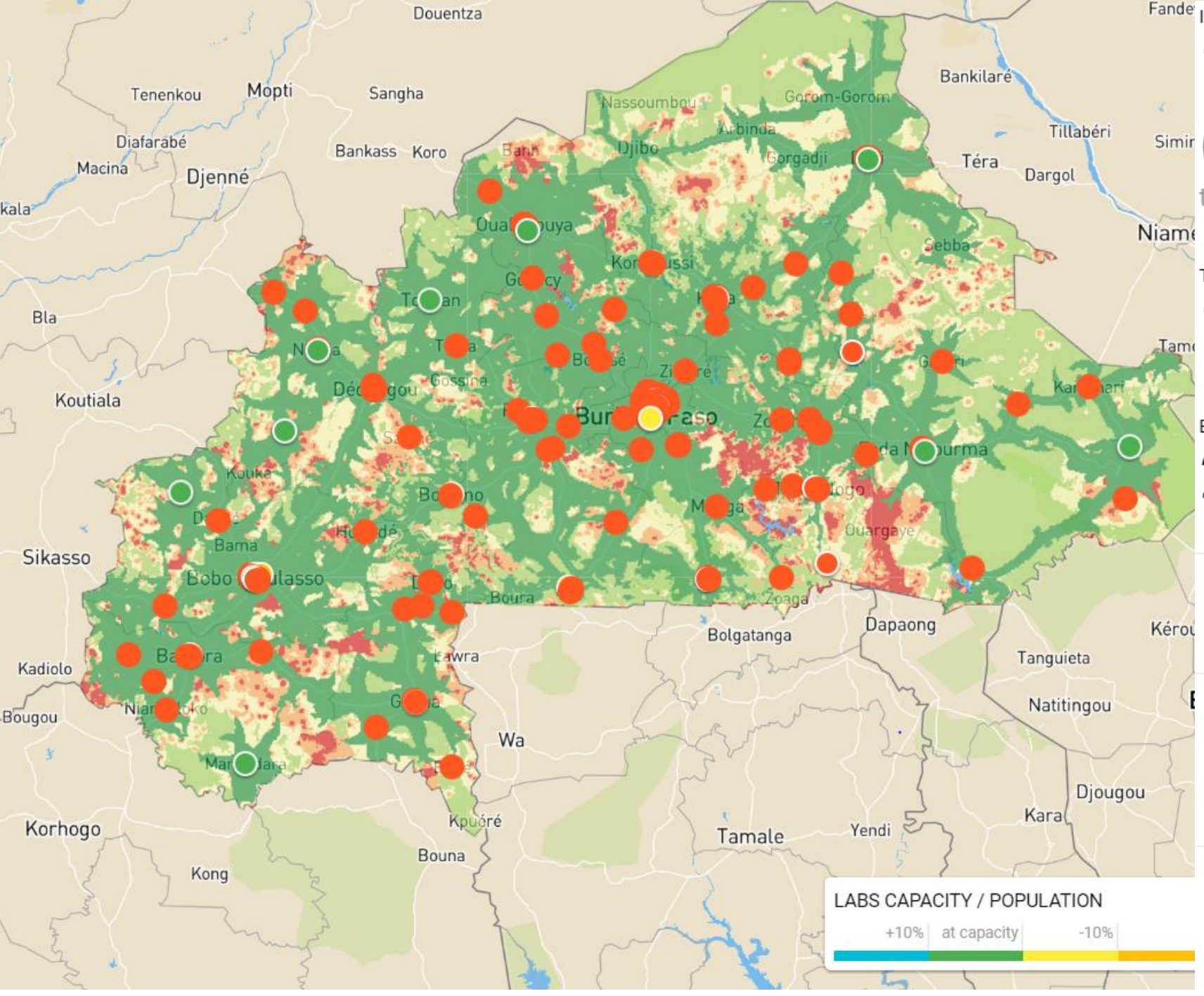
Gaps between policy and practices



Implication for UHC Prioritizing improvements



INCREASE IN TESTS COVERAGE

16,204,581 (77.69%)

to a total of 16,204,802 (77.69%)

