

# **Cholera RDTs: Catalysts for Enhanced Surveillance in the DRC**

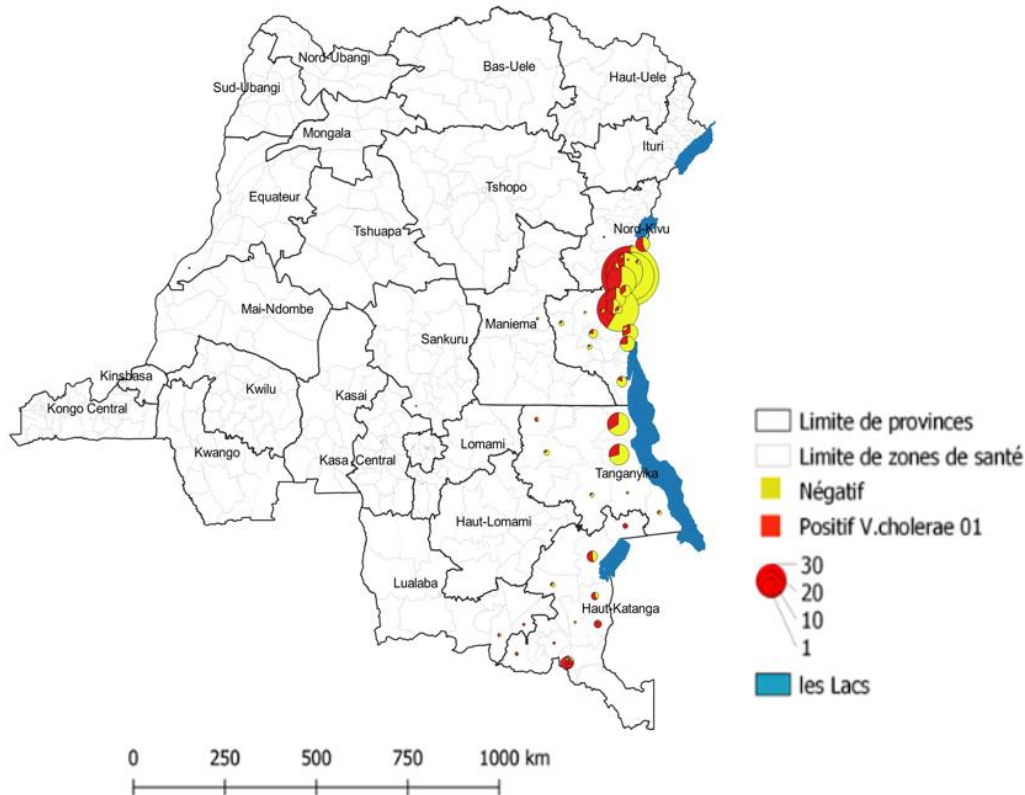
**Dr. Placide Welo, PNECHOL-MD DRC**

**Dr. Xin Wang, US CDC**

# Introduction

## DRC experiences alternating endemic or epidemic cholera disease

- a total of 147, 503 suspected cholera cases and 3187 deaths, 2017-2021
- >50,000 cases reported in 2023



Provinces	Cas S1 – S52	Nombre d'échantillons analysés par la culture	Positif au V.C	Taux de positivité (%)	Taux de prélèvement (%)
Nord-Kivu	33 549	6 109	2 272	37	18
Sud-Kivu	9 160	2 503	926	37	27
Tanganyika	5 532	680	210	31	12
Haut Katanga	1 726	254	151	59	15
Haut Lomami	1 079	59	9	15	5
Sankuru	785	33	1	3	4
Lualaba	531	13	8	62	2
Kasai	55	0	0	0	0
Maniema	38	4	2	50	11
Kasai Oriental	23	0	0	0	0
Lomami	12	0	0	0	0
Tshopo	11	6	0	0	55
Equateur	2	1	1	100	50
Kinshasa	2	1	0	0	50
Kongo Central	1	0	0	0	0
<b>Total</b>	<b>52 506</b>	<b>9 663</b>	<b>3 580</b>	<b>37</b>	<b>18</b>

# Introduction

- **Control and prevention of cholera requires a multisectoral strategy**
  - Surveillance, WASH (Water, Sanitation, and Hygiene), case management, and vaccination
- **Cholera Rapid Diagnostic Test (RDT) for routine surveillance**
  - Early detection of cholera outbreaks and rapid response
  - Assessment of cholera disease burden to inform preventative campaigns and implement other control measures



