Stop TB Partnership

TB Innovations in Africa

all slides combined

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38th BOARD MEETING

12–14 December 2024 • Abuja, Nigeria

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Stop TB Partnership

Using State of the Art Technology (CXR-AI, Xpert & Starlink) to reach remote & vulnerable populations in North East Nigeria

Dr Stephen John, Janna Health Foundation

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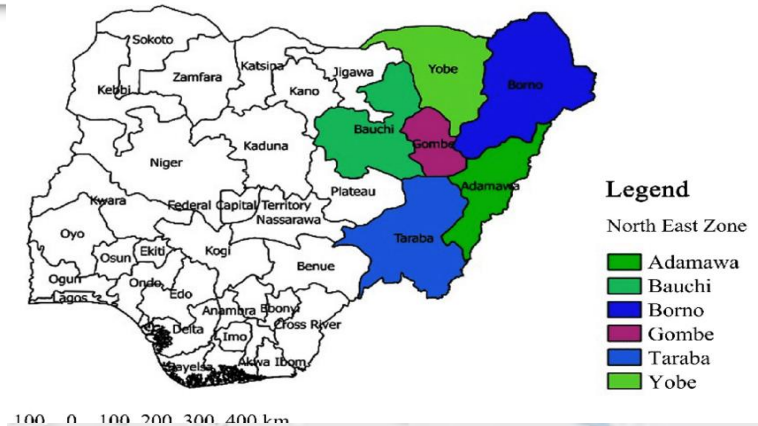
Northeast Nigeria

- Made up of 6 States
- > 26 million
- Land Mass: 272,451 km2
  - 1/3 of land in Nigeria
    - 12% of the population
- Limited **access** to Health Care
- Poor Health infrastructure
- Numerous **TB KVPs,** Remotely located in Hard-to-Reach areas;
  - Nomads
  - Internally Displaced Persons
  - Refugees
  - Miners
  - Tribal Populations (e.g. Koma People)



- WHO recommends testing algorithms with CXR
  - Most sensitive screening tool
  - Excellent triage tool as well
- WHO recommends rapid molecular diagnostics

Reality in NE Nigeria:

- Taraba State:
  - Population: 4.3 m
  - **Only 9** Public Health facilities (HFs) with CXR
    - **<u>Only 6 machines are functional</u>**
- **2 Radiologists** in 2 Tertiary HFs
- **6 HFs** have **Xpert**:
  - 1 Xpert equipment & CXR machine/**>700,000** population

- Access is difficult
- Roads are limited
- Transportation is expensive
- Violence is common
- Insecurity is a challenge

How do we reach all PWTB?

Despite these challenges:

- JHF is **reaching KVPs** with innovative technology
- We provide **Care to people in dire need!**

The Equipment!

- We use PDX-AI to screen KVPs!
- Can go **anywhere!**
  - Across Rivers, in Fields, on mountains & valleys
- We have set up in Schools, Camps, Clinics, Settlements, Communities, Grazing reserves & Resting points
- Run on batteries, no wires!
- This is NE Nigeria!

Our Team!

- **Leverage** on **stakeholder engagement** to reach communities
- Out Team is **trained** by MinXray/Qure
- They provide outreach services across NE Nigeria
- Screen Apprx 200/D

- With support from TB REACH we were able to bring this **state of the art TB screening tool** to the **doorstep** of KVPs in NE Nigeria!
    - What an opportunity this was!!
- JHF & SUFABEL Community Development Initiative (SCDI) have;
    - **Screened >1 million people for TB among KVPs in NE Nigeria**
    - **Diagnosed and Cured >15,000 PWTB (Bac+)** through TB REACH programming






- JHF is able to bring the best TB screening to people who have little or no access to TB care

- We provided Integrated Service Delivery since W5!
  - **Leprosy**, **Nutritional** Support, women **empowerment**, **skin disease screening & Care**, HIV, etc!

Acknowledgement

- Stop TB Partnership
- Canada and UK for their support to TB REACH, our work & the People we serve!
- MinXray & Qure
- TB REACH

- Makes a huge difference to people with many barriers to care
- JHF is reaching thousands of PWTB who would have been missed!


Yes We Can!
End TB!!
Thank You!!

Stop TB Partnership

Integrated care in Mozambique prisons: addressing TB and other conditions

Mario Vicente, Mozambique National Penitentiary Service

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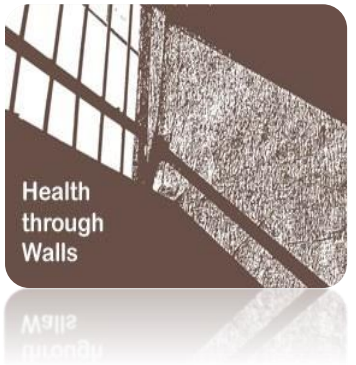
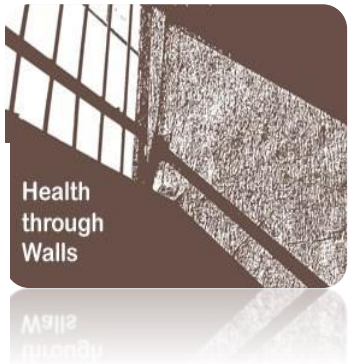
TB Burden in Mozambique



- Mozambique is one of 30 TB high burden countries, TB incidence 361/100,000
- Incarcerated persons are a key population for TB
- The National Penitentiary Service of Mozambique (SERNAP) previously detected TB via symptom screening alone estimating:
- **~50% of TB in prisons is undetected**
- **10-27X more TB in prisons than general population**
- SERNAP benefited from a TB REACH Grant led by Health Through Walls (HtW), in collaboration with ARISO, Emory Rollins School of Public Health, SureAdhere by Dimagi and Qure.ai
- Thanks to your funding, our partnership introduced digital chest radiography read by AI into prisons to rapidly detect TB and included an integrated health screening approach.

Integrating TB and other health services in Prisons in Mozambique



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Patient Pathway

TREATMENT LOCATIONS	TB SCREENING & HEALTHCARE ASSESSMENT HtW/SERNAP	INTEGRATED SERVICES TREATMENT ARISO/HtW/SERNAP	COMMUNITY – TPT and TB – ALL HEALTH CONDITIONS
REMAND PRISON	NEW RECEPTION	TB/HIV/Syphilis	PEER SUPPORT
	EXISTING INCARCERATED PERSON	CARDIOVASCULAR DISEASE	
MAX PRISON	NEW RECEPTION	NUTRITION	THROUGHCARE PATHWAY
	EXISTING INCARCERATED PERSON	CHRONIC RESPIRATORY DISEASE	
PROVINCIAL PRISON	NEW RECEPTION	SKIN CONDITIONS	
	EXISTING INCARCERATED PERSON	MENTAL ILLNESS	

Our “CIPMATOD” Project Approach

- 6 partners
- 21 month project
- 3 program phases
- 3 month blitz
- 10,735 people screened
- 3 intervention prisons
- 2 control locations
- 8 health conditions
- 27 staff
- 70 Peer Educators
- Humane treatment
- New learning
- **State of the art tech!!**

Health Matters App & Digital Chest X-Ray with AI Reading

Stop TB Partnership TB REACH hosted by UNOPS

Health through Walls

1 Registration

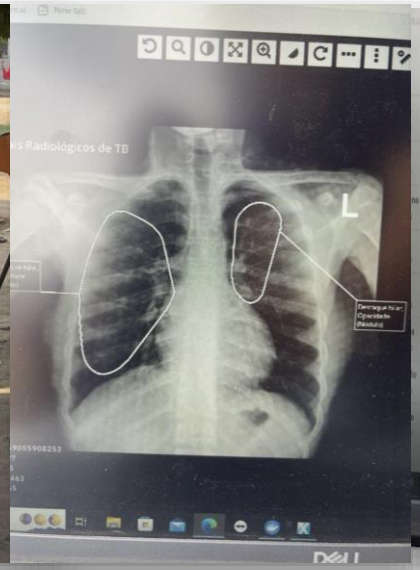
2 Screening

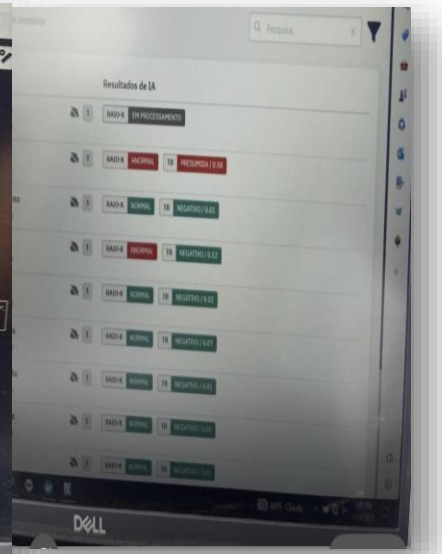
3 Laboratory

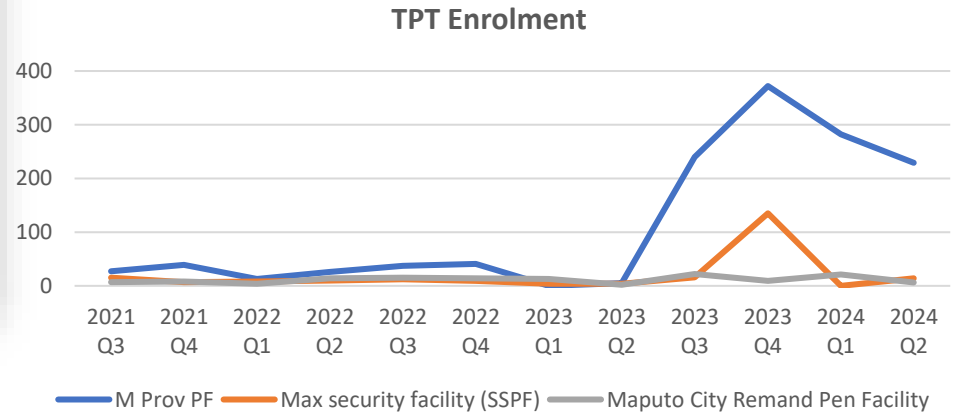
4 Results and Reports

Results

1. Screened: 10.735
2. TB Presumptive: 2,134
3. TB Confirmed: 307
4. Prevalence (country): **361/100,000.**
5. Prevalence (prisons): **3300/100,000.**
6. TPT Offered: 3.120
7. TPT Initiated: 1.600







Serviço Nacional Penitenciário Moçambique Pela Protecção da Sociedade

Our CIPMATOD Program (ISD)

Health Conditions (Integrated Services)			
	2022/2023	2023/2024	%
Number of Screens	No systematic screening recorded	10735	-
New HIV Cases	408	630 (5.8%)	>35
Syphilis	No tests available for PDL	3 (<1%)	-
Diabetes	No tests available for PDL	6 (<1%)	-
Malnutrition (BMI<18.5)	567	858 (7.9%)	>34
Mental Illness	132	155 (1.3%)*	>15
Respiratory Disease (Non-TB)	No systematic screening recorded	2039 (19.9%)	-
Cardiovascular Disease	No systematic screening recorded	1455 (13.5%)	-
Skin Conditions	908	700 (6.5%)	<30

Where in the World?

Latin America and the Caribbean

Argentina
Belize
Dominican Republic
Guyana
Haiti
Jamaica
Panama

Europe

Spain

Africa

Burkina Faso
Central African Republic
Democratic Republic of Congo
Malawi
Mali
Mozambique
Senegal
Uganda

"Our mission is to assist developing countries in implementing sustainable improvements in the health care services of their prisons."

John P. May, MD, - President,

Health through Walls

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Standby for a Wave 12 Application!

Thank you!

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Pooled testing to increase coverage of rapid molecular diagnostics for TB

Dr Comfort Vuchas -Tuberculosis Reference Laboratory Bamenda
at the Center for Health Promotion and Research in Cameroon

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Rational - Limited Access to Rapid TB Diagnostics

- Current molecular tests (Xpert MTB/RIF Ultra and TrueNat MTB-RIF) are highly sensitive and enable detection of rifampicin resistance
- In 2023, only 48% of people to be evaluated for TB were tested using a molecular assay (Global TB Report)
- We need to test many more people for TB to reach goals in Global Plan to End TB

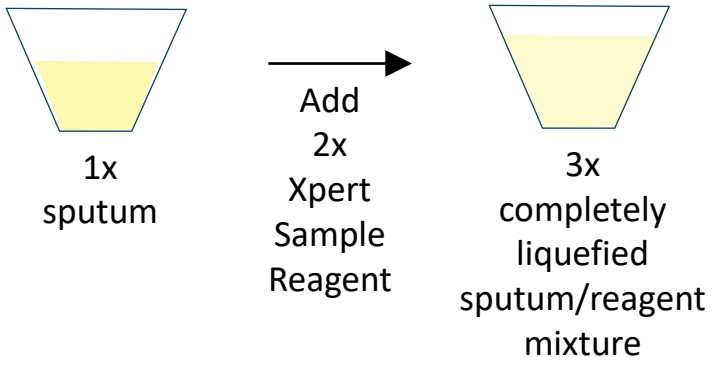
- Challenges to scale up for molecular testing
  - Cost of assays ($8++)
  - Equipment- Limited availability/ function; competition with other tests on same platforms
  - Supply chain issues
  - Competition with other spending priorities
  - Personnel time

→ Pooled testing has been used in HIV, STDs and COVID-19

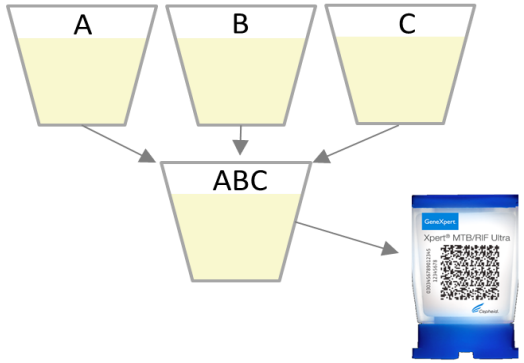
Has potential to increase access to molecular testing for TB

Process- Specimen preparation for pooled testing – Xpert MTB/RIF Ultra

Prepare each specimen as usual



Person only submits one sputum specimen, no need for repeat collection.

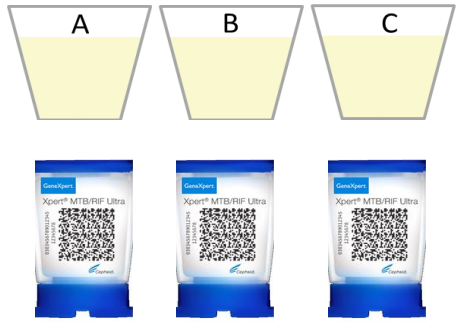


Pool samples from 2-8 specimens and test with a single cartridge

MTB NOT detected

All individual results reported as MTB NOT detected; no further testing

MTB detected



Each specimen re-tested and reported individually

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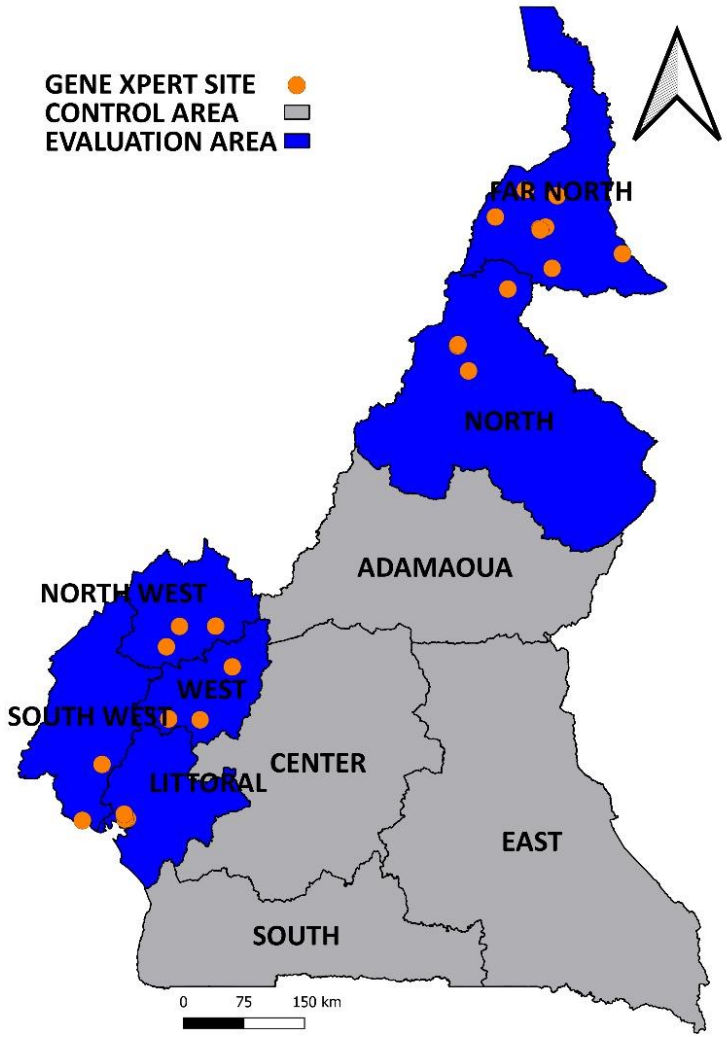
Scope of pooled testing