TOTAL TESTS UNDER GEOGRAPHIC COVERAGE

17,695,153

EFFORT REQUIRED

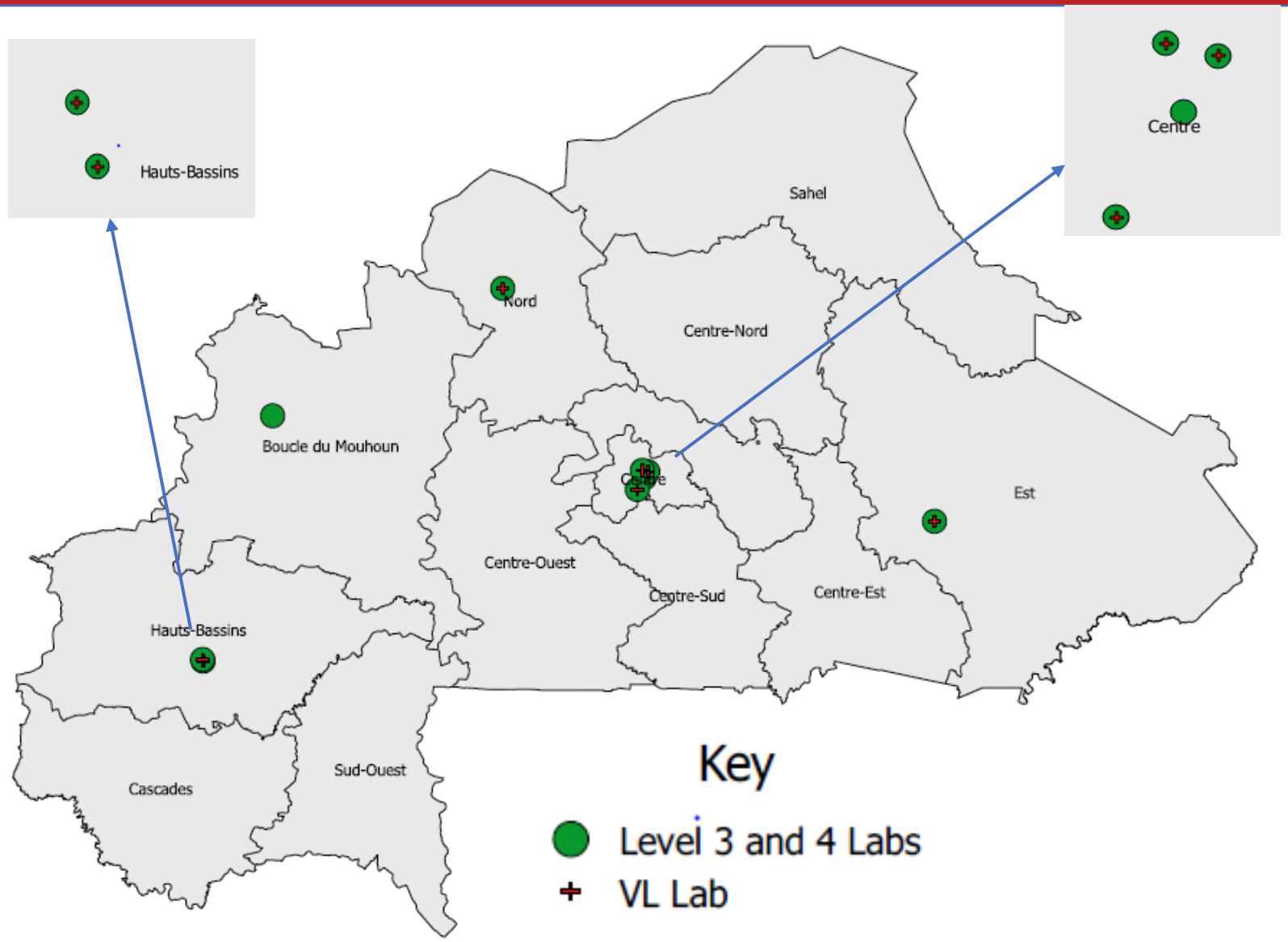
29

device to serve 79,344 tests

\+ Laboratoire CHUR/Ouahigouya
Increased capacity on 1,186,509 test
device to serve 1,080,382 tests