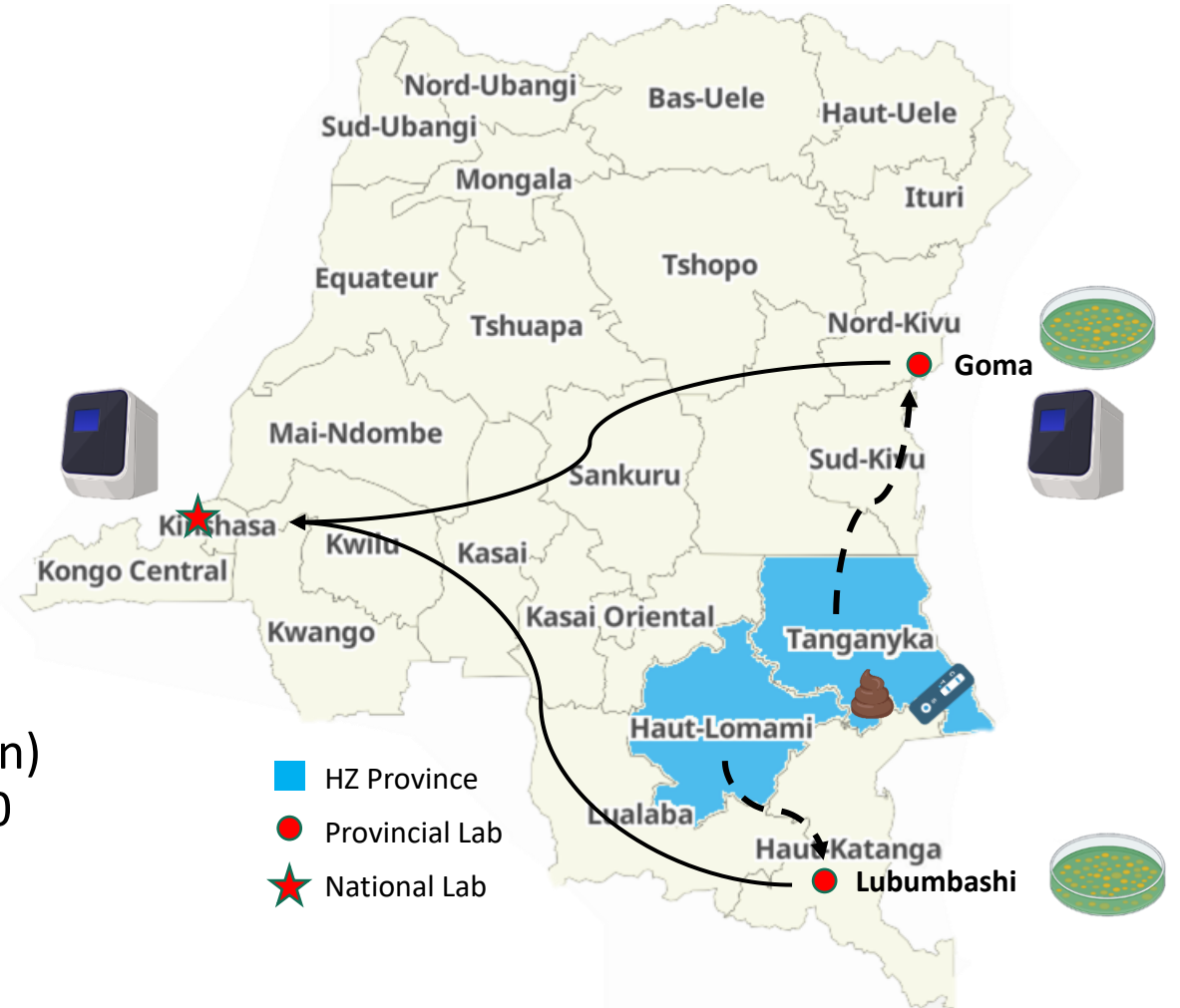
## Goal

Identify cost-effective strategies and best practices for integrating cholera RDTs into routine surveillance, therefore, more accurately estimate cholera incidence and provide timely data to inform preventative campaigns

# Objectives

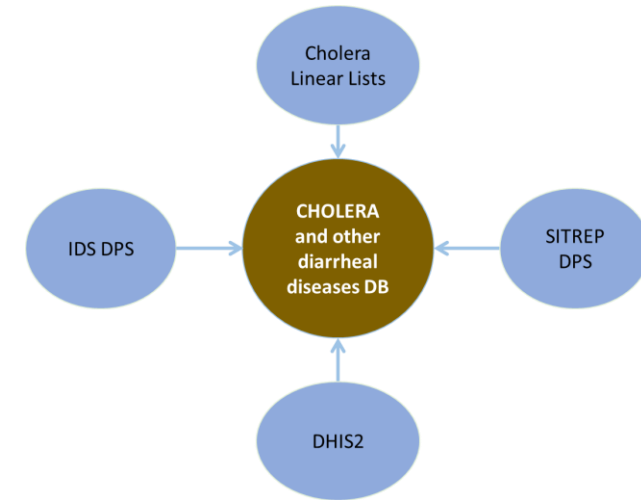
## 1. Evaluate implementation strategies to assess cholera disease burden

- Deployment strategies
  - CTCs vs UTCs vs HCs
- Testing strategies
  - a proportion vs every specimen
- Two settings
  - high (>100 cases per 100,000 population) vs low incidence (<20 cases per 100,000 population)



# Objectives

- **Assess RDT data reporting**
  - Existing electronic surveillance data systems
  - Data completeness and timeliness
- **Evaluate costs associated with RDT integration into routine surveillance.**
  - Self-reporting:
    - Staff time used for various activities
    - Specimen transport time or cost
  - Data collected by collectors
    - Equipment/Supplies
    - Transport (vehicles, fuel)
    - Per Diem, Travel, Lodging
    - Building and utilities



**Questionnaire papier**  
Combien de minutes sont nécessaires pour réaliser chaque activité pour les tests suivants ?  
\* Indiquez que le temps passé activement (et non le temps d'attente) pour chaque activité.

1) Prélèvement d'un échantillon de selles et préparation du test

Informations d'identification  
Identifiant(s) du spécimen : 13111, 13112  
Date à laquelle l'échantillon a été prélevé : May 10, 2023 (13111), May 12, 2023 (13112)

Activité	Exemples de sous-activités (y compris, mais sans s'y limiter)	Le nombre de tests (Si la durée déclarée d'une activité concerne un lot de tests)	Temps nécessaire (minutes)	Titre/Jonction du personnel menant cette activité
Prélèvement d'échantillons	<ul style="list-style-type: none"> <li>Port de l'ETI (si nécessaire)</li> <li>Prélèvement d'un échantillon de selles dans un récipient stérile.</li> <li>Préparation du matériel d'échantillonnage et de gestion des déchets (si nécessaire)</li> <li>Mise au rebut du matériel jetable.</li> </ul>	10	15	Agent de santé
Préparation des échantillons pour les tests de culture et en PCR (à enquêter)	<ul style="list-style-type: none"> <li>Ajust d'un échantillon de selles au milieu de Cary Blair (CB)</li> <li>Fermer hermétiquement le bouchon et étiqueter le tube</li> <li>Conservation du milieu CB avec l'échantillon de selles</li> <li>Mise au rebut du matériel jetable</li> </ul>	10	15	Infirmière