- In 2020 we started pooled testing out of necessity in a few labs to extend availability of limited Xpert cartridges in Country
- Reference laboratories have been performing pooled testing since July 2020 with good experience to date
- In the Context of TB reach – Wave 10, pooled testing has been extended to 25 GeneXpert labs receiving and performing pooled testing for specimens for TB testing from 183 health facilities



Map of Cameroon, with GX labs (orange); Regions currently testing(blue)

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PNLT

Flow of work for pooled testing for TB diagnosis

Diabetes clinic

ANC / IWC

HIV C&T

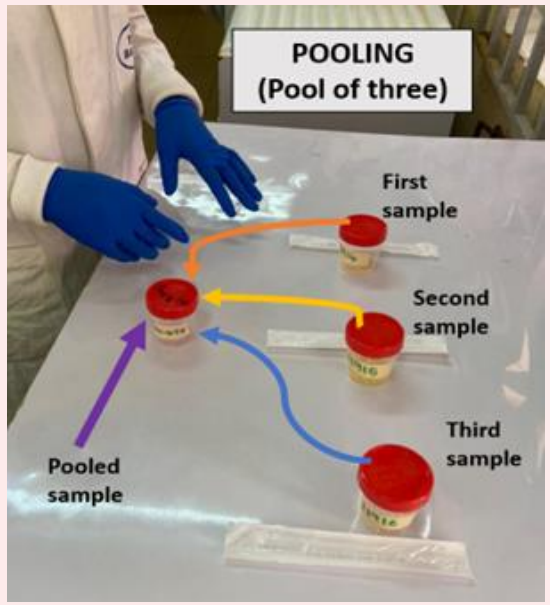
OPD

Malnutrition

At 183 health facilities

Collect sputum specimen

Specimen sent to Xpert testing lab



Clinical follow-up and linkage to appropriate care, until the person gets better

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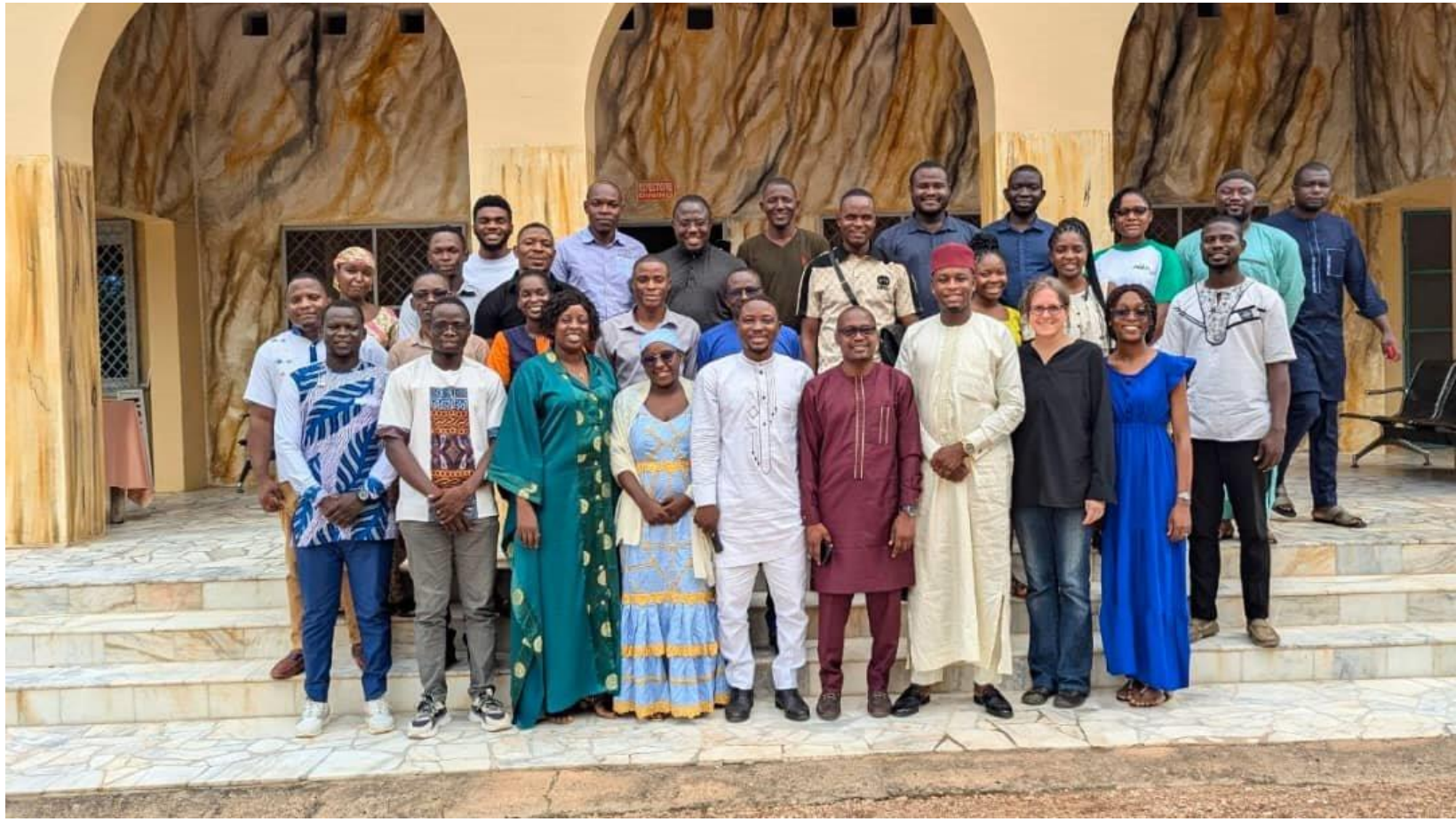
Impact of Pooled Testing

- **Testing more people with fewer cartridges**
  - **U**sing a combination of individual and pooled testing with pools of size 2-8
  - We have **tested over 36,312 specimens** with 18,668 cartridges (**49% cartridges saved**) in a population with 8.5% of specimens with MTB detected on Ultra
  - Nearly twice as many people (an additional 17,798 people) have been able to receive a molecular test result as compared to individual testing with the same number of cartridges
- Pooled testing is also useful when Xpert instrument service (such as module replacement) is delayed and fewer modules are available for testing.
- Cost and time savings increase with lower yield – most benefit from active case finding

THANK YOU!



Stop TB Partnership TB REACH

Canada

CHPR Center for Health Promotion & Research

INSPIRE TB CAMEROON

MINSANTE

PNLT

Stop TB Partnership

Achieving Universal Health Coverage & TB Elimination in Lesotho

Mrs Mathemba Radebe - Partners In Health – Lesotho

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Lesotho

Our History

PIH has worked in Lesotho since 2006, at the invitation of the MOH to support its response to the HIV epidemic. Since then, PIHL's work and programs have grown to include **MCH, DR-TB, mental health, NCDs and more,** transforming care and health systems across the country. PIH leverages its **5 S model** as a **system strengthening approach** to all programming.

Our programs and approach support community needs and are provided by **370 PIH-LS staff, 96% are local**. PIH-LS **RI** program reach approximately **120,000 people**, the **Reform reaches 40% of the population,** and the **national MDR-TB program** provides care and treatment for all Basotho.

Our Partners

Current TB Situation In Lesotho

TB incidence **664/100,000**

TB-HIV co-infection rate is **50%**

Treatment coverage is **42%**

TB cases are missed to care: **58%**

Treatment success rate: **80%**

TB case fatality ratio **37%**

We need innovative ways to search, prevent, and treat TB

Bo-mphato Litšebeletsong Tsa Bophelo

Partners In Health

Mr. Janki, a story of restored hope

Day 15 in the ICU – Janki intubated

Day 44 in ICU– Learning to walk

Day 178 – Janki going home

Bo-mphato Litšebeletsong Tsa Bophelo

Partners In Health

PIH's 5 S Model: System Strengthening Approach

STAFF Dr. Yonathan Gebrewold, PIH Lesotho radiologist reviewing chest X- ray images

STUFF A patient being screened with a portable X-ray machine at Tlhanyaku health center.

Bo-mphato Litšebeletsong Tsa Bophelo
Partners In Health

Applying 5 S Model to TB: Experiences from Rural Clinics

SPACE Adequate for TB testing and patient care

SYSTEMS for TB diagnosis, patient care and data reporting

SOCIAL SUPPORT for patients with social needs

.

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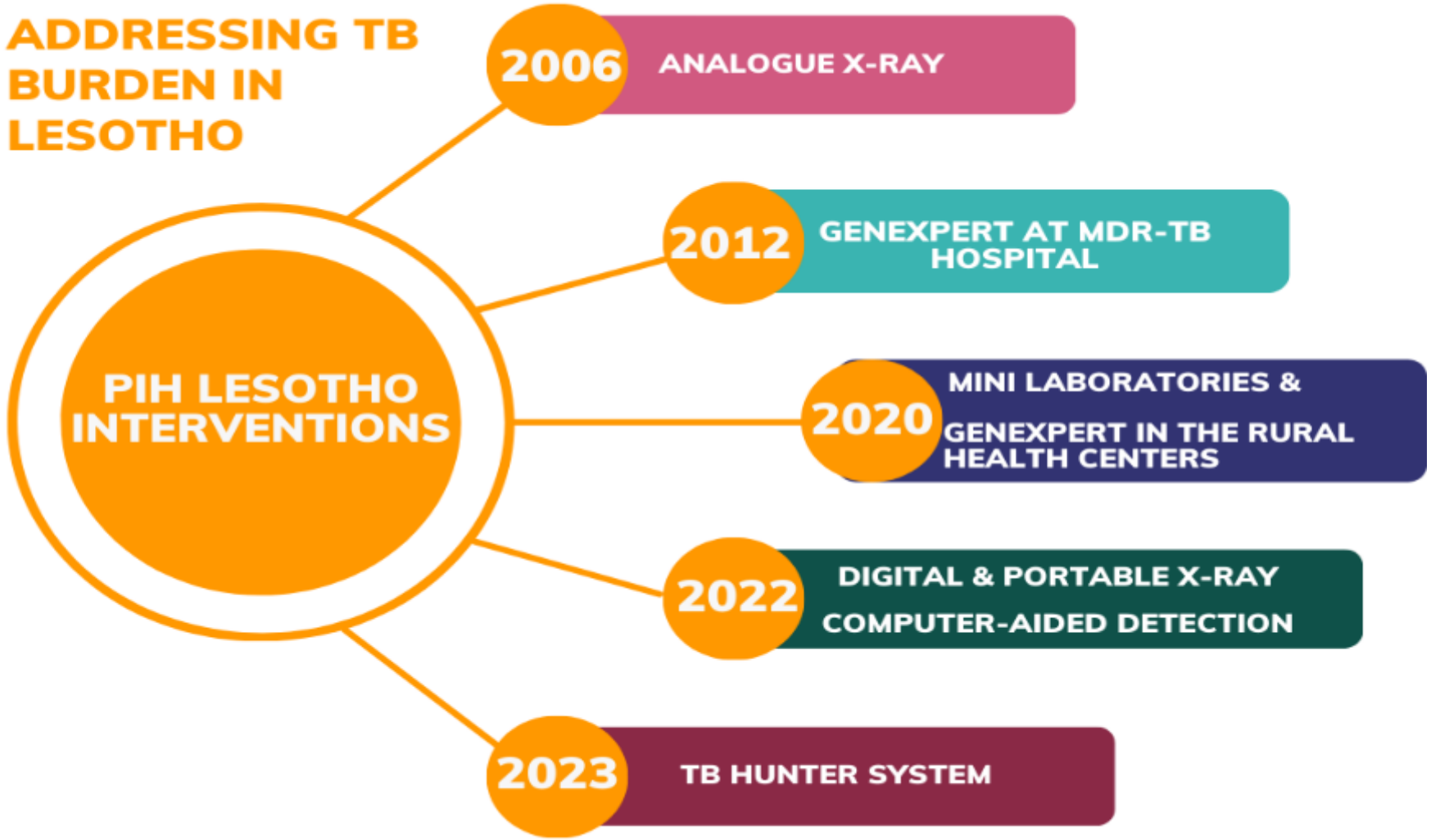
Partners In Health

Formula for success:

Ensuring TB Resources reach where they are *most needed*



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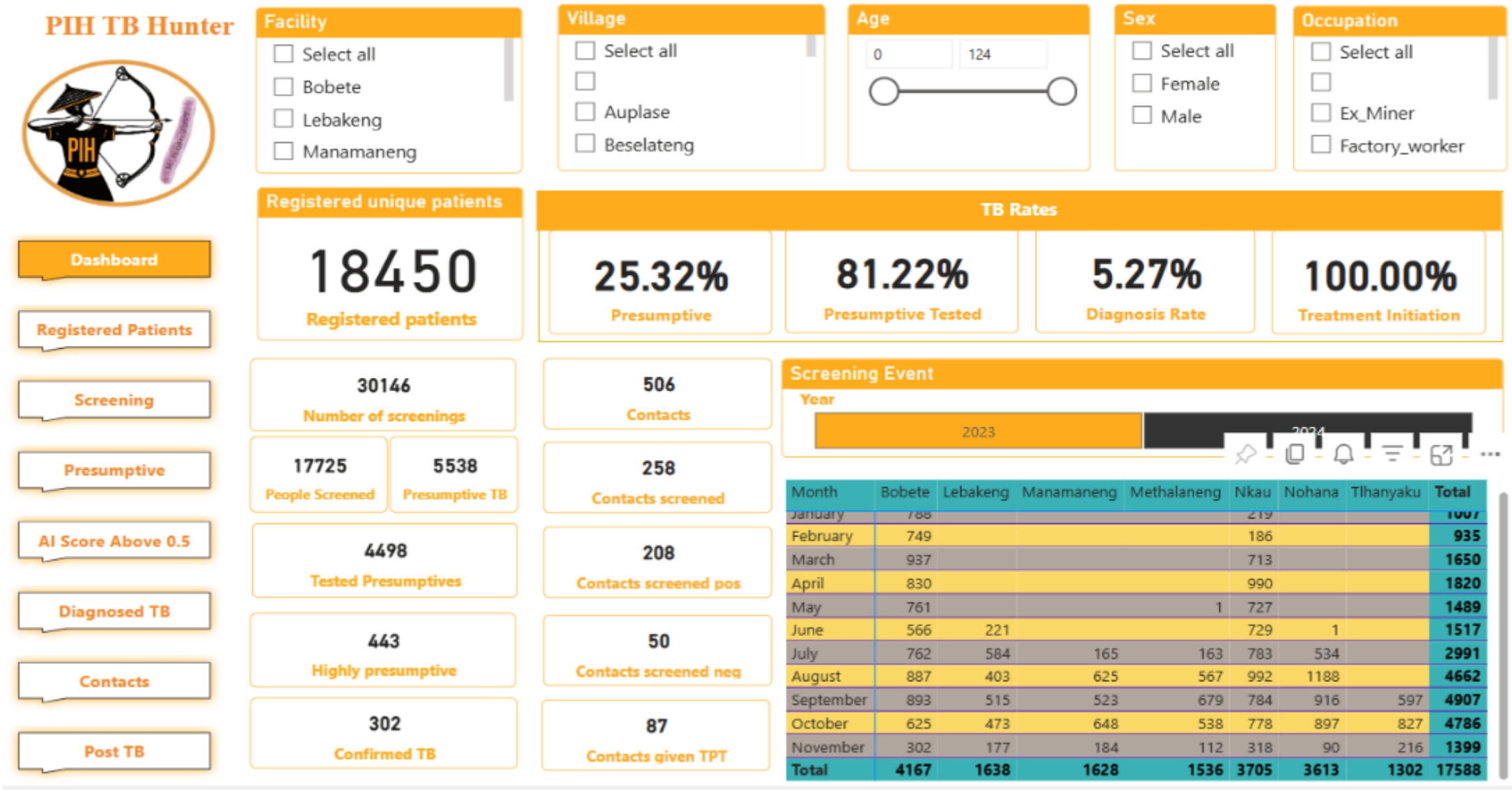
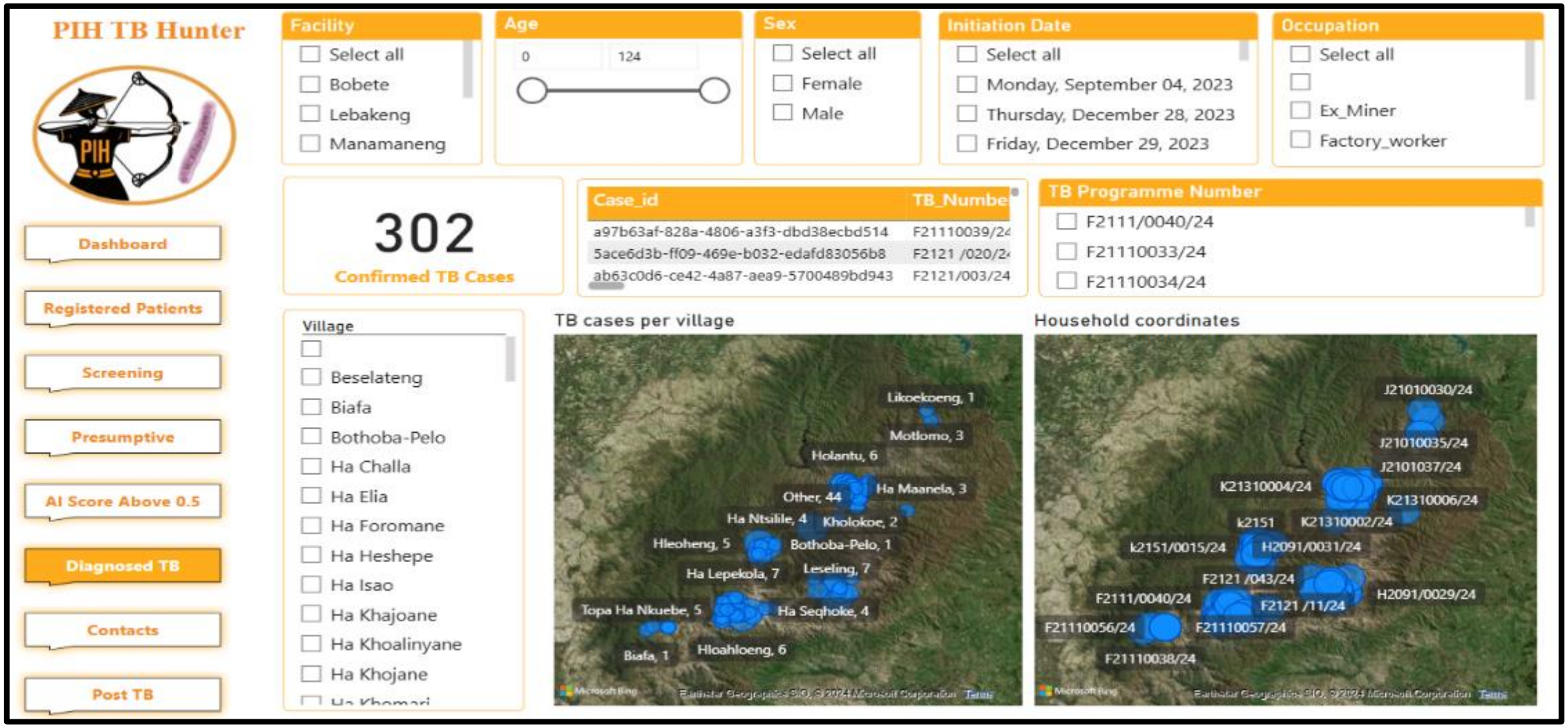
TB Hunter: An innovative data system combining new real-time, AI-supported screening, testing, contact tracing and follow-up