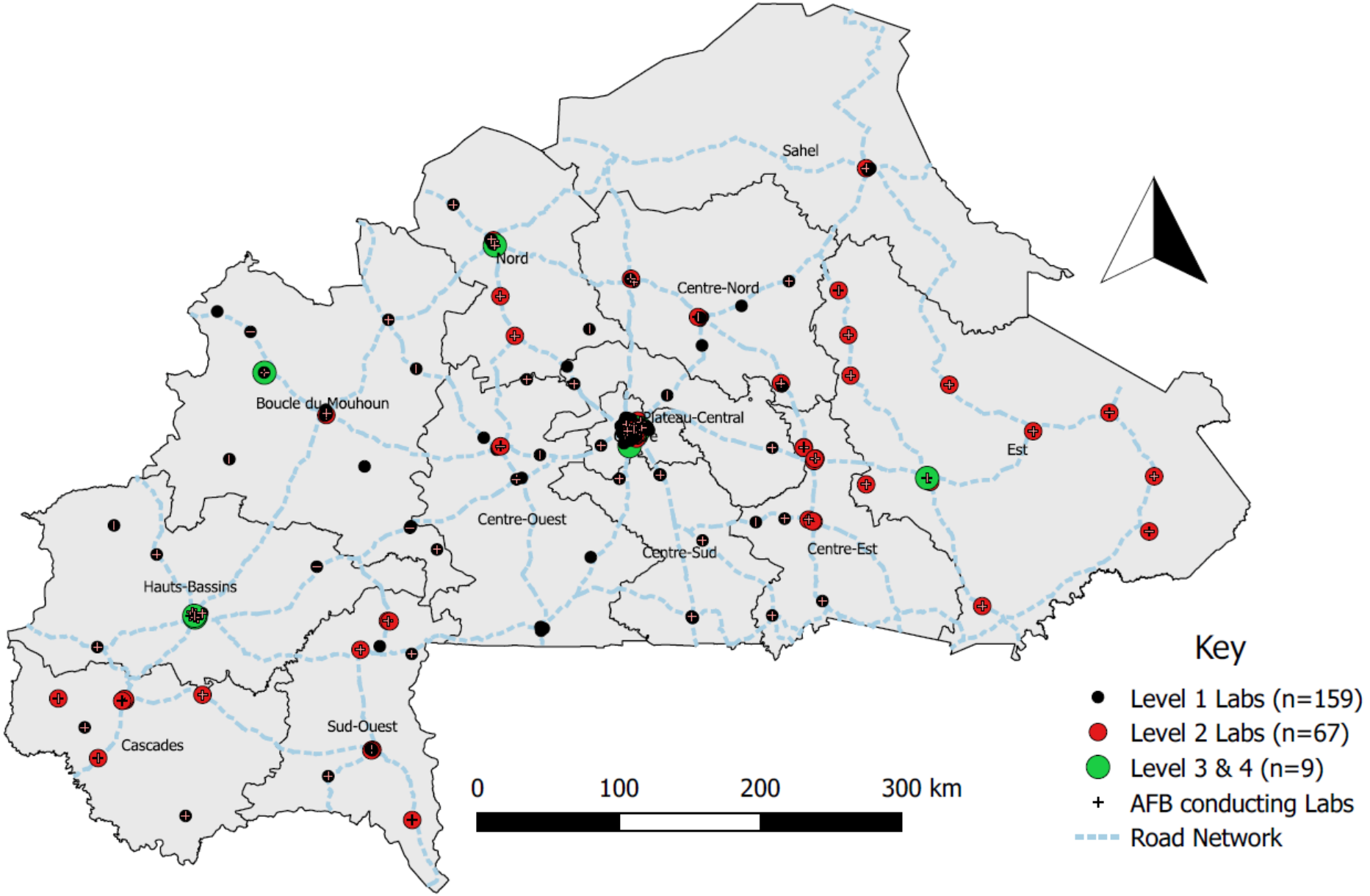
\+ Laboratoire du Centre Hospitalier Universifaire Souro Sanou (CHUSS)
Increased capacity on 2,324,959 test
device to serve 2,324,960 tests

Distribution et population coverage of HIV viral load



- 7 of 9 laboratories at tiers 3 & 4 provide HIV Viral load services.
- **59.3% of the population is covered** (within a radius of 2 hours travel)

Distribution et population coverage of microscopy for AFB



100 Laboratories conduct microscopy for the identification of AFB

- 57 at tier 1
- 36 at tier 2
- 7 at tiers 3 & 4

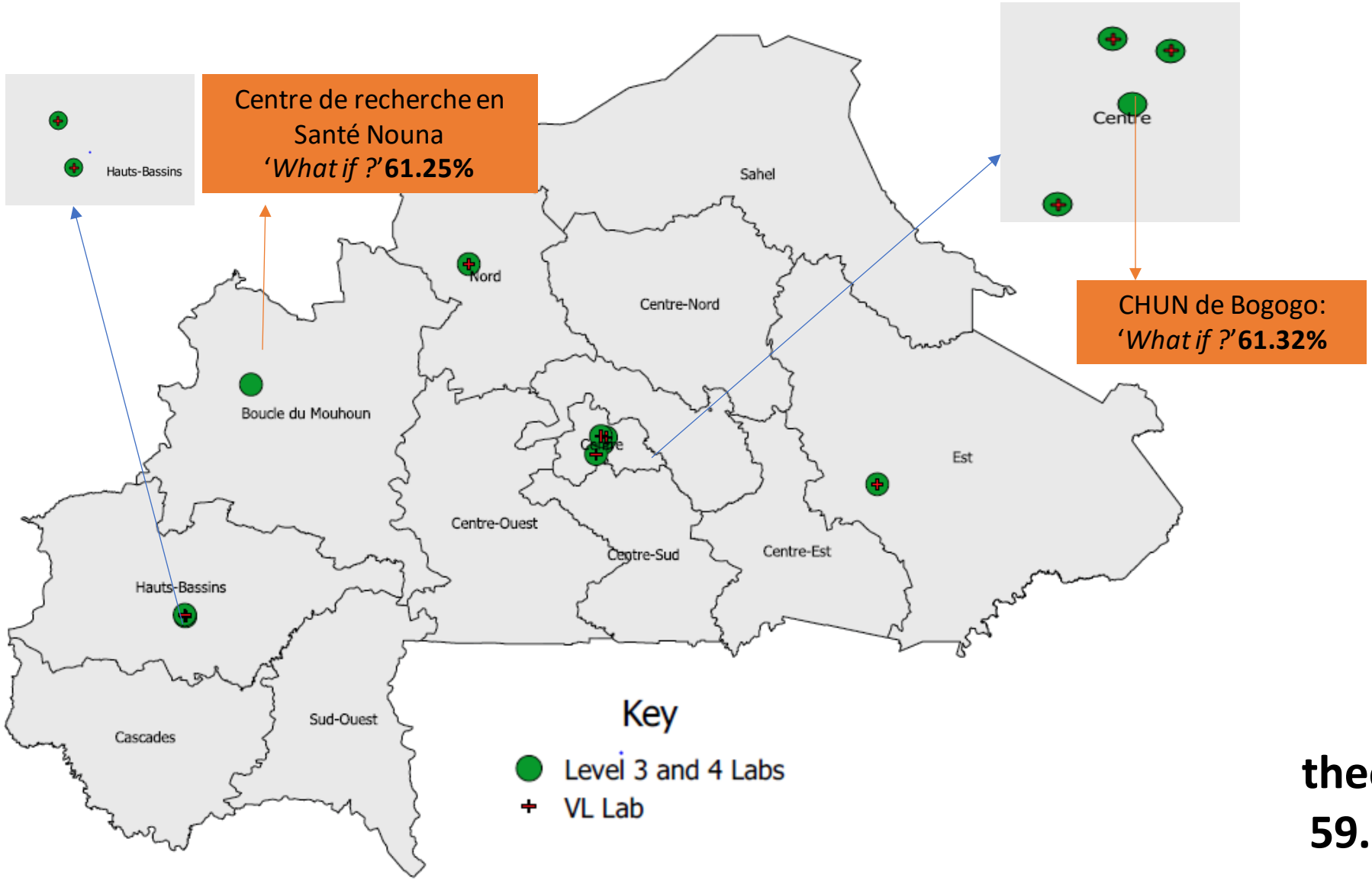
Good population coverage (almost 100%), but microcopy is not the most reliable technique