**Kobo collect**

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\* [Point de contact] Nom  
Le point de contact est une personne qui transfère les données du questionnaire papier vers la boîte à outils Kobo

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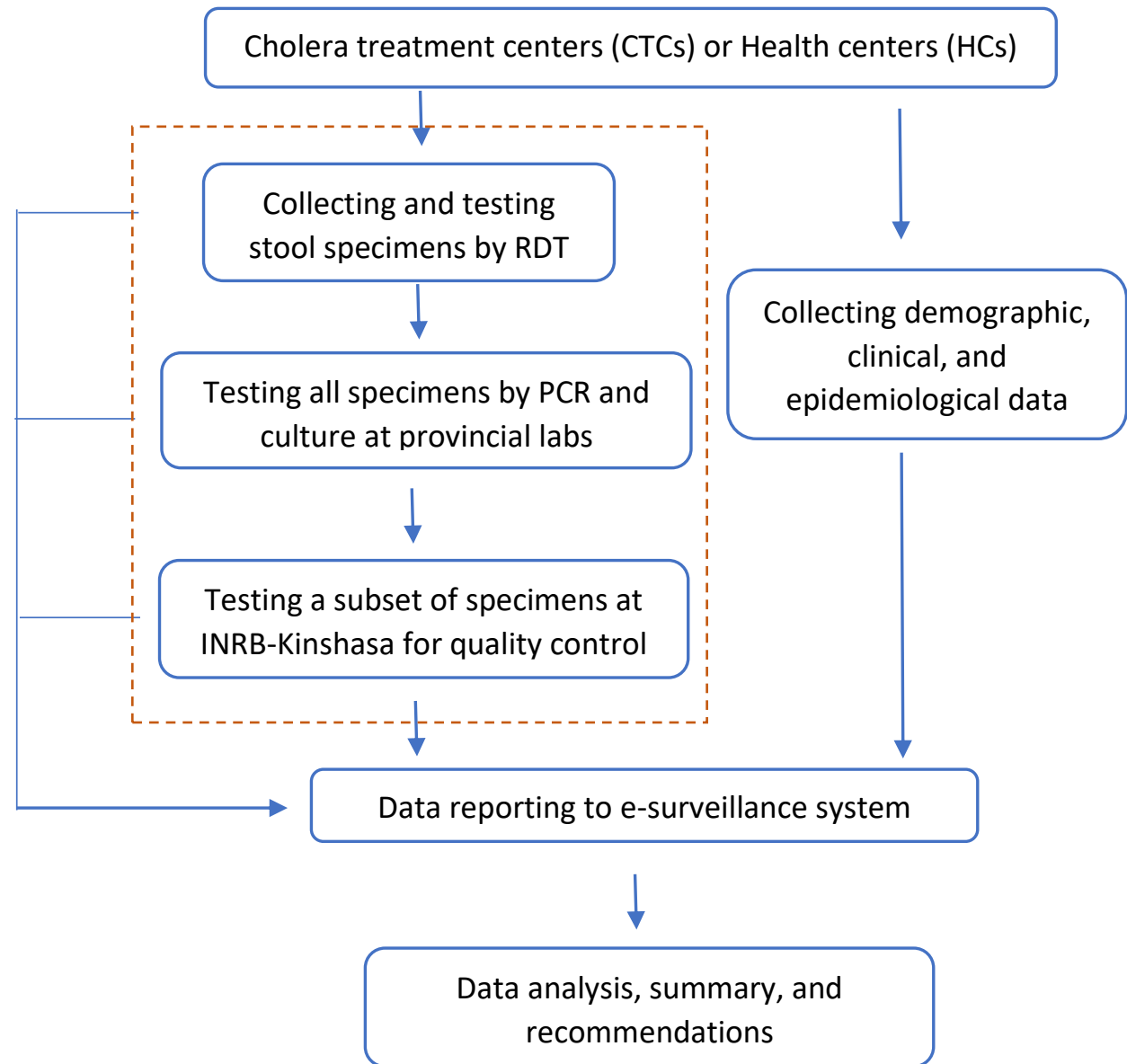
# Evaluation Design

## 47 Sites

- Tanganyika: Nyemba, Kalemie, and Kansimba
- Haut Lomami: Kinkodja and Malemba Nkulu

## Case enrollment

- 1000 suspected cholera cases
  - any patient who has acute watery diarrhea (3 or more loose or watery, non-bloody stools within a 24-hour period)
- Patient eligibility
  - meet the case definition
  - give consent to participants