Month	Bobete	Lebakeng	Manamaneng	Methalaneng	Nkau	Nohana	Tlhanyaku	Total
January	788				219			1007
February	749				186			935
March	937				713			1650
April	830				990			1820
May	761			1	727			1489
June	566	221			729	1		1517
July	762	584	165	163	783	534		2991
August	887	403	625	567	992	1188		4662
September	893	515	523	679	784	916	597	4907
October	625	473	648	538	778	897	827	4786
November	302	177	184	112	318	90	216	1399
Total	**4167**	**1638**	**1628**	**1536**	**3705**	**3613**	**1302**	**17588**

Geolocation of newly diagnosed TB patients



Identification of TB hotspots

PIH TB Hunter

- Dashboard
- Registered Patients
- Screening
- Presumptive
- AI Score Above 0.5
- Diagnosed TB
- Contacts
- Post TB

Facility
- Select all
- Nkau

Age
0 — 124

Sex
- Select all
- Female
- Male

Initiation Date
- Select all
- Monday, January 29, 2024
- Wednesday, February 21, 2024
- Monday, May 06, 2024

Occupation
- Select all
- Ex_Miner
- Other

7
Confirmed TB Cases

Case_id	TB_Number
f32a9f04-37ec-4af0-8dbd-3e7a49dcc6eb	F2121/016/24
f32a9f04-37ec-4af0-8dbd-3e7a49dcc6eb	F2121/016/24
f32a9f04-37ec-4af0-8dbd-3e7a49dcc6eb	F2121/016/24

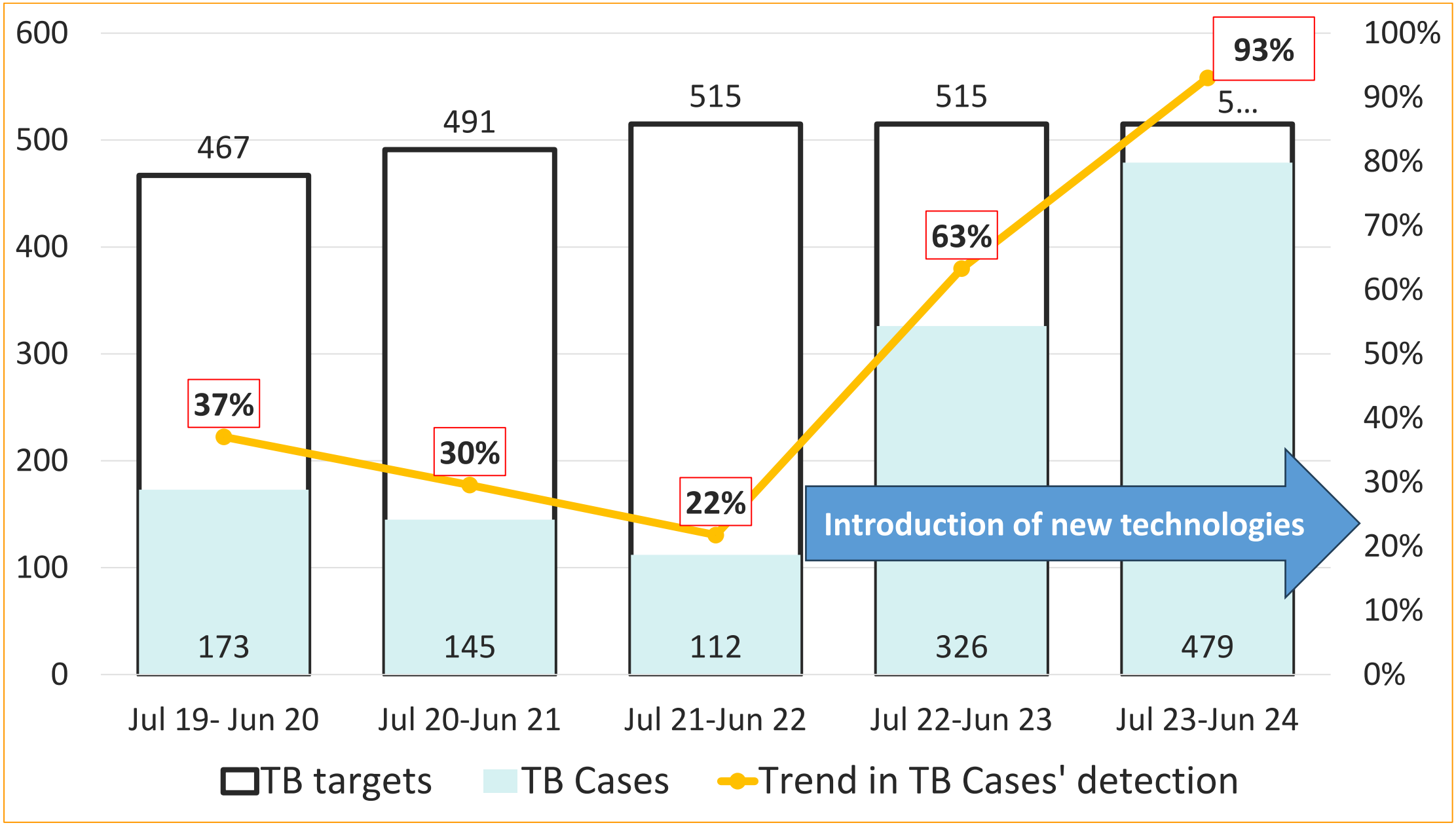
TB Programme Number
- F2121 /11/24
- F2121/016/24
- F2121/054/24

Village
- Ha Khoalinyane
- Ha Khojane
- Ha Khomari
- Ha Kojoana
- Ha Kolahali
- Ha Kori
- Ha Kou
- Ha Lebala
- Ha Lebala Mojese
- Ha Lepekola
- Ha Lephakha
- Ha Leronti

TB cases per village

Household coordinates

In pilot catchment areas, PIH Lesotho interventions dramatically increased case finding against the estimated total TB burden of disease



Launching Replication of PIH Lesotho's TB Innovations

Through population level Search-Treat-Prevent, we plan to detect and treat an additional 5,151 people with TB over 5 years, and drive down rates of TB.

- PIH Lesotho's plan spans 2 key areas
  - Intensive Search-Treat-Prevent in Mohale's Hoek and existing Rural Initiative sites
  - Targeted improvements in 6 other national health reform districts' hospitals

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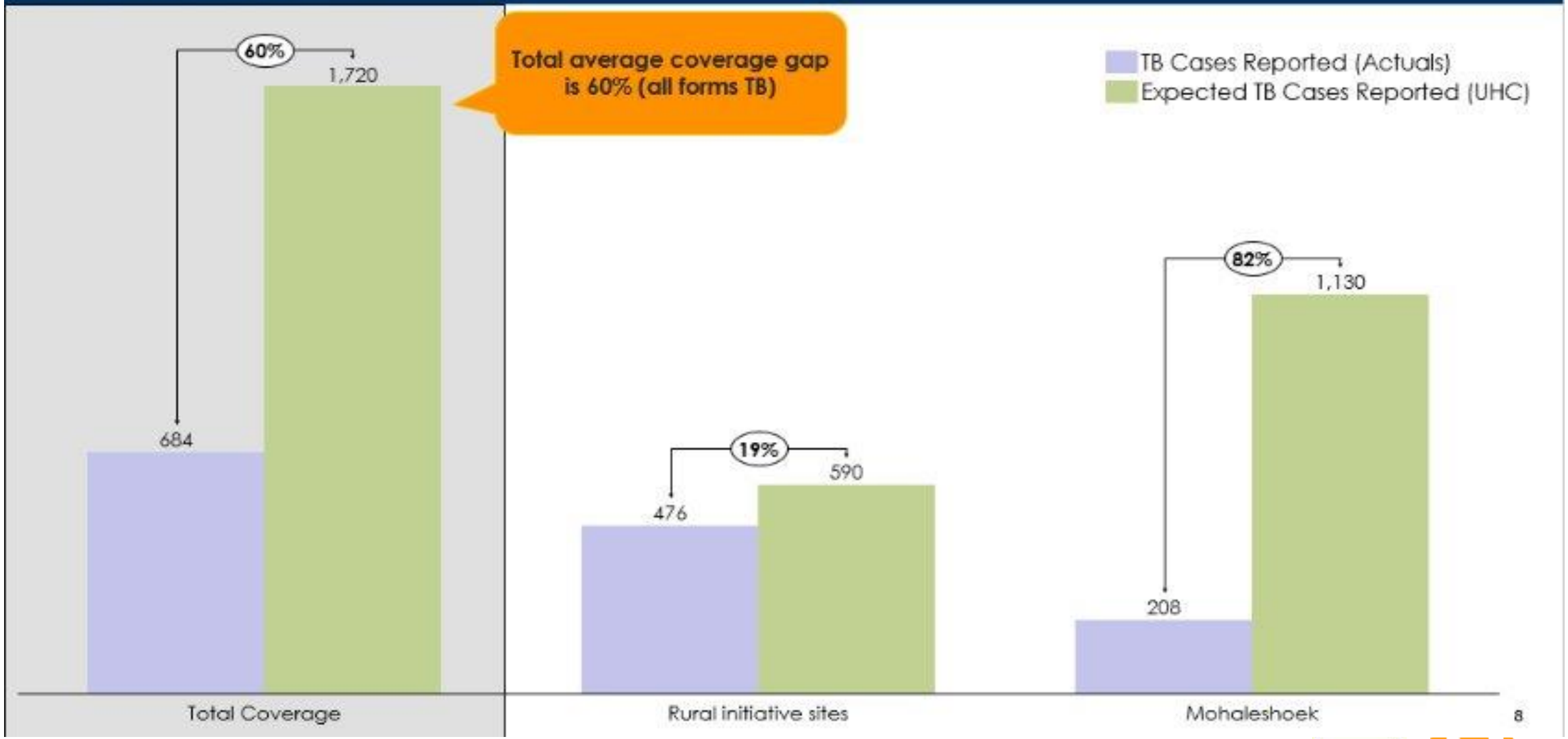
Coverage gaps for all forms of TB exist within the RI and Mohaleshoek catchment areas



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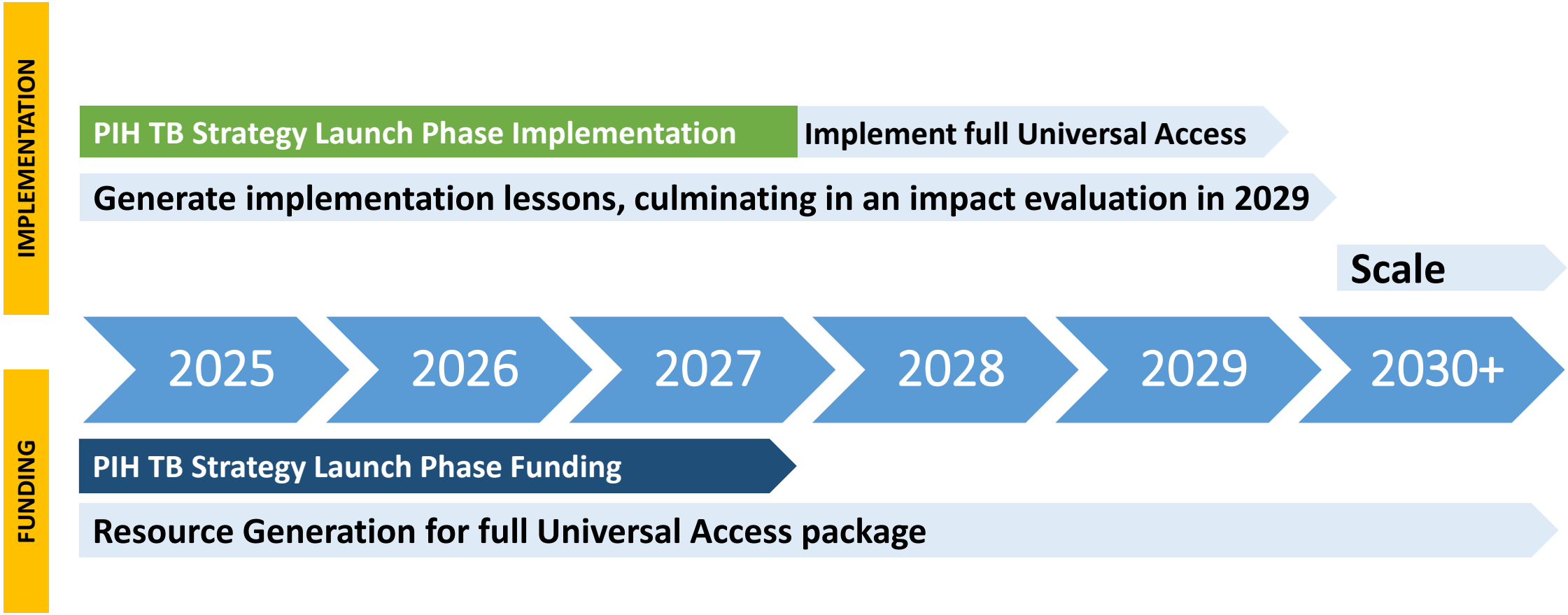
Over a five-year period, PIH Lesotho will replicate innovations to drive down rates of TB in a full district



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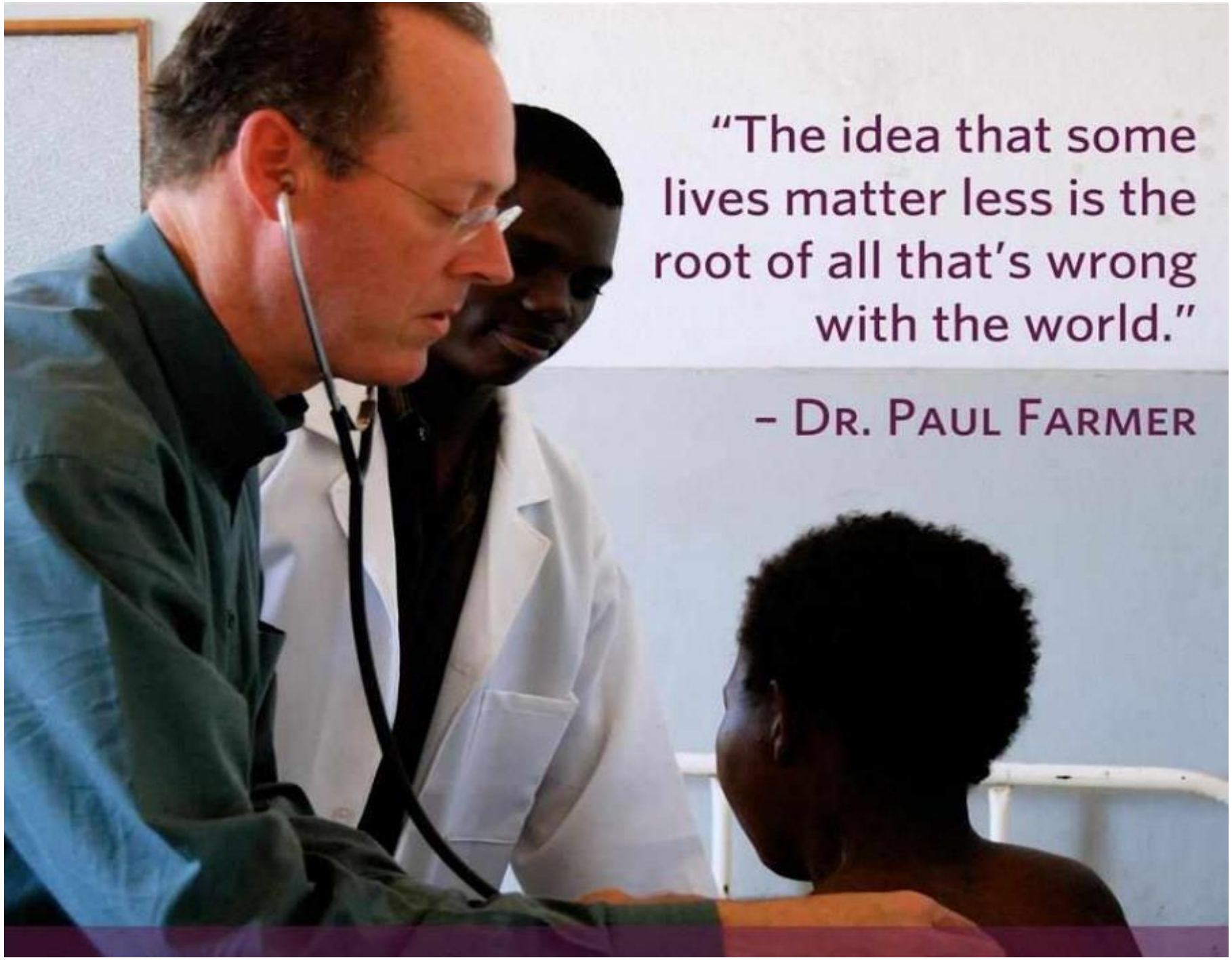
REMEMBERING DR PAUL FARMER