‘What if?’ scenarios

Case study: increase the population coverage of HIV Viral load

1. *Bring non-conform laboratories to the norms*
2. *Integrate VL testing to existing GeneXpert sites*
3. *Place new VL capacity*

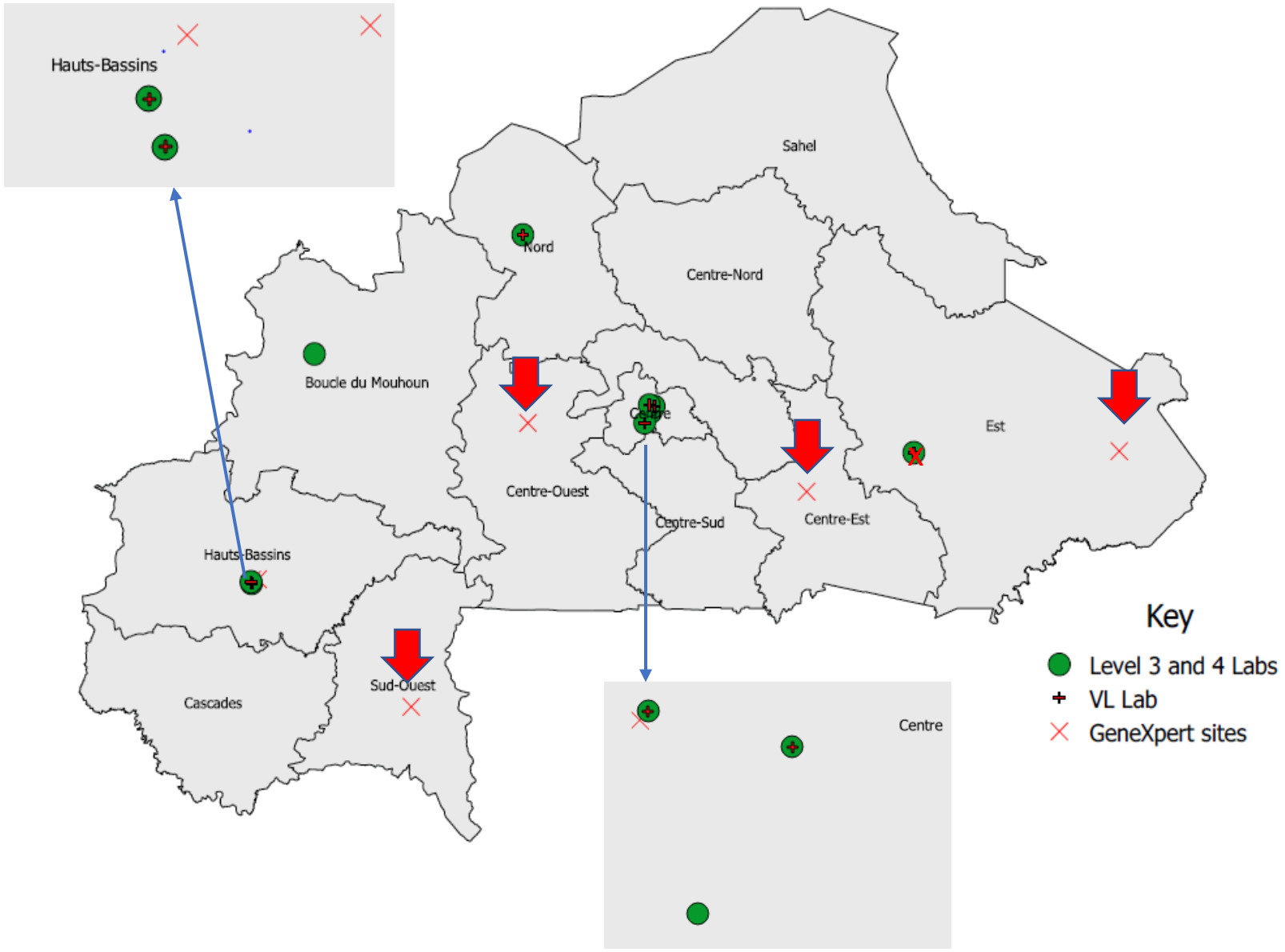
Improve the population coverage by increasing compliance to the norm