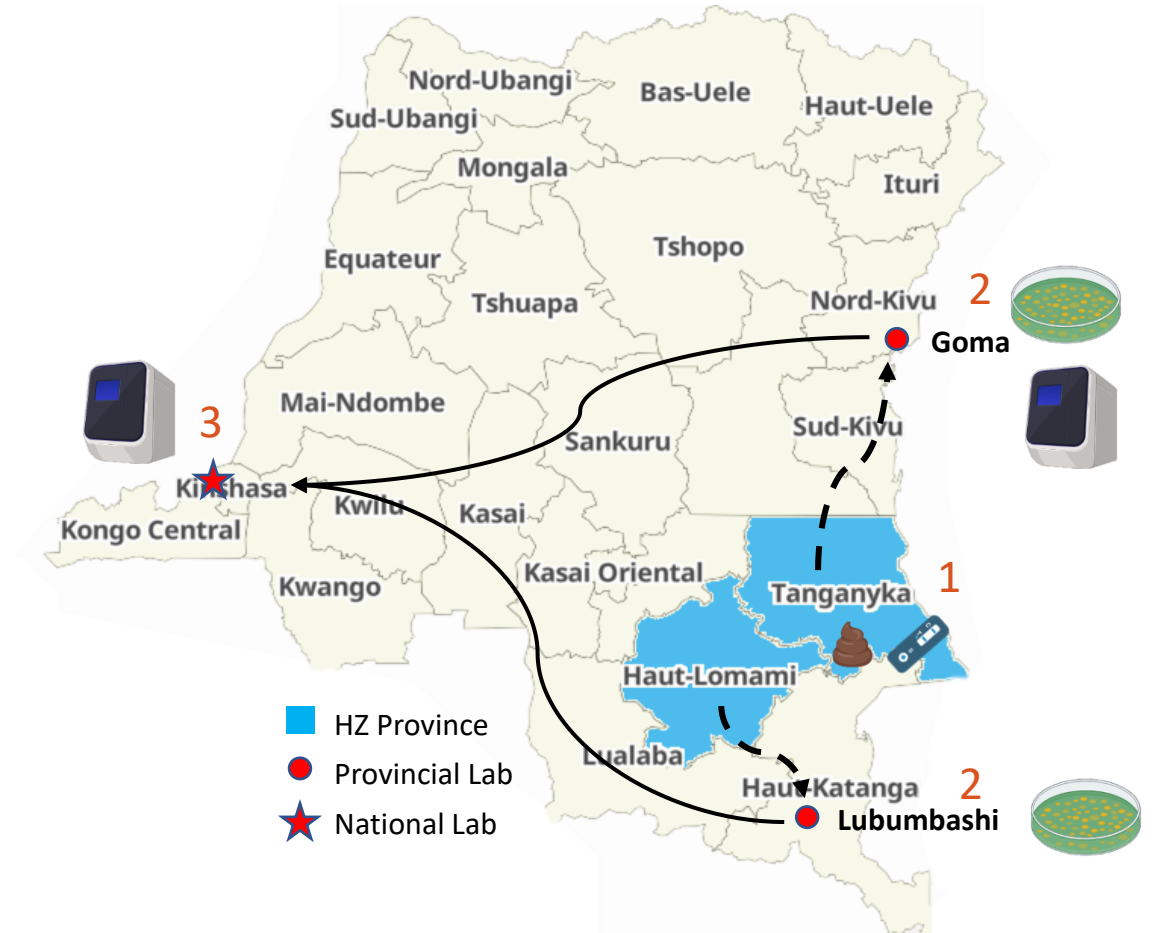


# Health facility location and specimen flow

Tanganyika (rural/urban)			
	Kalemie	Nyemba	Kansimba
CTC	1	1	1
UTC	3	3	
CS	8	5	4

Haut Lomami (rural)		
	Kinkondja	Malemba N'kulu
CTC	2	2
UTC	1	3
CS	7	6





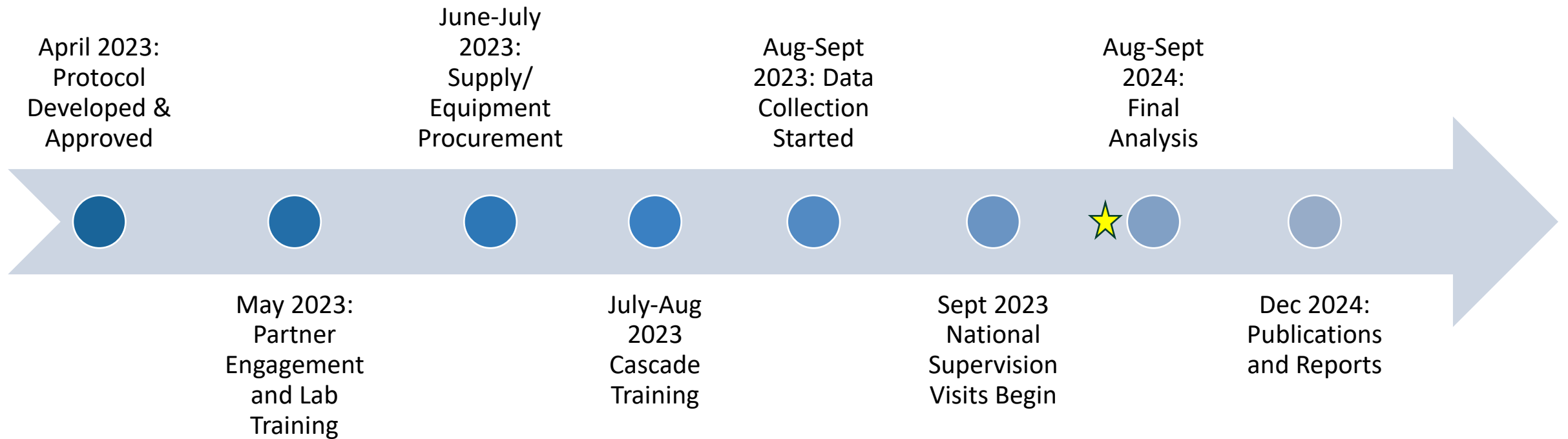
## Expected outcomes

1. **Cost-effective strategies to integrate RDT into routine surveillance and generate quality data**
2. **Guidance and recommendations for cholera RDT deployment and integration**
3. **Estimated cost and operational needs for cholera RDT scaleup**

## Long-term Impact

1. **Inform RDT scaleup in DRC for surveillance and outbreak detection**
2. **Quality data to inform preventative OCV campaigns in DRC**