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Novel TB infection testing in Zambia

Dr Kwame Shanaube - Zambart
Deputy Director of Research/Acting Executive Director

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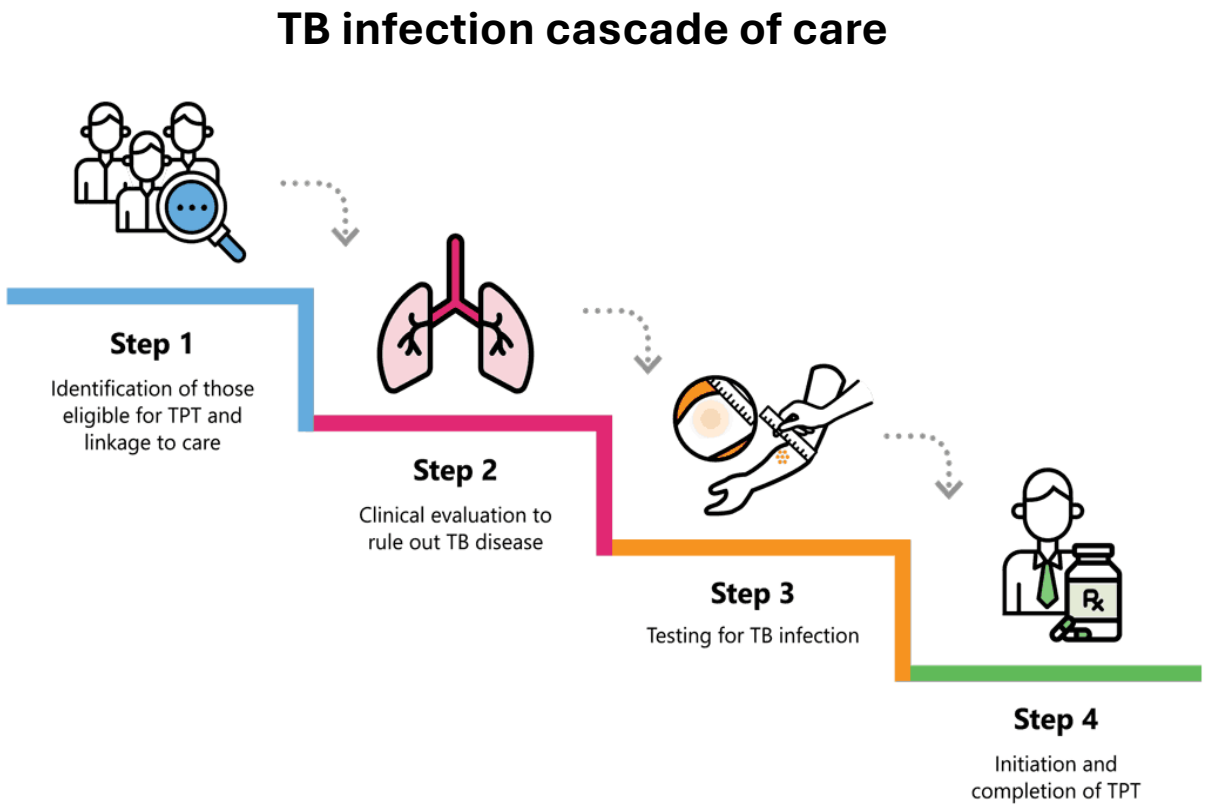
Background

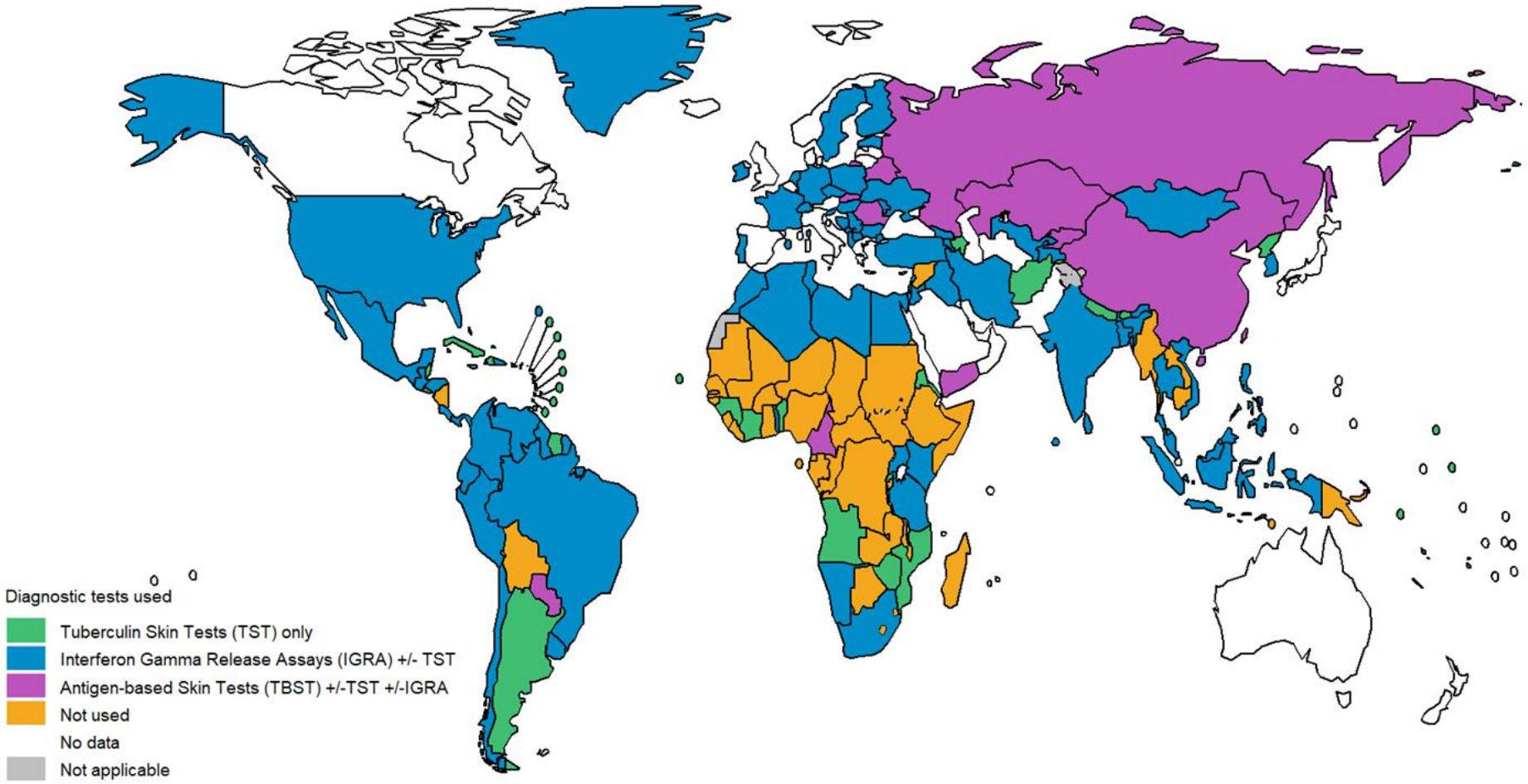
- A quarter of the world's population is estimated to be infected with Mycobacterium tuberculosis
- Testing for TB infection remains a big challenge especially in low-resource settings
- Current diagnostic methods such as Tuberculin skin test (TST) and interferon-gamma release assays (IGRAs) have limitations:
  - Nonspecific antigens that cross react with BCG and non-tuberculous mycobacterium (NTM)
  - IGRAs require costly laboratory infrastructure and trained laboratory personnel
- Novel TB infection tests such as Cy-TB and TB-Feron use more specific antigens and offer the advantage of lower costs and require basic laboratory infrastructure making them suitable for low-resource settings
- However, these new tests have not been tested in diverse populations with data mostly limited to the country of origin



TB, tuberculosis; TPT, TB preventive treatment

Source: Oxlade et al. *(15)*. Modified and used with permission of the copyright holder, The International Union Against Tuberculosis and Lung Disease.

Diagnostic tests used for TB infection, by country, 2023



Of the 38 countries reporting no use of tests for TB infection, 27 were in WHO African Region

What is the role of novel tests for TBI for provision of TPT in Zambia?

At-risk population: Household contacts to TB patients, PLHIV, diabetics

Participants randomly allocated to one arm

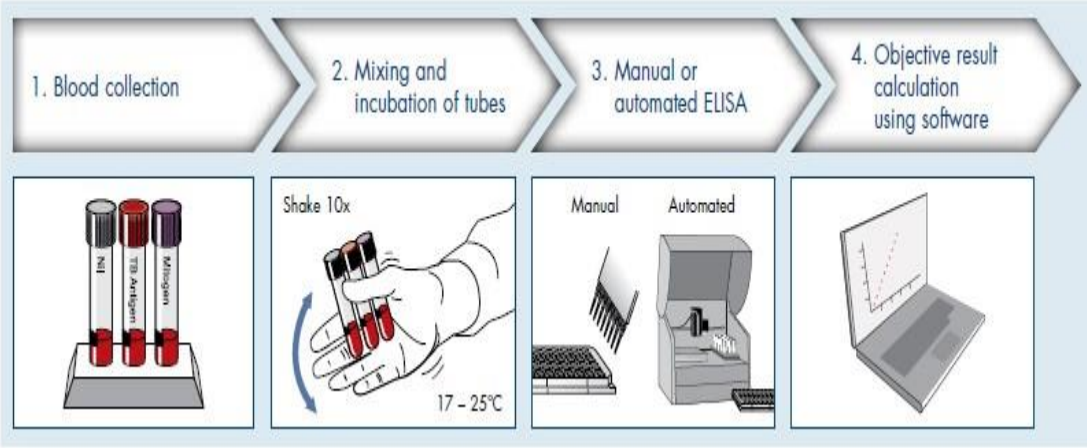
Standard of Care
Offer TPT without testing

Intervention Arm - Cy TB
Offer TPT if skin test positive

Intervention Arm - TB Feron
Offer TPT if TB-Feron test positive

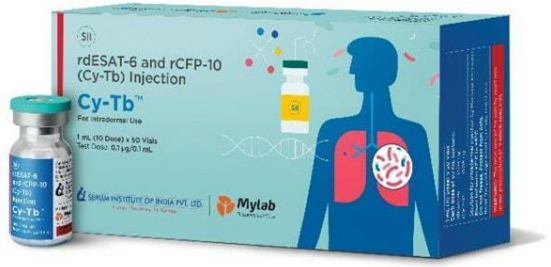
Follow up at 1 month

Reference test :QuantiFERON-TB Gold Plus



We need a test that is fast, accurate and cost-effective in detecting TB infection in LMICs

Cy-TB Skin Test



Intradermal Injection into the skin

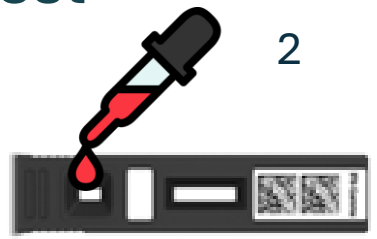
Reading of induration 2-3 days later

TB-Feron Blood Test

1

Blood collected and incubated overnight

2

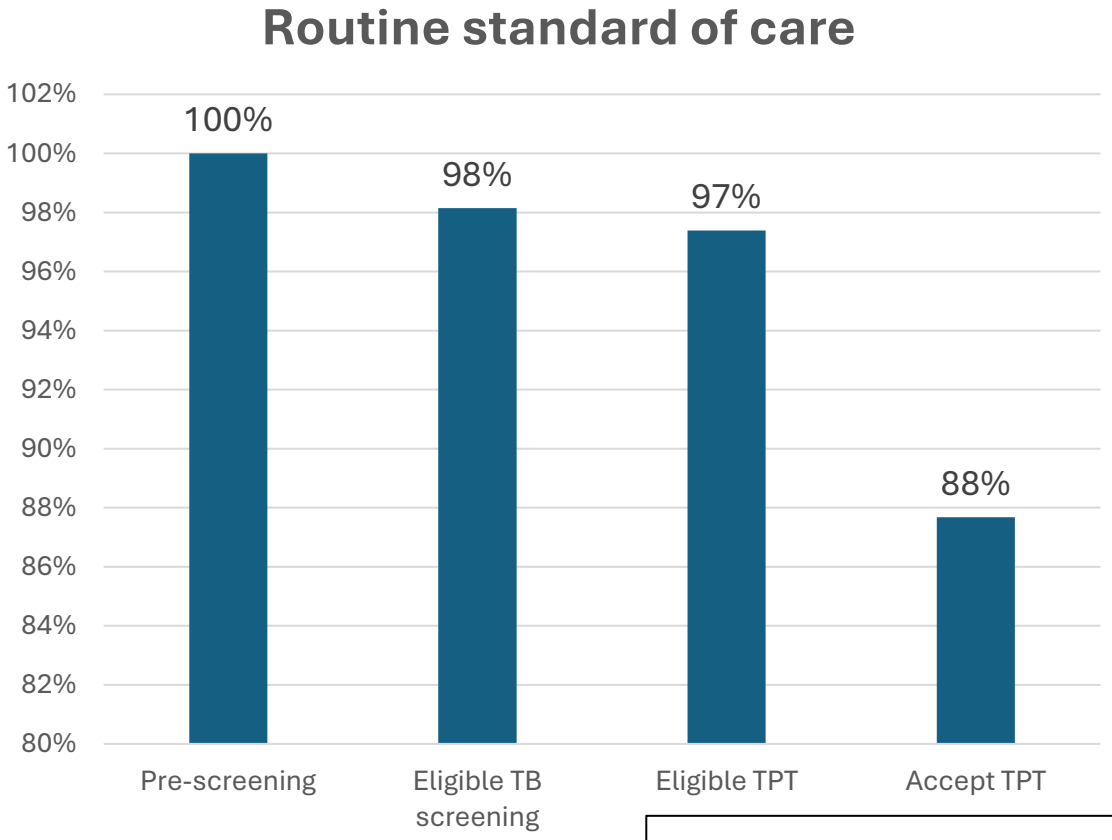


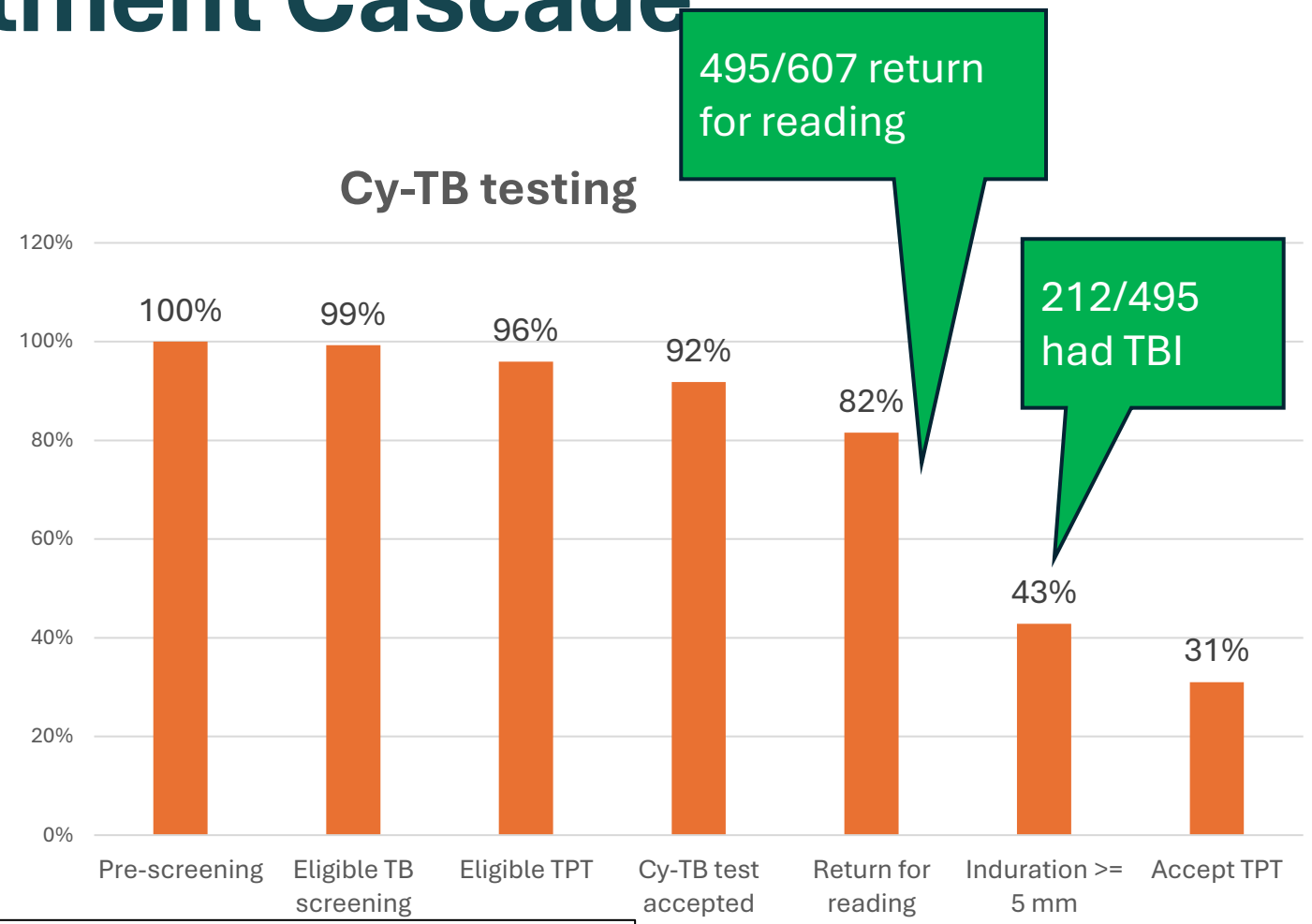
A drop of serum added to TB-Feron test kit after 1 day