Bring tiers 3 & 4 laboratories to the norm

Population coverage theoretically increases from 59.3% to 61.25% to 61.32%

Improve the population coverage by decentralizing VL testing toward geneXpert sites



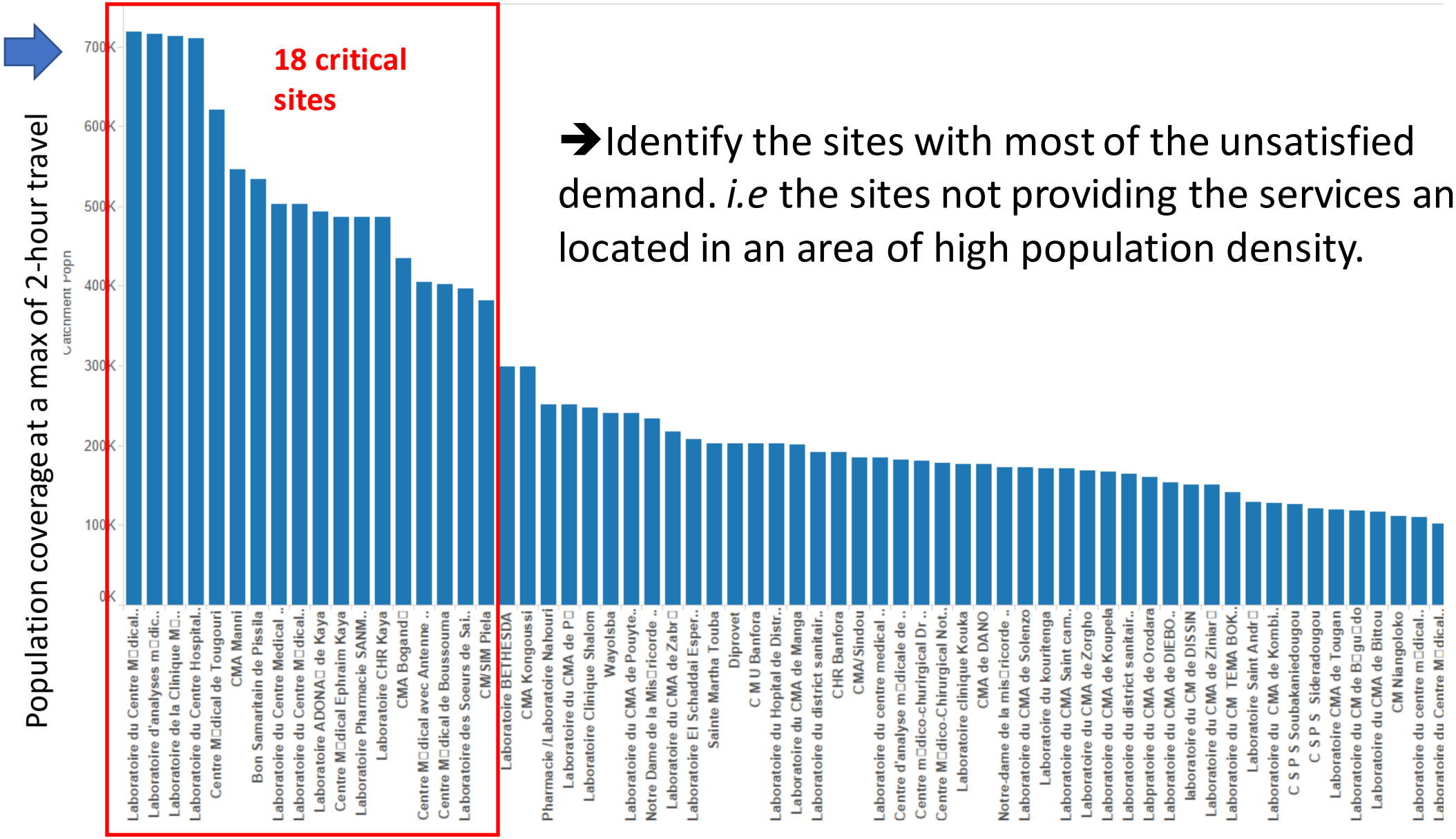
4 / 8 GeneXpert sites are located in regions not covered by any HIV viral load laboratories.