# Project timeline



# Accomplishments and lessons learned



Lubumbashi Laboratory working session



Handing off supplies in Haut Lomami



Road to Kinkondja

# Partner engagement and training of trainers at the national level

49 participants and guests from 10 organizations

- Ministry of Health
- PNECHOL-MD: the national ending cholera program
- INRB Kinshasa: the national reference lab
- INRB Goma and Grand Labo Lubumbashi: the provincial reference labs
- Tanganyika and Haut Lomami DPS
- US CDC
  - Enteric Disease Laboratory Branch, Division of Foodborne, Waterborne, and Environmental Disease (DFWED)
  - Waterborne Disease and Prevention Branch, DFWED
  - Accelerated Disease Control Branch, Global Immunization Division (GID)
  - The Office of the Director, GID
- CDC Country office DRC
- WHO Country Office DRC

9 working sessions (5 days)

- Overview of the project and cholera surveillance
- RDT and specimen management
- Database and epi/lab data management and reporting
- Supply Chain
- Economic data collection and analysis
- Supervision visits
- Communication and coordination

Laboratory training (5 days)

- Overview of the project and cholera surveillance
- RDT and specimen management
- Culture
- Real-time PCR
- Data analysis and reporting





# Cascade training at the provincial and health zone levels

- Training topics
  - Overview of the project and cholera surveillance
  - Specimen collection and management
  - RDT and result interpretation
  - Data reporting and management
  - Economic data collection



## Tanganyika

- 3 Health zones: Kalemie, Nyemba, and Kansimba
- 66 staff members trained
  - 3 provincial experts (epi, lab, and data manager)
  - 12 managers from the 3 health zones
  - 3 data managers at the level of the health zoners
  - 48 health providers from 21 Cholera Treatment Centers, Cholera Treatment Units, and Health Centers

## Haut Lomami

- 2 health zones: Malemba Nkulu and Kinkondja
- 57 staff members trained
  - 3 provincial experts (epi, lab, and data manager)
  - 8 managers from the 3 health zones
  - 2 data managers at the level of the health zoners
  - 44 health providers from 21 Cholera Treatment Centers, Cholera Treatment Units, and Health Centers

# Leveraging existing supply procurement system

## Partnerships for procurement

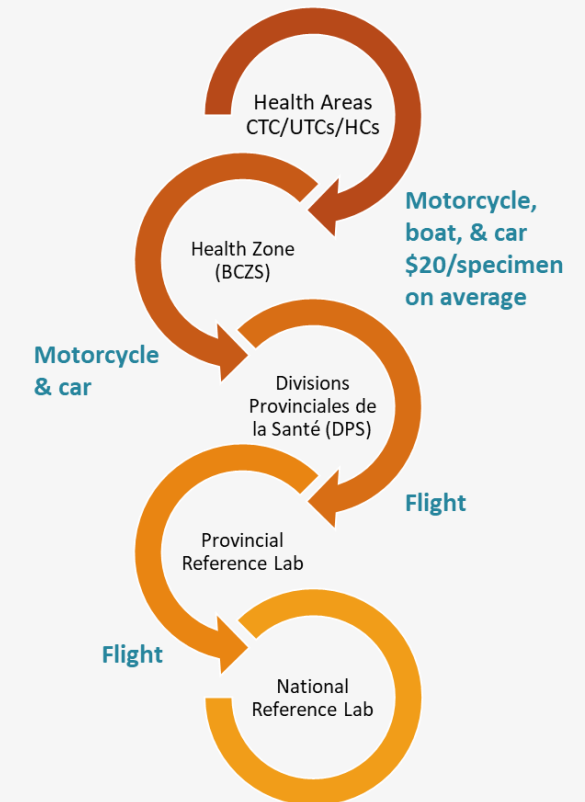
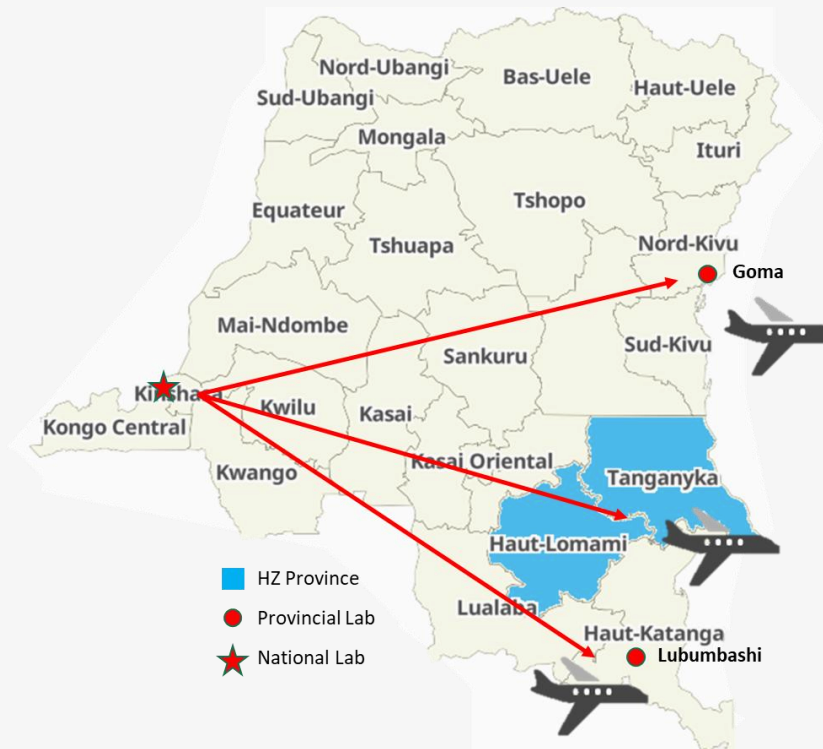
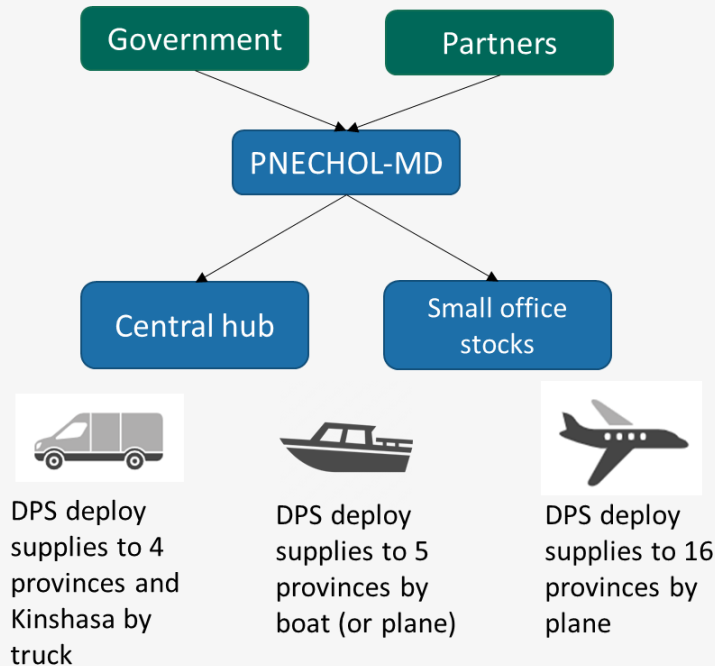
Leverage local vendors  
CDC direct support for PCR reagents