3

Test device inserted into TB-Feron analyzer machine and results available in 15 minutes

TB Prevention Treatment Cascade





Acceptance of TPT among those eligible

SoC: 804/893 (90%)

CyTB: 205/212 of those positive (97%)

Performance of novel tests compared to QuantiFERON-Gold Plus

	QFT-positive	QFT-negative	Total
TB-Feron-positive	73	16	89
TB-Feron-negative	14	98	112
Total	87	114	201

	QFT-positive	QFT-negative	Total
Cy-TB positive	52	9	61
Cy-TB negative	27	74	101
Total	79	83	162

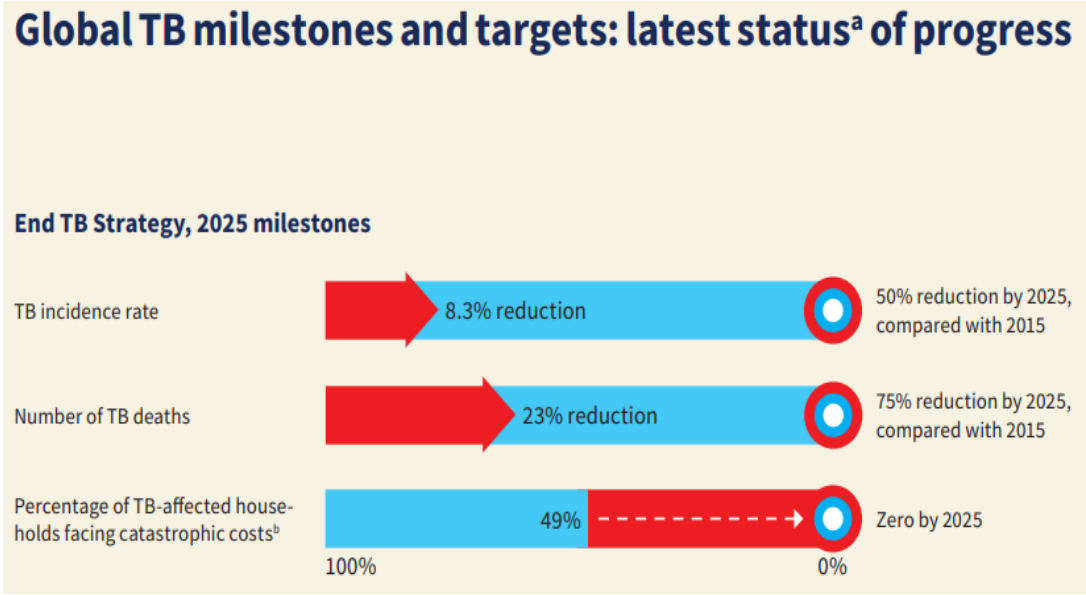
Cy-TB cut off-universal 5mm

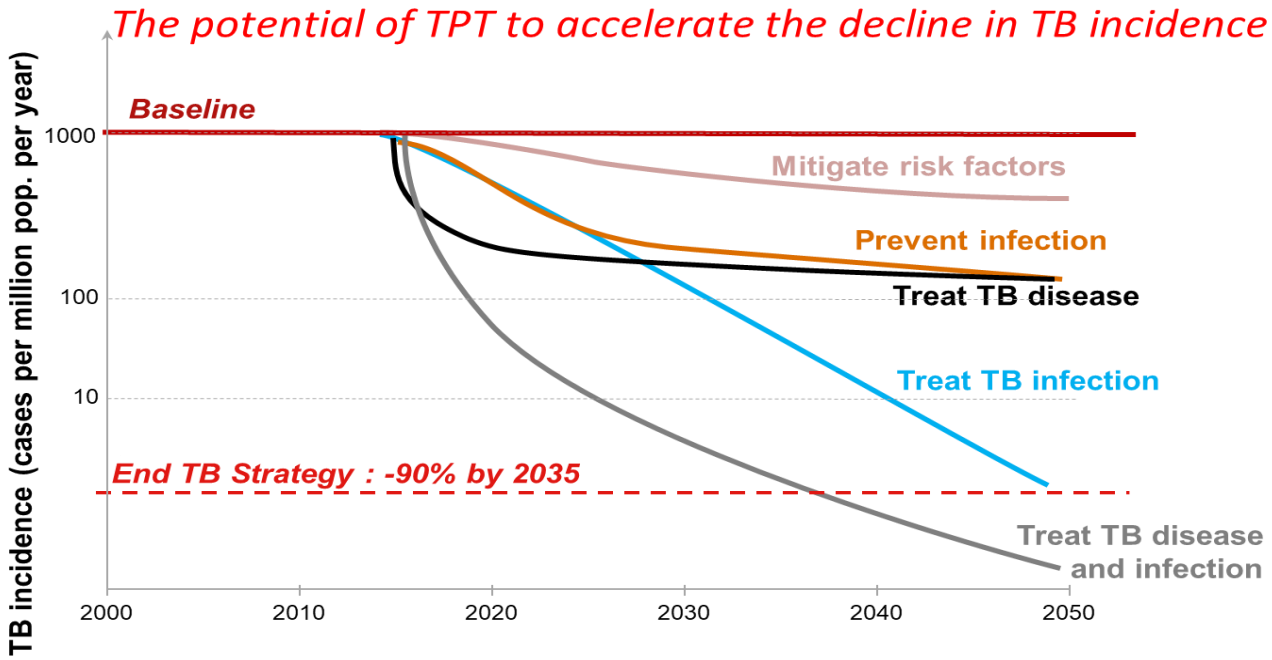
Sensitivity and Specificity		
	TB Feron	Cy-TB
TBI-prevalence	89/201 (44%)	61/162 (38%)
TBI-Prevalence QFT	87/201 (49%)	79/162 (49%)
Sensitivity	73/87 (84%)	52/79 (66%)
Specificity	98/114 (86%)	74/83 (89%)

- TBI positivity rate lower novel tests compared to QFT-Plus
- TB-Feron had higher sensitivity than Cy-TB
- Evaluating the accuracy of TBI tests in diagnosing TBI remains a problem since there is no “gold standard”

Looking towards the future

- TB infection testing with novel tests produces comparable results to QFT gold plus and can be implemented at primary care level
- TB-Feron had higher sensitivity than Cy-TB but had more operational challenges in our setting
- Uptake of TPT is high (~90%) among those eligible with novel tests
- **INVEST** in systems for TBI testing
  - Development of tests that don't require lab infrastructure or a second visit for reading
  - Tests or biomarker signatures that are more predictive for TB disease
- **TREAT** TB disease and Infection to end TB
- Primary results of our trial (**role of novel tests for TBI for provision of TPT)** pending analysis soon





From *Dye C et al., Prospects for Tuberculosis Elimination. Ann Rev Public Health 2013. 34:271-86*

Vasiliu A, et al. TB prevention: current strategies & future directions. Clinical Microbiology & Infection. 2024;30(9):1123-30.

Acknowledgements

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Canada

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UK International Development
Partnership | Progress | Prosperity

Zambart
Research and Development
to Improve Health for All

UBUMI BWANDI
MY HEALTH, MY CHOICE

Stop TB Partnership

Innovations in Service Delivery

Dr Stella Zawedde – WALIMU, Uganda

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12–14 December 2024 • Abuja, Nigeria

END TB

Introduction

Global TPT Uptake is very low and mainly among PLHIV

The global numbers of people provided with TB Preventive Treatment between 2018 and 2022, compared with targets set at the 2018 UN high-level meeting on TB

ALL AGES

Target: 30 million 2018-2022

15.5 million (52%) treated in 2018-2022

PEOPLE LIVING WITH HIV

Target: 6 million 2018-2022

11.3 million (>100%) treated in 2018-2022

HOUSEHOLD CONTACTS < 5 YEARS

Target: 4 million 2018-2022

2.2 million (55%) treated in 2018-2022

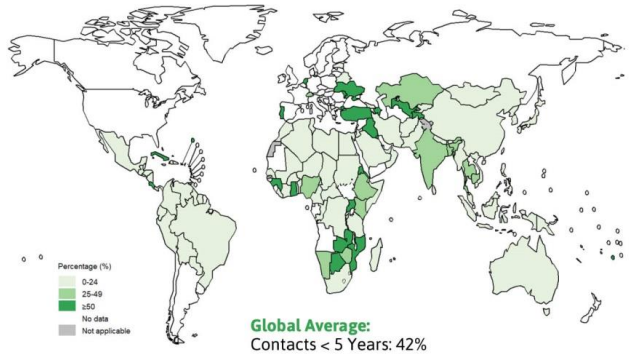
HOUSEHOLD CONTACTS ≥ 5 YEARS

Target: 20 million 2018-2022

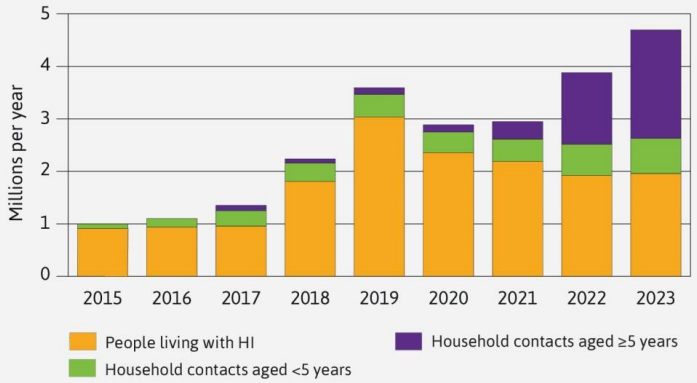
2.0 million (10%) treated in 2018-2022

Global TPT Uptake in 2023

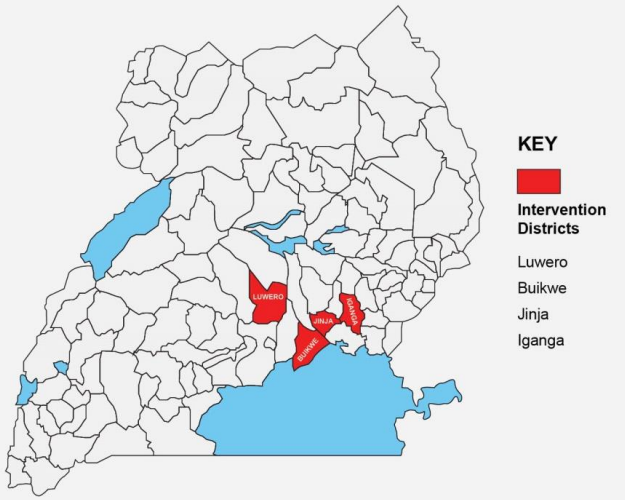
%age of household contacts (all ages) provided with TPT, 2023



Global Average:
Contacts < 5 Years: 42%
Contacts ≥ 5 Years: 18%



TPT Uptake in Uganda, 2022



PEOPLE LIVING WITH HIV

78.5%

HOUSEHOLD CONTACTS < 5 YEARS

42%

HOUSEHOLD CONTACTS ≥ 5 YEARS

27%

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Quality Health Care For Everyone

Introduction

Challenges of Traditional Delivery Models for TPT

Crowded Health Facilities = Long Waiting Times = Missed Wages

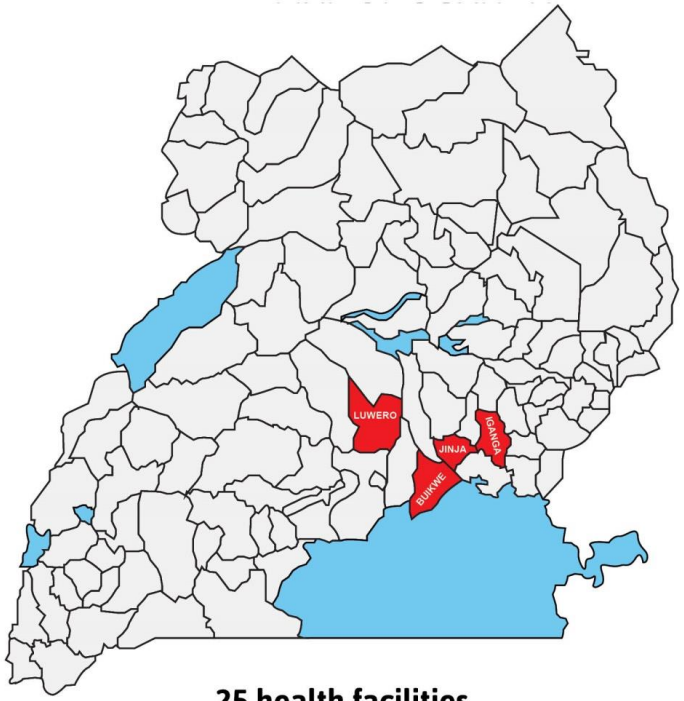
Lack of transport fares to come for medicine refills

Long treatment regimens

Few healthcare workers with multiple roles (little time to pay attention to contact screening and TPT delivery

Project Setting and Objectives

Project Setting



25 health facilities in 4 districts

Project Objectives

Overall goal

To increase TPT coverage among eligible household contacts < 5 years and PLHIV in accordance with the Uganda NTLP Strategic Plan.

Specific objectives

- To increase the proportion of eligible household contacts <5 years initiated on TPT to ≥74%.
- To increase the proportion of eligible household contacts living with HIV initiated on TPT to >90%.
- To achieve 90% treatment completion rates for all people started on TPT.