IF VL is decentralized in those 4 sites

Population coverage increase from 62.32% to 67.95%

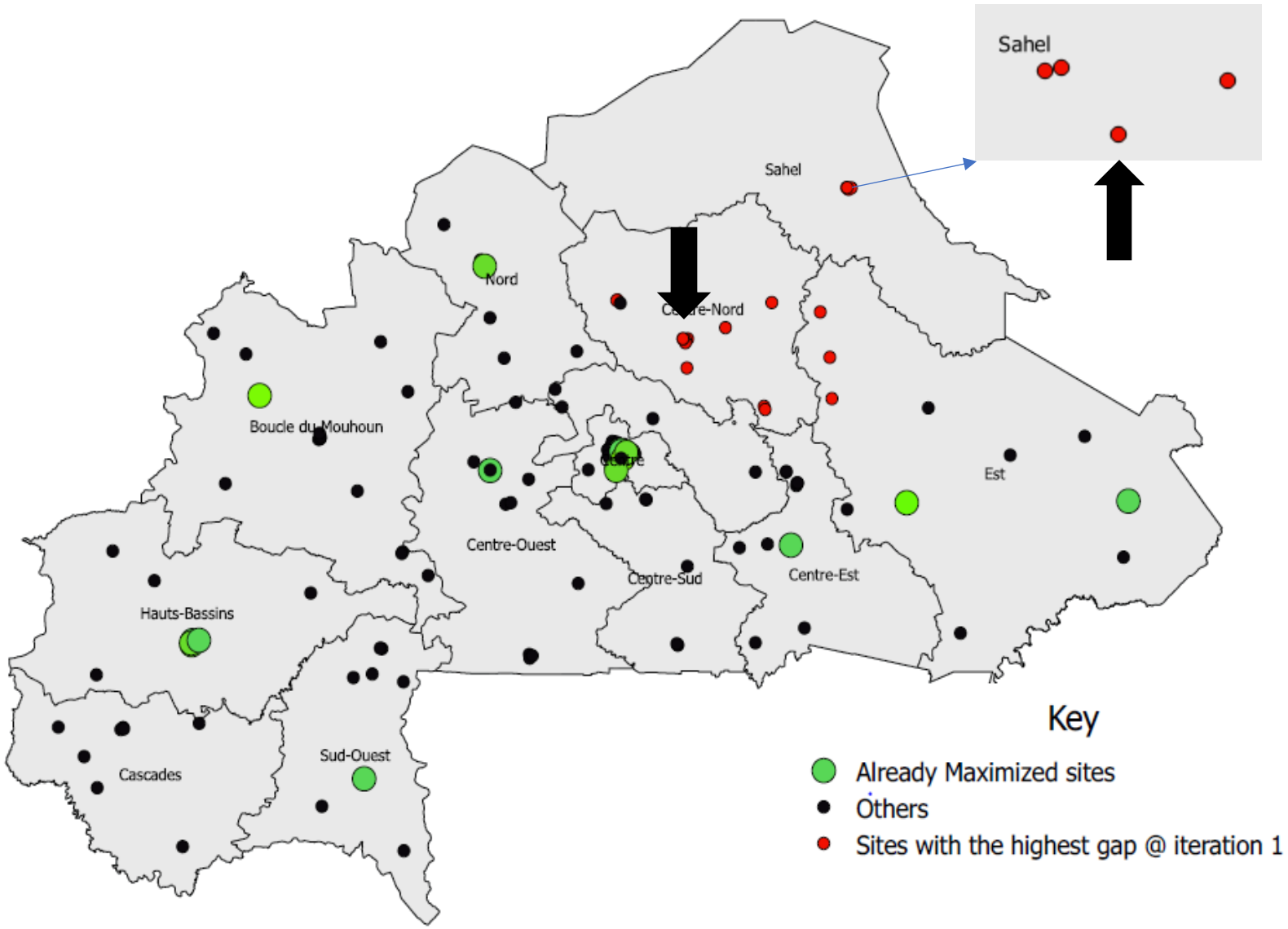
Where to place new capacity to increase the coverage up to 80%?

700,000



➔Identify the sites with most of the unsatisfied demand. *i.e* the sites not providing the services and located in an area of high population density.