# Streamlining specimen transport system

Formalized specimen flow and implemented specimen tracking measures

Improved coordination between shippers and recipients

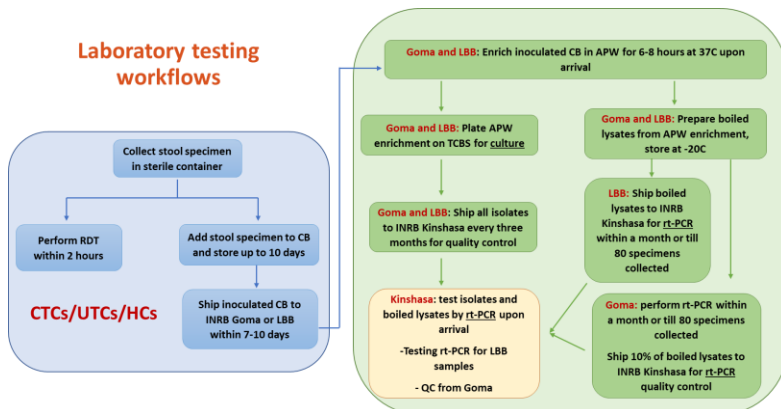
Provided SOP for specimen storage and transportation



# Enhancing laboratory capacity

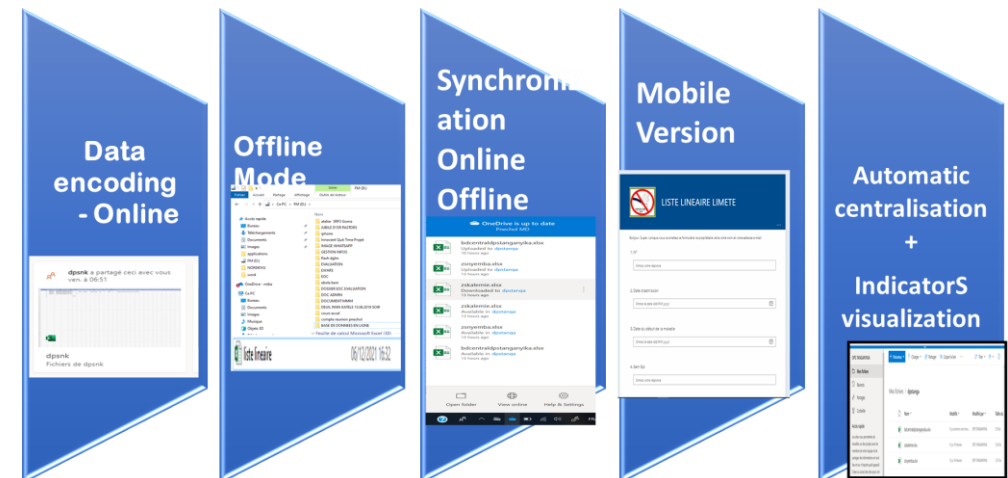
- Training for three national and provincial reference laboratories
- Implemented real-time PCR capacity at INRB Kinshasa
- Developed streamlined, site-specific workflows with INRB Kinshasa, INRB Goma, and Grand Labo Lubumbashi
- Established national quality control between INRB and provincial labs and external quality control between INRB and CDC

## Laboratory testing workflows



# Promoting lab/epi data integration and timely reporting

- Adopted cholera line-list database, allowing data centralization and synchronization
- Defined and finalized data variables (i.e., patient, surveillance, lab)
- Reinforced data transmission flow
- Promoted lab/epi data integration





# Strengthening national & provincial supervision visits

- Developed laboratory and site supervision checklists and formalized the supervision process
- Completed 3 national supervision visits and provided onsite technical advice
  - The Grand Labo Lubumbashi
  - 13 health structures in four health zones (Kalemie and Nyemba in Tanganyika and Malemba Nkulu and Kinkondja in Haut Lomami)
  - Workshop with 3 health zones (Kalemie, Nyemba, and Kansimba)
- Completed planned provincial supervision visits covering >80% of health structures