Project Implementation

The Expand TPT Project Implemented an Innovative Community-based Model for TB Preventive Therapy

Health Systems Interventions to Improve Capacity for TPT Delivery

Trained CHWs to conduct home-based contact tracing

Provided shorter TPT regimens

Community rider to support CHWs

Trained CHWs to fill TPT registers

Community Interventions to Decrease Costs Associated with Accessing TPT

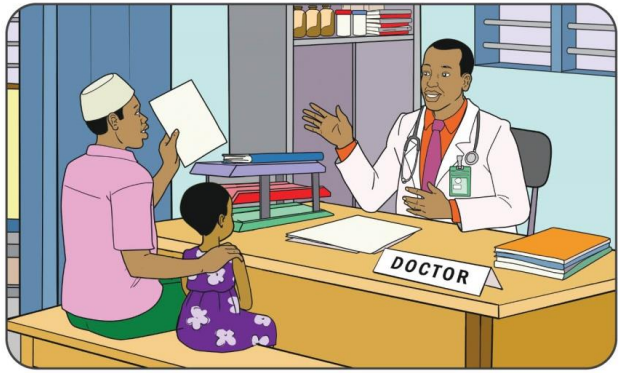
Increased community awareness about contact tracing and TPT to combat stigma

Home-based contact tracing

Home-based TPT initiation and refills

Home-based TST placing and reading

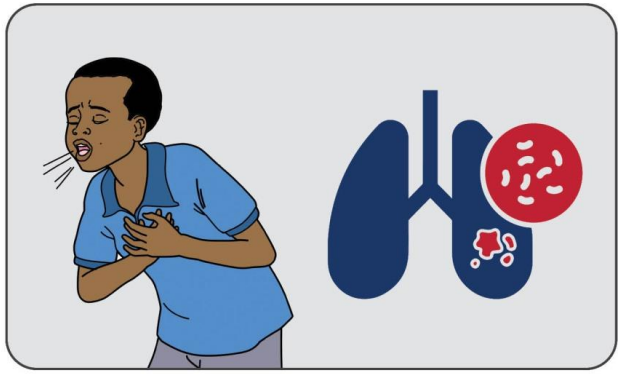
Project Results, July 2023 - June 2024



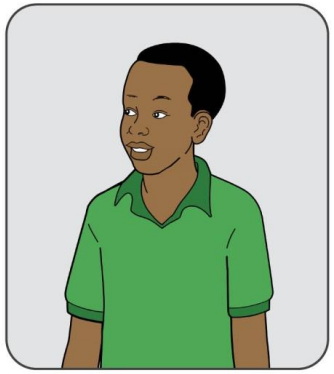
3,418 TB patients

2,726 (80%) received a contact tracing visit

16,226 contacts
(av. 6 contacts per patient)



612 were symptomatic
112 patients diagnosed with TB and started on TB treatment



15,614 were asymptomatic and eligible for TPT

14,871 (95%) were started on TPT

11,463 (77%) completed TPT

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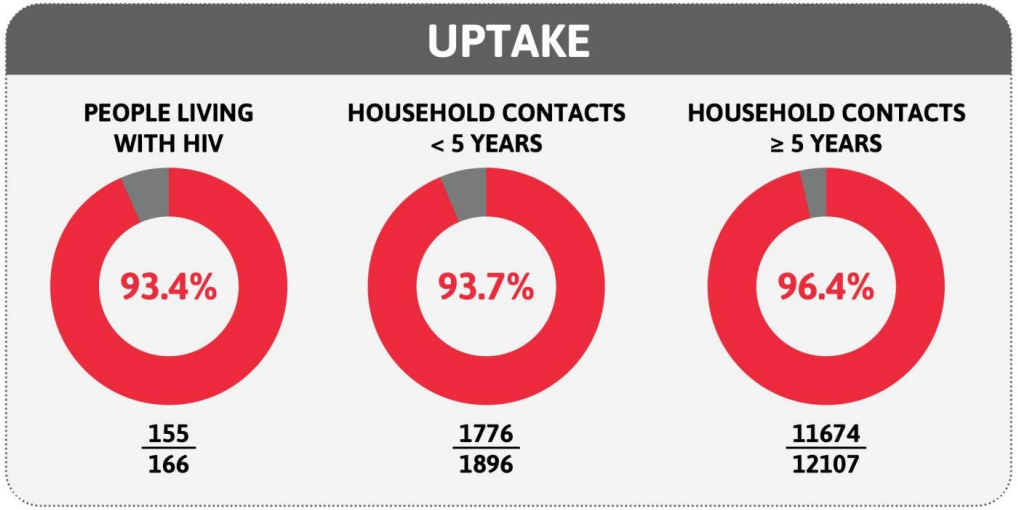
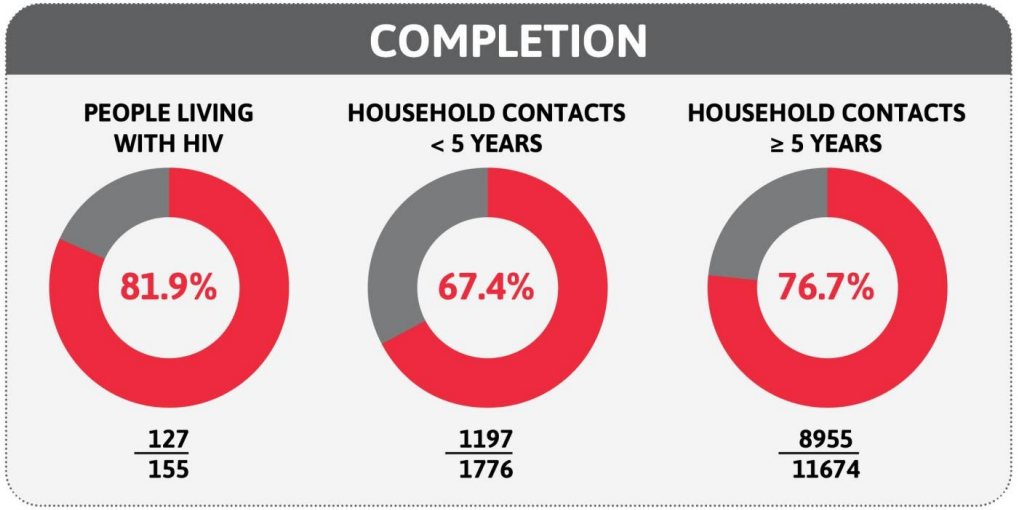
Project Results, July 2023 - June 2024

UPTAKE



COMPLETION



CONCLUSION

A community-based TPT delivery model improved TPT uptake and completion among eligible household contacts

CALL TO ACTION

Scale up of community-based delivery models should be considered by countries which seek to increase uptake and completion of TPT among household contacts.

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Acknowledgements

Stop TB Partnership

TRANSFORMING LUNG HEALTH (TB) through INTEGRATED HOLISTIC SOLUTIONS

Mr Gustav Eschberger - Vertice

STOP TB PARTNERSHIP

38th BOARD MEETING

12–14 December 2024 • Abuja, Nigeria

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OUR JOURNEY

South African based healthcare company with a global reach

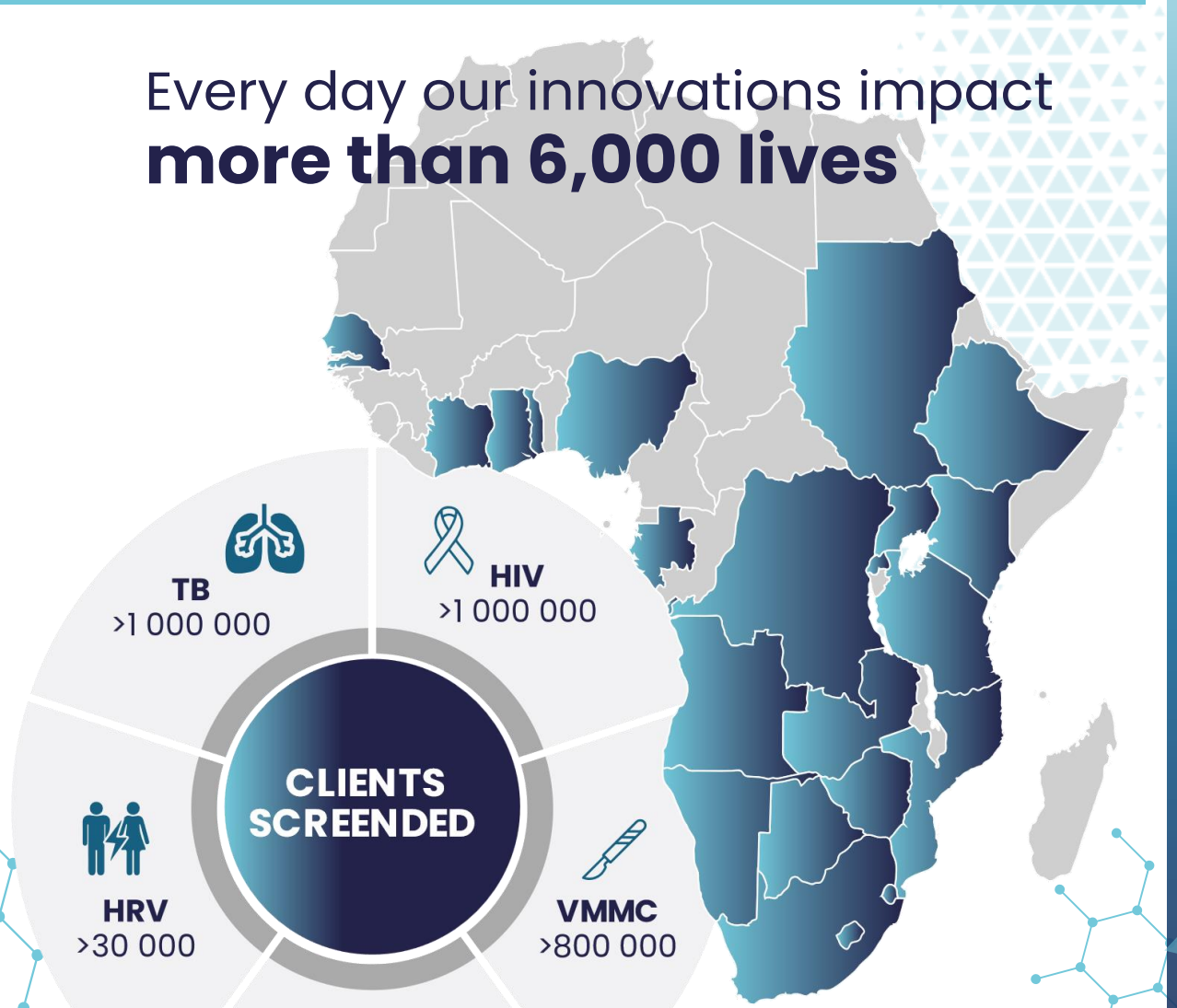
More than a decade of providing integrated, mobile healthcare and software solutions

Over **5 million lives** impacted, including Global Fund supported TB and HIV programs.

Programs implemented in over 20 Africa countries with expansion into South America and Australasia

CLIENTS SCREENDED WITH HCF

Every day our innovations impact
more than 6,000 lives



HOLISTIC INTEGRATED SOLUTION

Hardware

Optimal

Outcomes

Clinical Management Software

IHMS
Electronic Health Record M&E Platform

HCF HEALTHCARE FRAMEWORK

- Clinical Information Management
- Workflow Management
- Telemedicine & Remote Clinical Reporting
- Dynamic & Statistical Reporting

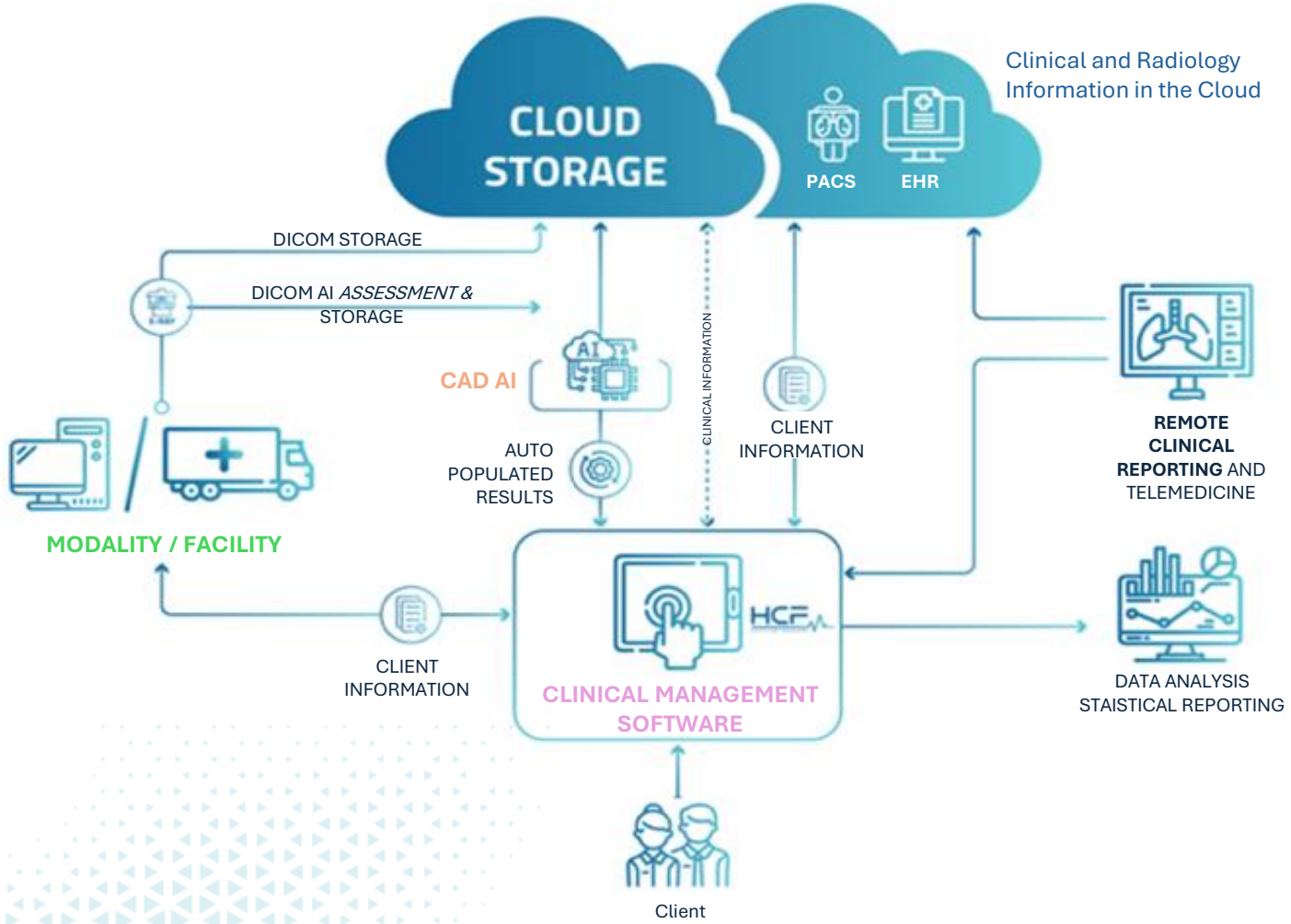
Computer Aided Diagnosis

NEXUS | AI

qure.ai

Hardware + Software + Healthcare Provider = Total Solution

RESULT = COMPREHENSIVE ECOSYSTEM



- Full integration between Clinical Management Software, EHR (HCF), CAD Ai, PACS and Hardware systems enabling automated accurate data transfer.
- Automated CAD Ai result population within EHR (HCF).
- Built-in remote radiology reporting and telemedicine modules.
- Dynamic real-time extracts, dashboards and BI reports.
- Optimized outcomes.

LOOKING AHEAD

OUR GOALS

- **Scaling Innovations to End TB:**
  By expanding our innovations and encouraging transition from a product-centric approach to a comprehensive, solution-driven model, we aim to strengthen and accelerate the global effort to eradicate TB.

- **Data Systems Integration:** Adoption of Clinical Management Software (HCF) with integration of Nexus AI, improving workflow & case management, linkage to care and real time reporting leading to improved outcomes.

- **Expanding Mobile Healthcare Solutions:**
  Extend our reach into new regions with enhanced mobile healthcare technologies and holistic solutions.

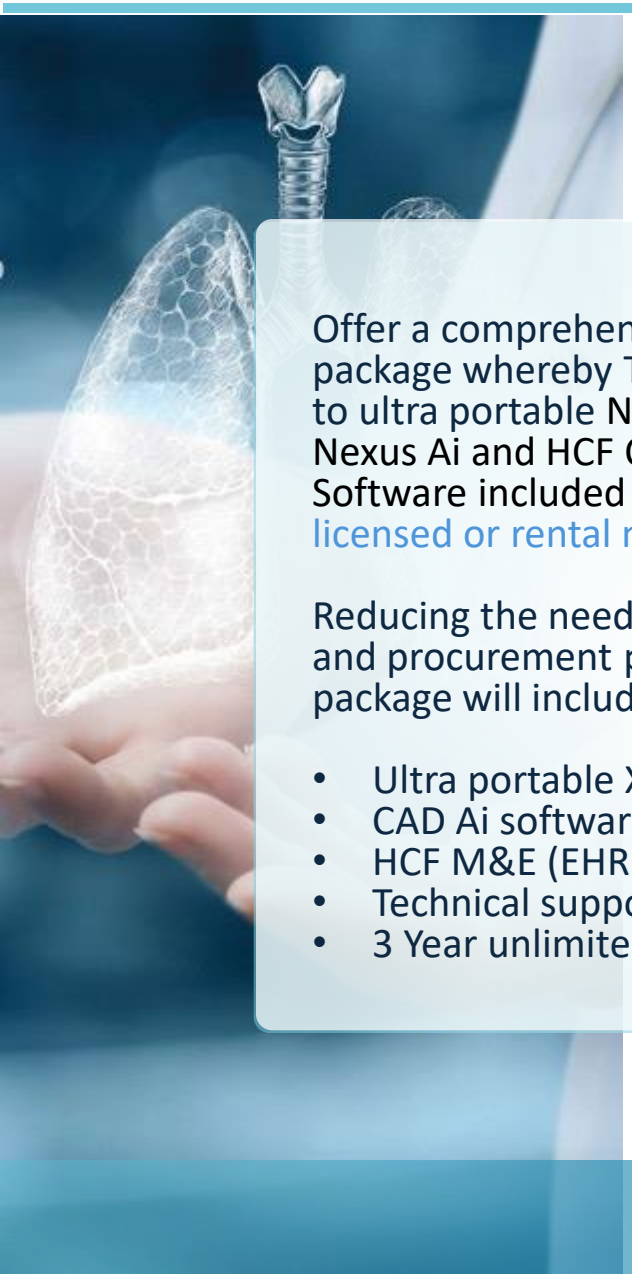
- **LLM Integration:**
  Harnessing advanced tools, including LLMs, to enhance outcomes by integrating CAD AI results with clinical information from CMS / HCF, enabling data-driven insights for optimized patient care and actionable recommendations.