Key considerations to place new Viral Load testing capacity



Key Considerations

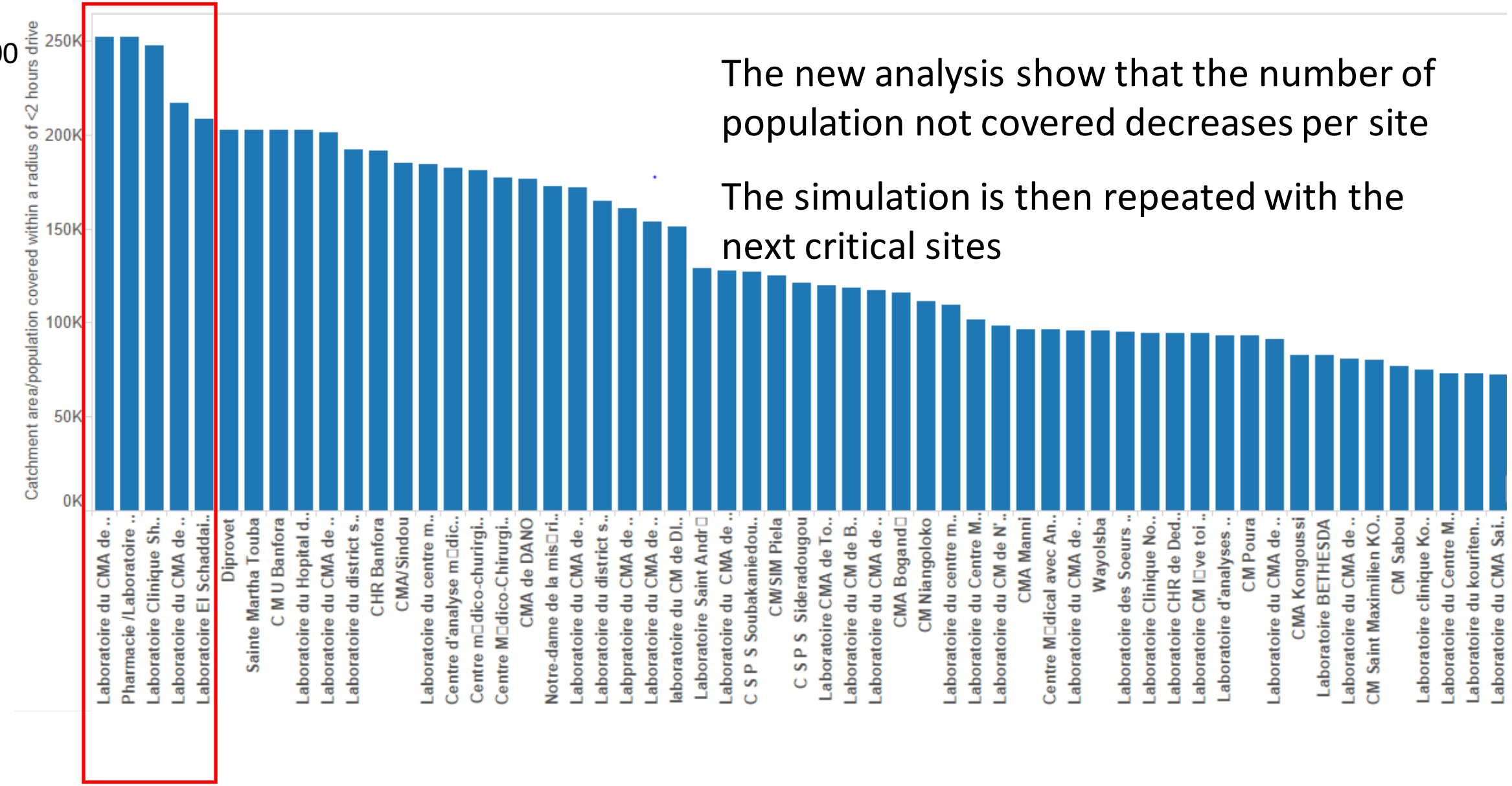
1. The sites of Sahel, Centre-Nord and Est are the one with most unsatisfied demand for VL.

2. When the ***Laboratoire du Centre Medical Urbain de Dori*** n Sahel is activated, the population coverage increases from **67.95 to 71.39%**

3. When the **Laboratoire du Centre Medical du secteur 1** au Centre-Nord is activated, the population coverage increase from **71.99 to 72.84%** with a spillover to the East.

2nd iteration towards 80% population coverage

250,000



The new analysis show that the number of population not covered decreases per site

The simulation is then repeated with the next critical sites

Limitations and key considerations

- The choice of bringing laboratories to the norms, placing new capacity, integrate VL on geneXpert available within the TB programme **depends on the priorities of the Government**

Perspectives for Burkina Faso

- Consolidate the LabMap portal of Burkina Faso (at the MoH)
- Train the Burkina Faso data team to use the data and run their own scenarios for:
  - Developing, adjusting and optimizing the performance and capacity of the tiered laboratory network
  - Quickly identify the sites that can be activited during outbreak response, and for a maximum of population coverage
  - Monitor the implementation of the recommended minimum testing packages
  - Guide the mutualizing of resources in general and test integration in particular