Date	(dd/mm/yyyy)
Name of Supervisor	
Position of Supervisor	
Name of Laboratory	
Type of laboratory	<input type="checkbox"/> Sub-district <input type="checkbox"/> District <input type="checkbox"/> Regional <input type="checkbox"/> Reference laboratory
Days/Hours of operation	
Laboratory Director	
Date of last supervisory visit	(dd/mm/yyyy)
Key contacts	(name, title, phone/email)
	1.
	2.
	3.
	4.
<b>1. HUMAN RESOURCES</b>	
Total number of trained personnel (culture and PCR)- under standard operating conditions:	
Under surge conditions:	
Do you have any new members since the last visit? <input type="checkbox"/> Yes <input type="checkbox"/> No	
How is training conducted and assessed for new members?	
Who provides the trainings?	
Are there any refresher trainings for current members? <input type="checkbox"/> Yes <input type="checkbox"/> No	
Additional comments:	
<b>2. SPECIMEN ACCESSIONING</b>	
What is the standard information captured when accessioning specimens?	
What is the standard information captured when accessioning specimens? (Please fill in the table below)	



# Training on economic data collection



**... papier**

... sont nécessaires pour réaliser chaque activité par test pour ...

... temps passé activement (et non le temps d'attente) pour chaque ...

... prélèvement d'un échantillon de selles et préparation du test

Informations d'identification

Identifiant(s) du spécimen : S1111, S1112

Date à laquelle l'échantillon a été prélevé : May 10, 2023 (S1111), May 12, 2023 (S1112)

Activité	Exemples de sous-activités (y compris, mais sans s'y limiter)	Le nombre de tests (Si la durée déclarée d'une activité concerne un lot de tests)	Temps nécessaire (minutes)	Titre/poste du personnel menant cette activité
Prélèvement d'échantillons	<ul style="list-style-type: none"> <li>Port de l'EPI (si nécessaire)</li> <li>Prélèvement d'un échantillon de selles dans un récipient stérile</li> <li>Préparation du matériel d'échantillonnage et de gestion des déchets (si nécessaire)</li> <li>Mise au rebut du matériel jetable</li> </ul>	10	15	Agent de sante
Préparation des tests de PCR	<ul style="list-style-type: none"> <li>Ajout d'un échantillon de selles au milieu de Cary Blair (CB)</li> <li>Fermer hermétiquement le bouchon et étiqueter le tube</li> <li>Conservation du milieu CB avec l'échantillon de selles</li> <li>Mise au rebut du matériel</li> </ul>	10	15	Infirmière

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- Developed tools for economic data collection
- Video training for laboratories and health providers on self-reporting data collection
- Onsite training for laboratories and provincial focal points on economic data collection

# Lessons learned & opportunities

- **Effective planning at national, provincial, and health zone levels**
- **Timely RDT and supply procurement**
  - Slow and expensive custom clearance
  - Forecasting for RDTs and other supplies
- **Proper transport of specimens**
  - Expensive and logistically difficult
  - Coordination between the sender and recipients is essential to ensure proper transfer.
  - Rarely do triple packaging
- **Equipping Health facilities**
  - Tools made available for HFs
  - Training and refresher training for health care workers on case management, surveillance, and data management
  - Improving infrastructure of health facilities for patient care and enrollment
- **Supervision visits to maintain rigor and adherence to protocols and guidelines**
  - Expand supervisory visits to other surveillance sites, laboratories, and health centers

# Lessons learned & opportunities

- **Laboratory capacity and quality**

- Adequate reference testing capacity
  - Need a cholera reference lab in Tanganyika
- Robust method for scaling up reference testing
  - rt-PCR capacity at Grand Labo Lubumbashi laboratory
- National and External Quality Control programs
  - INRB Kinshasa vs INRB Goma and LBB lab
  - CDC vs INRB Kin

- **Effective data management and prompt reporting**

- Regular data review and quality check
- Need reliable network coverage to report data in real time
- Differences in forms from different health areas caused some confusion
- Timeliness of data reporting
  - differed on the economic part compared to laboratory data

- **Address unexpected challenges**

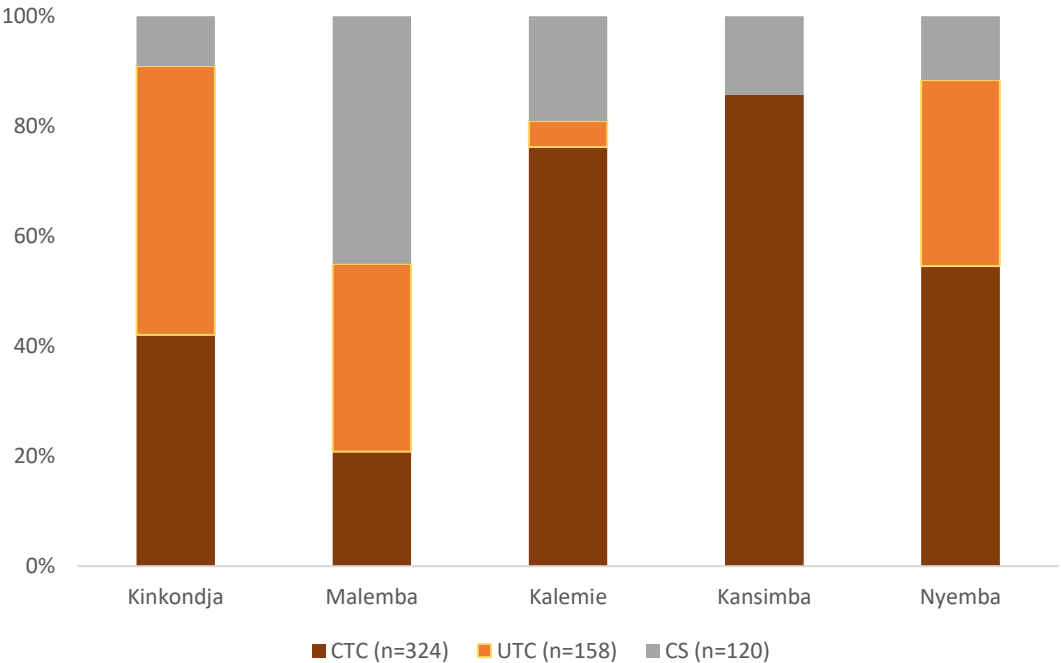
- Health care worker strike in health facilities affected overall project implementation