- **Innovative, Cost-effective Solutions**:
  Develop and implement cost-effective CAD AI tools (Nexus Ai) to enhance TB/HIV programs, facilitating accurate detection, CRRS, and seamless linkage to care. Collaboration with Google to drive costs down.

- **Sustainable Screening:**
  Deploy integrated mobile solutions powered by sustainable energy for off-grid operations, utilizing Starlink and providing access to specialists(CRRS) worldwide thus improving healthcare delivery in remote areas.

* CRRS – Central Radiology Reporting Solution

NEW INNOVATION – TB DCXR SCREENING PACKAGE



Offer a comprehensive TB screening turnkey package whereby TB programs can get access to ultra portable Nano X-Ray, integrated CAD Nexus Ai and HCF Clinical Management Software included in all inclusive fixed licensed or rental model.

Reducing the need for complicated CAPEX and procurement processes, our licensed package will include:

- Ultra portable X-Ray unit.
- CAD Ai software.
- HCF M&E (EHR) software.
- Technical support.
- 3 Year unlimited usage license.

NEW INNOVATION – AUTOMATED XPOD

RESULTS

IMMEDIATELY AVAILABLE

The X-POD is a CXR facility that allows for comprehensive lung health screening integrated with CAD Ai and HCF Clinical Management Software allowing immediate results.

The X-POD ensures a **radiation-controlled environment**, fully compliant with international radiation safety standards.

Versatile and can be strategically placed at entry points such as borders, airports and settings requiring screening for lung health or infectious diseases.

Portability, ease of deployment, minimal operational footprint and equipment less prone to damage.

NEXUS AI - COMPUTER AIDED DIAGNOSIS (CAD)

Nexus AI, developed in collaboration between Nexus and Google LLC, is an advanced chest X-ray algorithm designed for detecting findings in chest X-rays.

The AI model can classify X-rays as:

- Normal/Abnormal
- TB Suggestive/Non-TB Suggestive

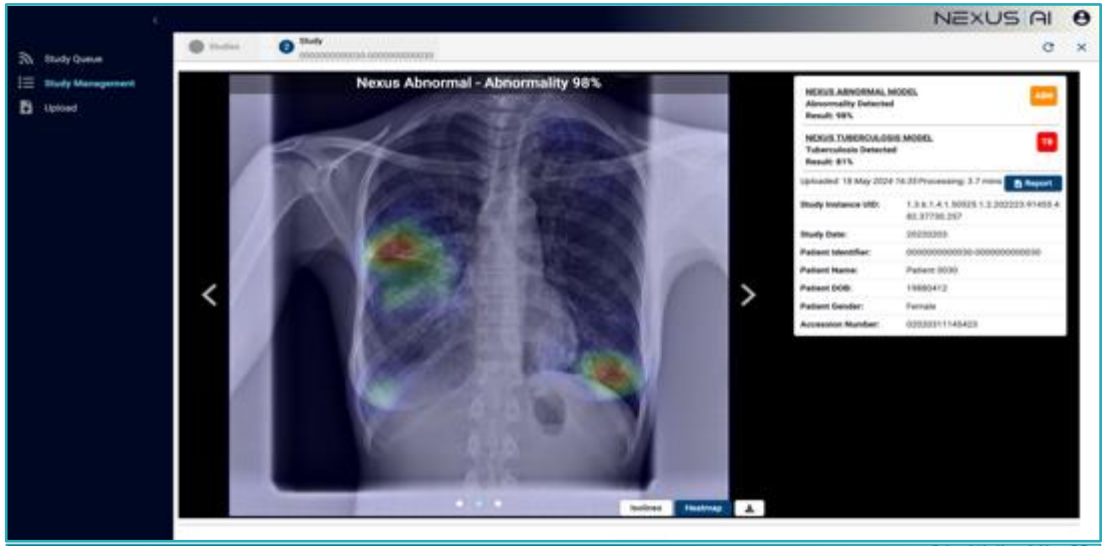
Outputs include:

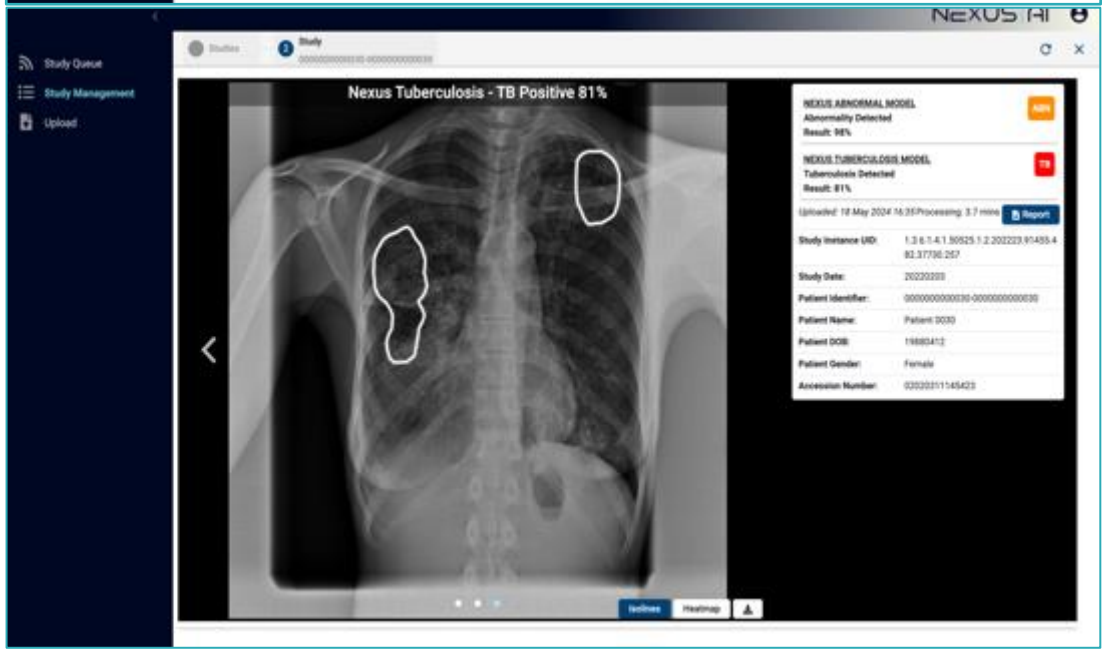
- Heatmap secondary capture
- Abnormality score
- Classification

Evaluated by StopTB and top CAD AI for TB Screening

(Published in The Lancet)

ADVANCED CHEST X-RAY AI





AI COMPUTER AIDED DETECTION (CAD) - NEXUS AI

Computer-aided detection of tuberculosis from chest radiographs in a tuberculosis prevalence survey in South Africa: external validation and modelled impacts of commercially available artificial intelligence software

Zhi Zhen Qin, Martie Van der Walt*, Sizulu Moyo, Farzana Ismail, Phaleng Maribe, Claudia M Denkinger, Sarah Zaidi, Rachael Barrett, Lindiwe Mvusi, Nkateko Mkhondo, Khangelani Zuma, Samuel Manda, Lisa Koeppel, Thuli Mthiyane†, Jacob Creswell†*

Summary

NEJM AI 2024; 1 (10)
DOI: 10.1056/AIoa2400018

ORIGINAL ARTICLE

Prospective Multi-Site Validation of AI to Detect Tuberculosis and Chest X-Ray Abnormalities

Sahar Kazemzadeh, B.S.,[1] Atilla P. Kiraly, Ph.D.,[1] Zaid Nabulsi, M.S.,[1] Nsala Sanjase, MBChB.,[2] Minyoi Maimbolwa, B.S.,[2] Brian Shuma, D.M., M.P.H.,[2] Shahar Jamshy, Ph.D.,[1] Christina Chen, M.D.,[1] Arnav Agharwal, M.S.,[1] Charles T. Lau, M.D., M.B.A.,[3] Andrew Sellergren, B.A.,[1] Daniel Golden, Ph.D.,[1] Jin Yu, M.S.,[1] Eric Wu, M.S.,[1] Yossi Matias, Ph.D.,[1] Katherine Chou, M.S.,[1] Greg S. Corrado, Ph.D.,[1] Shravya Shetty, M.S.,[1] Daniel Tse, M.D.,[1] Krish Eswaran, Ph.D.,[1] Yun Liu, Ph.D.,[1] Rory Pilgrim, B.E., LLB.,[1] Monde Muyoyeta, MBChB., Ph.D.,[2] and Shruthi Prabhakara, Ph.D.[1]

Received: January 8, 2024; Revised: July 31, 2024; Accepted: August 7, 2024; Published: September 26, 2024

	Threshold	Sensitivity	Specificity
Threshold to match 90% sensitivity			
Lunit	0·07	89·9% (85·6–93·3)	67·7% (63·5–71·7)
Nexus	0·48	89·9% (85·6–93·3)	67·1% (62·9–71·2)
JF CXR-2	0·23	89·5% (85·1–93·0)	62·7% (58·3–66·9)
qXR	0·18	90·3% (86·0–93·6)	62·3% (57·9–66·5)
ChestEye	0·08	89·1% (84·7–92·7)	61·3% (57·0–65·5)
Xvision	0·11	89·9% (85·6–93·3)	58·6% (54·2–62·9)
CAD4TB	3	89·9% (85·6–93·3)	55·7% (51·3–60·0)
InferRead	0·26	90·3% (86·0–93·6)	54·9% (50·5–59·3)
Genki	0·02	89·5% (85·1–93·0)	54·5% (50·1–58·9)
TiSepX-TB	0·18	89·9% (85·6–93·3)	48·0% (43·6–52·4)
XrayAME	0·02	88·4% (83·8–92·0)*	36·9% (32·8–41·3)
RADIFY	0·02	82·6% (77·4–87·0)*	32·5% (28·5–36·7)
Threshold to match 70% specificity			
Lunit	0·09	89·5% (85·1–93·0)	70·2% (66·1–74·1)
Nexus	0·54	88·8% (84·3–92·3)	69·8% (65·7–73·8)
qXR	0·32	86·8% (82·1–90·7)	70·2% (66·1–74·1)
JF CXR-2	0·4	86·4% (81·6–90·4)	70·0% (65·9–73·9)
ChestEye	0·11	86·0% (81·2–90·0)	69·6% (65·5–73·6)
InferRead	0·37	85·7% (80·8–89·7)	70·4% (66·3–74·3)
Xvision	0·14	85·7% (80·8–89·7)	69·6% (65·5–73·6)
Genki	0·09	84·5% (79·5–88·7)	70·6% (66·5–74·5)
CAD4TB	12	81·0% (75·7–85·6)	70·6% (66·5–74·5)
TiSepX-TB	0·29	77·5% (71·9–82·5)	70·8% (66·7–74·7)
XrayAME	0·13	68·6% (62·6–74·2)	70·6% (66·5–74·5)
RADIFY	0·57	43·4% (37·3–49·7)	71·0% (66·9–74·9)†

*The closest sensitivity to 90%. †The closest specificity to 70%.

Table 2: **Computer-aided detection performance compared with 90% sensitivity and 70% specificity target values**

LLM / GPT for Report Generate and Peds Diagnosis

Abnormality Detection	TB Detection
Abnormality Detected (Score = 94%)	TB Detected (Score = 86%)
	

Chest X-Ray Report Summary:

This chest x-ray shows suspicious areas in your lungs called **opacities**. The x-ray shows **strong signs of abnormality which are highly indicative of tuberculosis (TB)**. The model used to analyze your x-ray is very confident in its prediction of both abnormalities and TB.

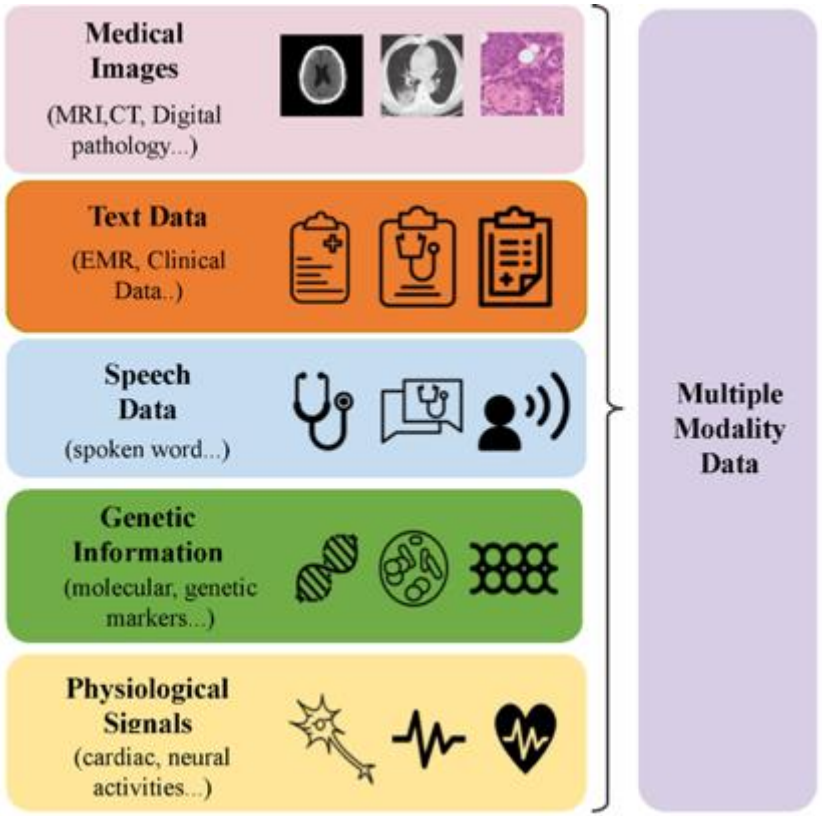
Location:

- **Right Upper Lung:** A dense area is present, suggesting consolidation (fluid buildup) which is common in TB.
- **Left Upper Lung:** A similarly dense area is seen, with a possible cavity. Cavities are concerning and often indicate active TB.
- **Left Lower Lung:** A smaller, defined nodule is present, possibly a granuloma, another hallmark of TB infection.

Key Findings and What They Might Mean:

- The opacities in both upper lungs, particularly the possible cavity, strongly suggest TB.
- The presence of possible granulomas further supports this diagnosis.
- While other conditions can cause similar findings, the combination and location of these abnormalities point towards TB.

* CAD results combined with clinical information from CMS for better LLM outputs and suggestions



RETROFITTING EXISTING CXR CAPACITY

Can be installed on current install base to increase TB screening footprint.

GREATER IMAGE VERSATILITY

IMPROVED WORKFLOW

REDUCE RADIATION

REDUCE OPERATING COST

CAD AI ASSISTANCE

Benefits of a DR Upgrade Kit for TB Programs:

Seamless Transition to Digital:
Allows for a smooth transition from outdated film or computed radiography to advanced digital systems. This cost-effective upgrade enhances diagnostic accuracy without the need for entirely new X-ray machinery. (Quarter of the price of new DR system)

Advanced Diagnostics:
Integrated CAD Ai technology, ensures early and accurate detection of TB and other lung conditions, including atypical cases and simultaneous screening for COPD and malignancies.

Comprehensive Package:
Complete with digital detector panel, CAD software, a high-performance workstation, and installation services—ensuring a smooth, efficient upgrade process

Quarter of new DR system price

PROVEN IMPACT

REACHING THE HARD TO REACH - SOUTH AFRICAN ACTIVE TB CASE FINDING - COMMUNITY AND FACILITY BASED DIGITAL CHEST X-RAYS WITH CAD AI AND M&E.

In a collaborative venture with the Global Fund, the South African Department of Health has introduced an innovative TB screening program. This initiative unites active case finding in both facilities and communities with state-of-the-art digital chest x-ray technology, supplemented by advanced computer-aided detection (CAD) AI and an integrated monitoring and health management system **(HCF) to streamline the screening process, case management, diagnosis, linkage to care while offering real-time data analytics.**

From 6000 to over 30 000 screenings

Through our integrated solutions and **HCF Clinical Management Software**, monthly screenings have increased from fewer than 6,000 to over 30,000—delivering impactful, scalable healthcare outcomes.