Lab CoP

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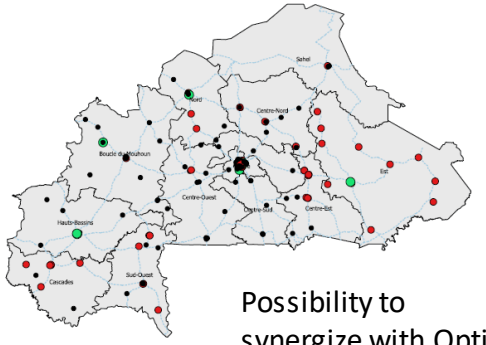
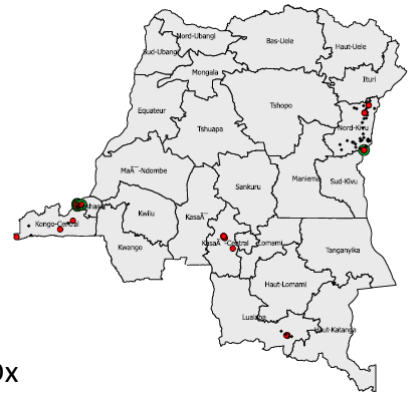
Scenarios can inform national plans and/or funding requests

Perspectives of the LabMap program

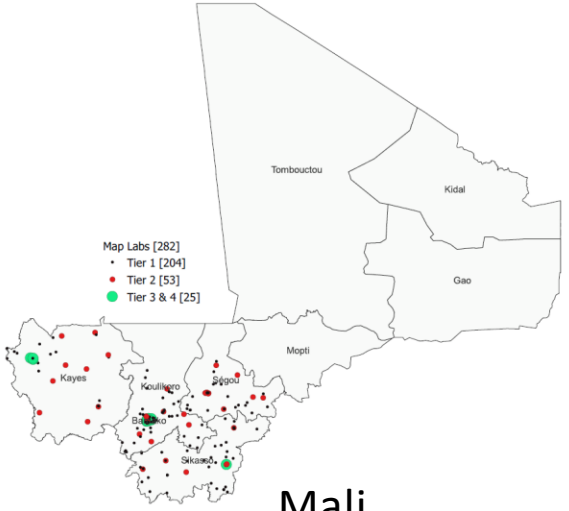


Possibility to synergize with OptiDx from FIND

Burkina Faso



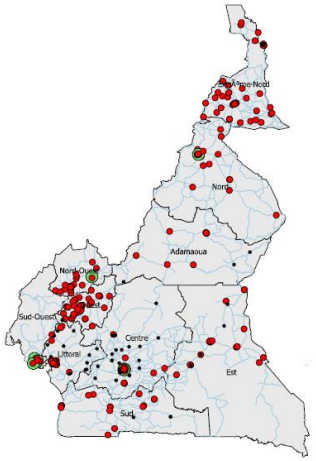
DRC



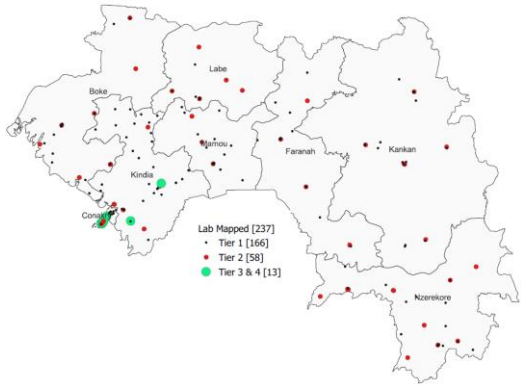
Mali

- ❑ Gabon
- ❑ Chad
- ❑ Congo
- ❑ Sao Tomé
- ❑ CAR
- ❑ Malawi
- ❑ Zambia
- ❑ Zimbabwe

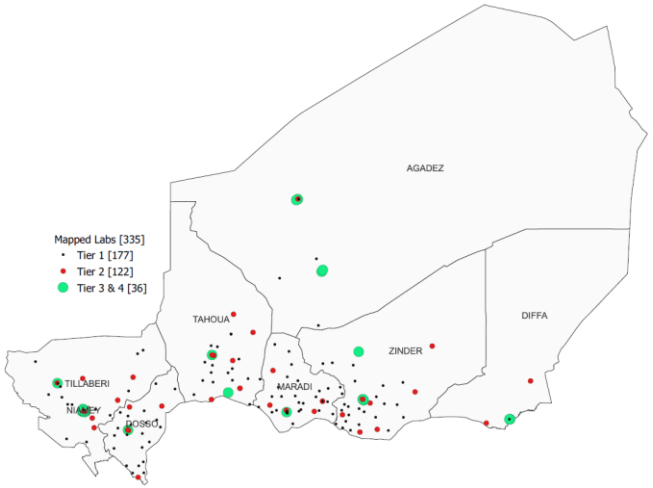
AFRICA CDC
Centres for Disease Control and Prevention
Safeguarding Africa's Health



Cameroon



Guinea



Niger

Niger integrated their data with DHIS-2

Data collection with contribution from partners and funders

- IDDS
- GHSA
- Fondation Mérieux
- GHSS
- IRESSEF

Perspectives of the LabMap program

- Ensure that all countries that completed the collections are trained and fully independent (Guinea, Mali, Burkina)
- Finalize data collection in countries already started and enroll new counrties through the Africa CDC RISLNET
- Link the data update to the national system for laboratory registration and licensing
- Facilitate collaboration with partners also working on GIS-based laboratory improvement

Training in Cameroon

Ministère de la Santé

Acknowledgements

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- **Africa CDC Laboratory division**
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2021

10th Anniversary