# Preliminary analyses

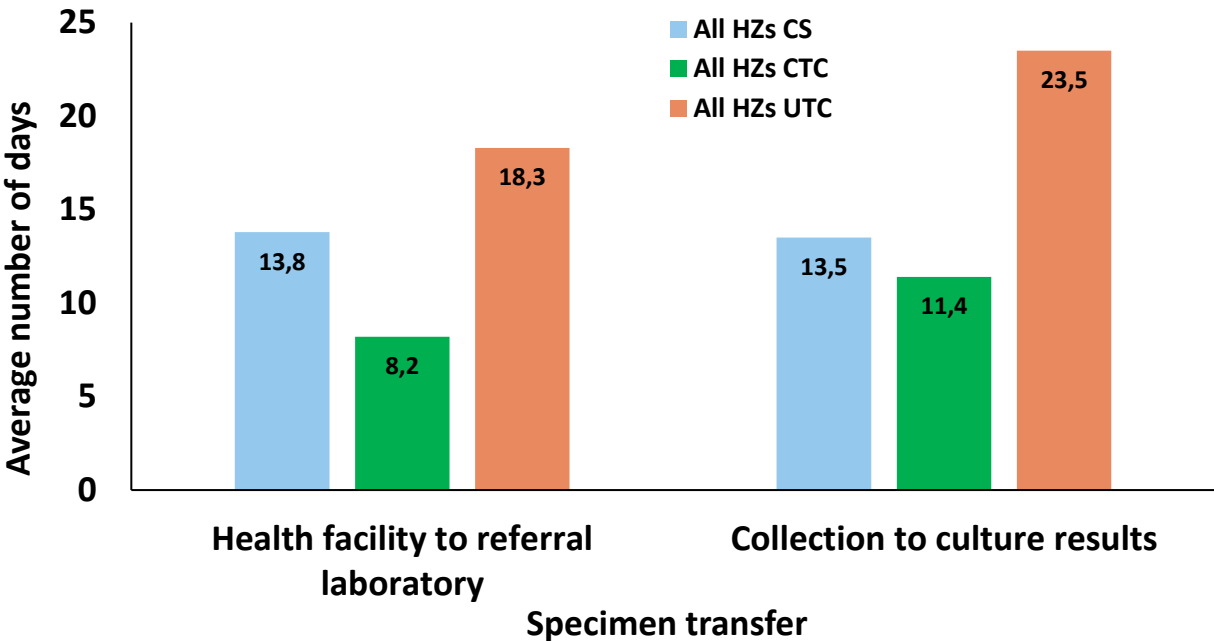
## Demographic and Clinical Characteristics

	Total	Haut Lomami	Tanganyika
<b>Specimens</b>			
# of specimens collected	602	208 (34.6%)	394 (65.4%)
# of specimens tested by RDT, Culture and rt-PCR	468 (77.7%)	123 (26.6%)	345 (73.4%)
<b>Age</b>			
Under 5 years	149 (24.7%)	48 (23.0%)	101 (25.6%)
Over 5 year	453 (75.3%)	160 (76.9%)	293 (74.4%)
<b>Sex</b>			
Female	314 (52.1%)	107 (51.4%)	207 (52.5%)
Male	287 (47.6%)	101 (48.6%)	186 (47.2%)
Unknown	1 (0.3%)		1 (0.3%)
<b>Level of Dehydration</b>			
Severe	504 (83.1%)	204 (98%)	300 (76.1%)
Moderate	94 (16.3%)	0	94 (23.9%)
No Data	4 (0.6%)	4 (2%)	

# Cholera Cases Tested Using RDTs



# Specimen transport time



# Comparison of Test Results for Cholera Detection

N=468	Culture		rt-PCR	
RDT	Pos	Neg	Pos	Neg
Pos	111	124	150	85
Neg	44	189	66	167

N= 468	rt-PCR	
Culture	Pos	Neg
Pos	142	13
Neg	74	239

	RDT	Culture	rt-PCR
Pos	235	155	216
Neg	233	313	252

# Key Takeaways

- If properly implemented, RDTs will significantly enhance the ability to rapidly detect, monitor, and track cholera cases.
- Capacity building investments lay the foundation for nationwide cholera RDT scale-up
- Trainings, streamlined processes, advanced tools strengthen the country's surveillance and laboratory capabilities for cholera detection and reporting
- Effective supervision visits is a key driver for high surveillance performance
- Fostering seamless coordination between laboratories and epidemiological efforts is crucial
- Promoting the integration of lab/epi data enhances the overall effectiveness of the outbreak response and surveillance systems



# Acknowledgement

- **DRC**

- Dr. Placide and the PNECHOL cholera epi and data management team
- Mrs. Berthe and the INRB Kinshasa lab team
- Dr. Daniel Mukadi and the INRB Goma lab team
- Director Muzinga and the LBB lab team
- Dr. Toto, Haut Lomami focal point
- Mr. Armand, Tanganyika focal point
- Healthcare workers

- **CDC Country Office DRC**

- **CDC Foundation**

- **WHO Country Office**

- **UNICEF**

- **CDC HQ**

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