9
Provinces covered across South Africa

33
Mobile X-Ray Clinics with HCF M&E and CAD Ai

> 450,000
Individuals screened to date

> 8,500
Individuals initiated on TB treatment

health
Department:
Health
REPUBLIC OF SOUTH AFRICA

The Global Fund

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HCF
HEALTHCARE FRAMEWORK

Stop TB Partnership

The potential of CAD for aiding TB diagnosis in children

TB REACH Wave 7

Dr Monde Muyoyeta
Centre For Infectious Disease Research in Zambia (CIDRZ)

STOP TB PARTNERSHIP
38th BOARD MEETING
12–14 December 2024 • Abuja, Nigeria

END TB

TBREACH Wave 7: Childhood TB Project

Study Purpose and Objectives

- To improve TB case detection rates and access to TB preventive therapy in children
- To evaluate and validate innovative TB screening and diagnostic tools so that their use in childhood TB case finding can be optimized

Objectives

- To increase TB case detection in Children

Secondary Objectives

- To assess KAP of health workers and caregivers towards childhood TB
- To validate CAD4TB and evaluate CRP as TB screening tools in children 5 years and above.
- To evaluate novel screening and diagnostic tools and tests in children less than 5 years
- To explore and validate laboratory methods for stool Xpert ultra

Stop TB Partnership TB REACH

Hosted by UNOPS

Canada

CIDRZ

TBREACH Wave 7- Outputs

Successes

- Health care worker training on childhood TB
- Community Health care worker training on childhood TB
- Improved access to CXR services at both facilities
- Access to LAM- for undernourished
- Strengthened contact tracing
- Nutritional Support to all diagnosed with TB
- Increased TB case detection
- Lessons learned adopted by NTLP and TBLON

Summary Indicators	Target	Performance	% Achieved
Number screened for TB	11831	5185	43.8
Number with presumptive TB identified (Facility/ADS)	2833	2103	74.2
Number with TB diagnosis (Facility/ADS))	250	429	171.6
Number with TB linked to care (Facility/ADS)	250	407	162.8
Initiated on IPT	2009	532	26.4

Background: Rationale for CAD

- ~1 million children develop TB every year
- ~63% never access TB diagnosis & treatment or are not reported
- Diagnosing TB in Children presents numerous of challenges including:
  - Wide spectrum of disease manifestations and symptoms that overlap with other common childhood conditions such as pneumonia, HIV-associated lung disease, and malnutrition
  - Difficulties with collecting sputum from children.
  - Other specimens have low sensitivity / specificity
  - Diagnosis of TB in children is often made clinically (No confirmation)
- CXR is an important tool for childhood TB diagnosis but:
  - Difficult to read due to atypical presentation of TB in children
  - Lack of experienced staff/ or radiologists
  - Even radiologist may struggle to interpret child x-rays

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Canada
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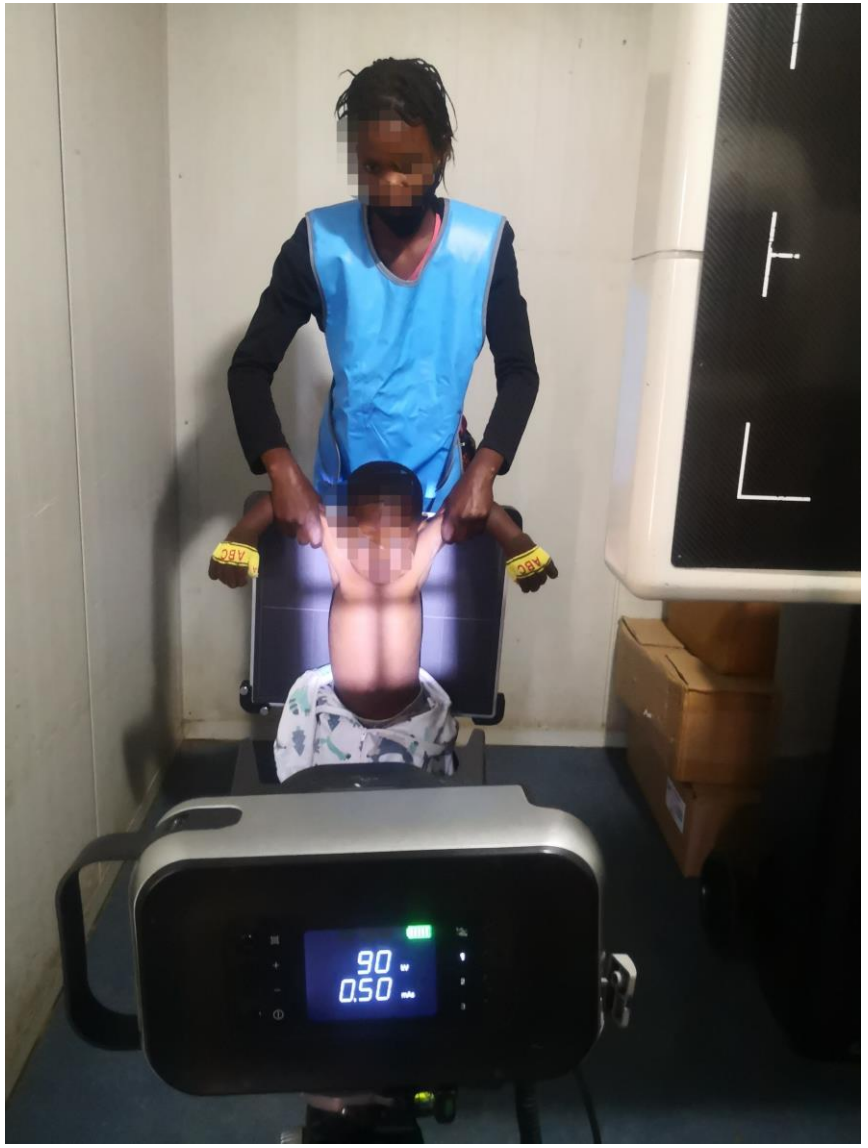
Background: Rationale for CAD

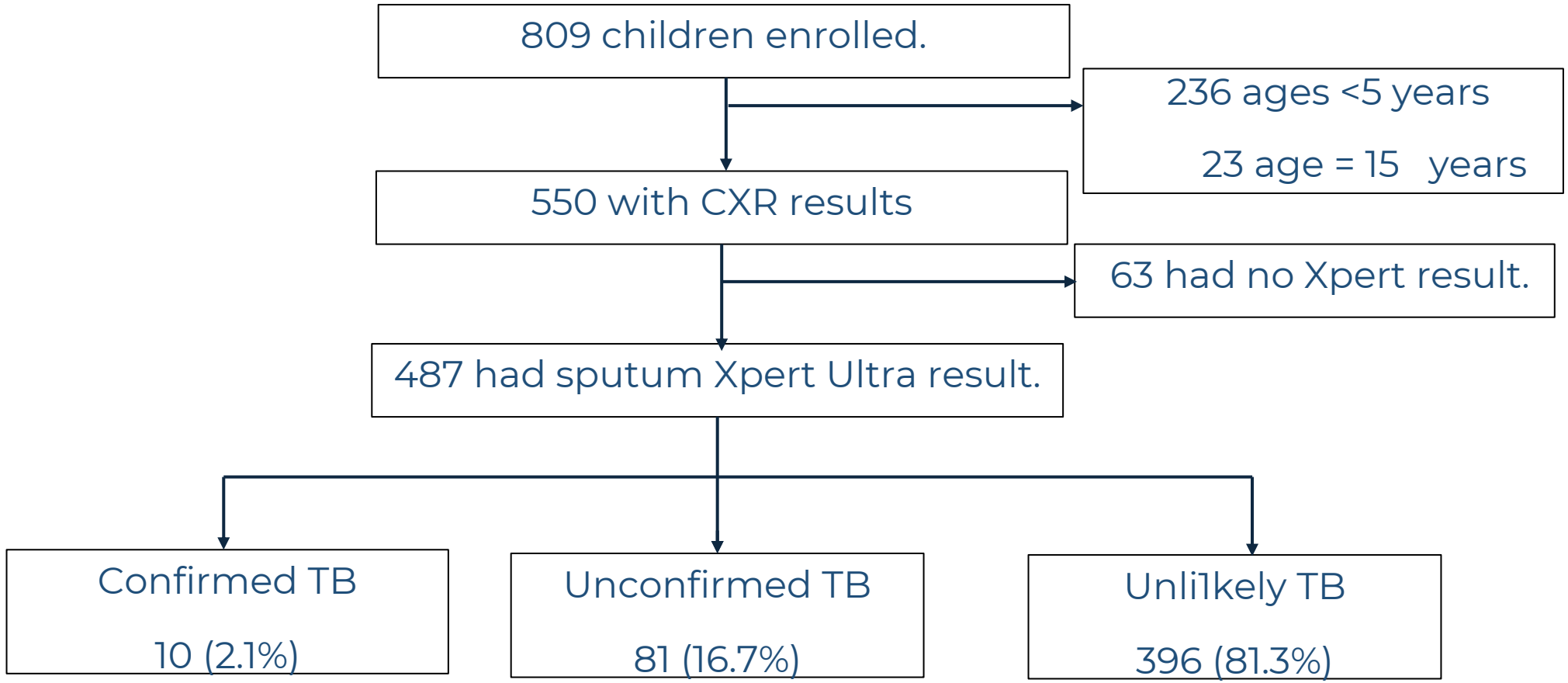
- Diagnosis of TB in children is often made clinically
  - Paucibacillary disease - limitations of current diagnostics
  - Low sensitivity
- CXR is an important tool for childhood TB diagnosis but:
  - Difficult to read due to atypical presentation of TB in children
  - Lack of experienced staff/ or radiologists
  - Even radiologist may struggle to interpret child x-rays
- Computer-aided-detection (CAD) for automated interpretation of CXRs may overcome these challenges
  - CAD is not validated for use in children
- There is urgent need for AI solutions to aid TB diagnosis in children



New Tools , New opportunities

- Developments in Artificial Intelligence and Machine Learning
  - Opportunities to overcome challenges of reading CXRs
  - Improve screening and diagnosis
  - Improve patient flow and access
- Ultra portable Xray units can increase access- Lower cost
- WHO approved and include use of Computer Aided Diagnosis (CAD) for TB in adults in 2021
  - Improve screening sensitivity
  - Perform equal and sometimes better than expert readers
- CAD is not validated for use in Children
  - There is urgent need for AI solutions to aid TB diagnosis in Children

Evaluation of CAD : Results



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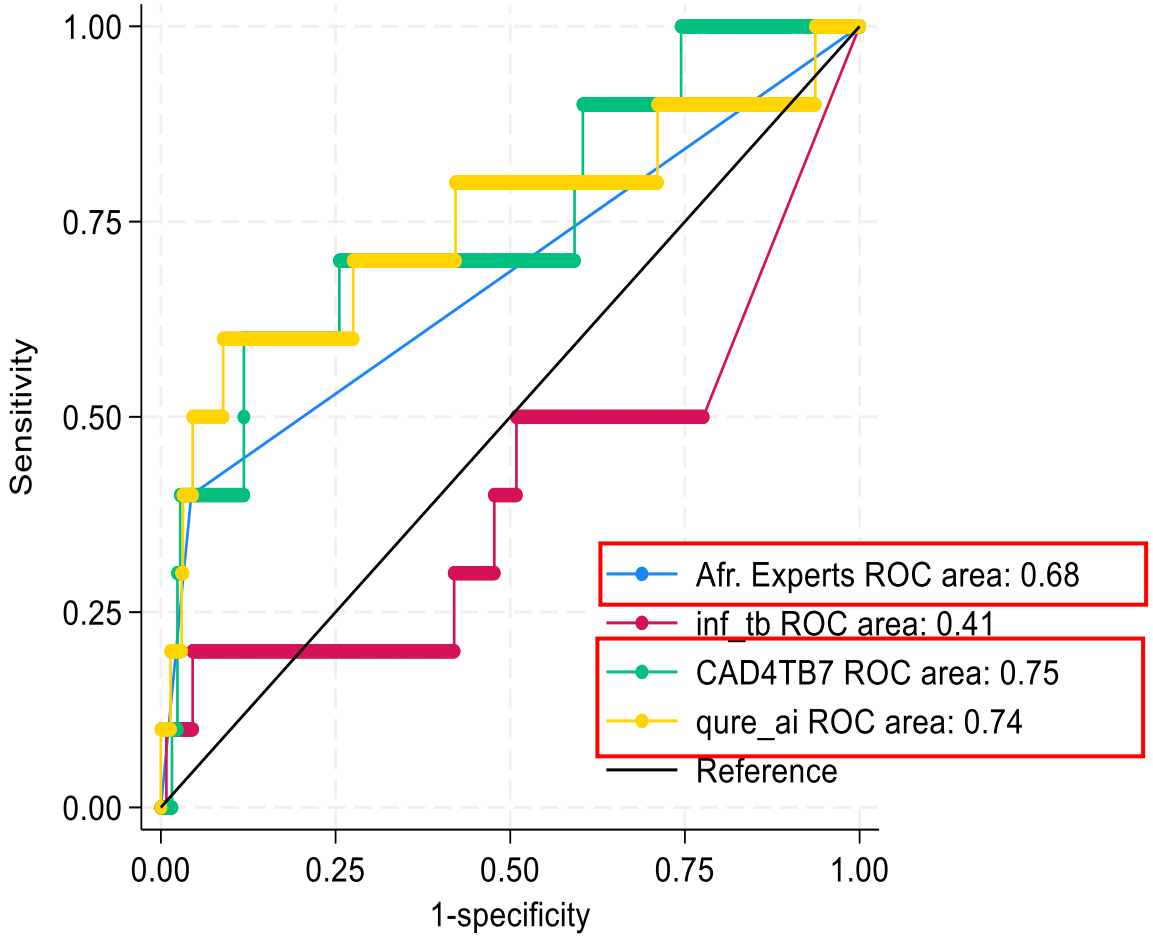
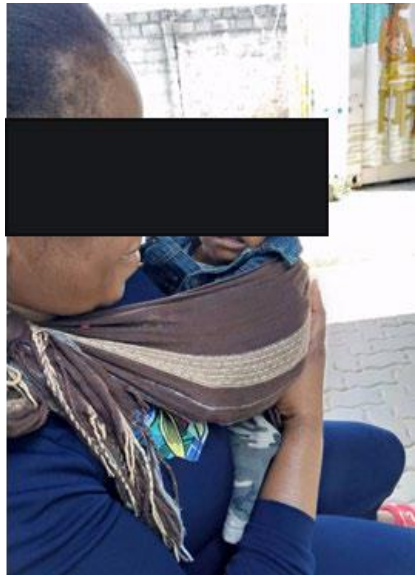
CAD performance



- 2 CAD systems performed better than Human expert readers
- All CAD software improved when compared to CXR scored as TB by >=3 experts
- 2 CAD Systems had excellent performance
- Offers option to create expert panel data base for training
- Data from this work will contribute to WHO Policy development on CDA use in Children

Stories

- Baby SN was unwell for several months with regressing milestones
- “Baby SN was eventually referred to the HIV clinic for HIV testing. Whilst in queue at the HIV clinic, baby SN’s grandmother listened to the childhood TB sensitisation that was being given by the TB REACH team and she decided to take the child to the open access point for TB screening”
- Baby SN was diagnosed with TB based on CXR findings, clinical presentation, and urine LAM results.
- “Baby SN has shown remarkable improvement, he has started walking and symptoms have subsided. He can now play with friends and his appetite has improved, and he has gained weight”



Two days later, after the mother started her treatment Tshawn’s Aunt brought him to Kanyama First Level Hospital because he had fever and a cough. As she and the baby were seated in OPD waiting to be attended to, she heard the health sensitization on TB Childhood and decided to come through to TB Reach Open Access where the child was screened for TB. Tshawn had fever, weight loss, a productive cough for more than 3weeks, and had experienced some night sweats according to his Aunt, after registration, the child was subjected to Chest X-ray whose results came out Abnormal he was seen by the TB Reach Study Doctor and Gastric Lavage was done and the sputum results came out the next day in which MTB was not detected. However, the baby was put on TB treatment based on Chest X-ray and suggestive symptoms of TB.

Thank You

TB REACH wave 11: Integrated Lung Health approaches

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How to Implement a Sustainable TB Connectivity Solution

A Case Study of Ethiopia

Mr. Ernest Okot – Founder, MedX Intl

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Connect critical patients to care
in low resource settings

Retrieve results

Notify Patients & Clinicians

Your TB Test Result is now ready. Please visit St Peter's Hospital to see a doctor. Your result code is SPH-9232D

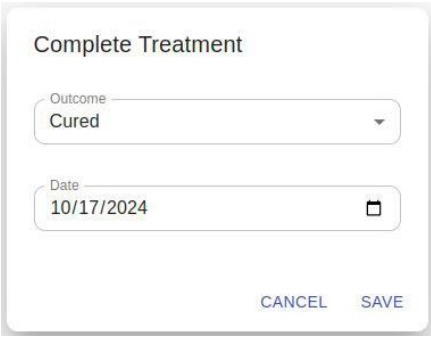
Patient SPH-9232D: MTB DETECTED, RIF Resitance NOT DETECTED from St Peter Hospital

Confirm MDR

Notify TB Focals About MDR

New RIF Resistant patient identified at St Peter Hospital - https://et.lbxpt.io/ert3412

Track treatment from start to end



Connect equipment vendors
for faster resolution of issues

Identify equipment issues

Identify equipment due for maintenance

Notify vendors

#231: Reported Module Failure At St Peter Hospital

OPEN

Track issue resolution

#231: Resolved Module Failure At St Peter Hospital

OPEN

Vendor SLA performance report

Connect the logistics network

to prevent stock out and expiry

Track consumption and at stock hand

Identify facilities for restocking

Initiate restocking

Identify expiring stock

Initiate stock redistribution

Serve as a platform for launching other digital innovations in the TB program

Realtime National Reporting

Sample Referral Network Monitoring

Data Analytics and Dissemination

Decision Support System

The need for **sustainability**

Existing Models	Sustainable Model
Provided on a **recurring cost basis** maintained by **offshore teams** running on **global telecom infrastructure**	Acquired with **one time investment** as a **country owned** solution maintained by a **local team** using **local telecom infrastructure**
Cost Of Ownership	
$$$	**$**

MedX introduced as a local connectivity solution in Ethiopia from 2022 to 2023

Installation	**Training**	**Capacity Building**	**Technical Support**	**Customisation**

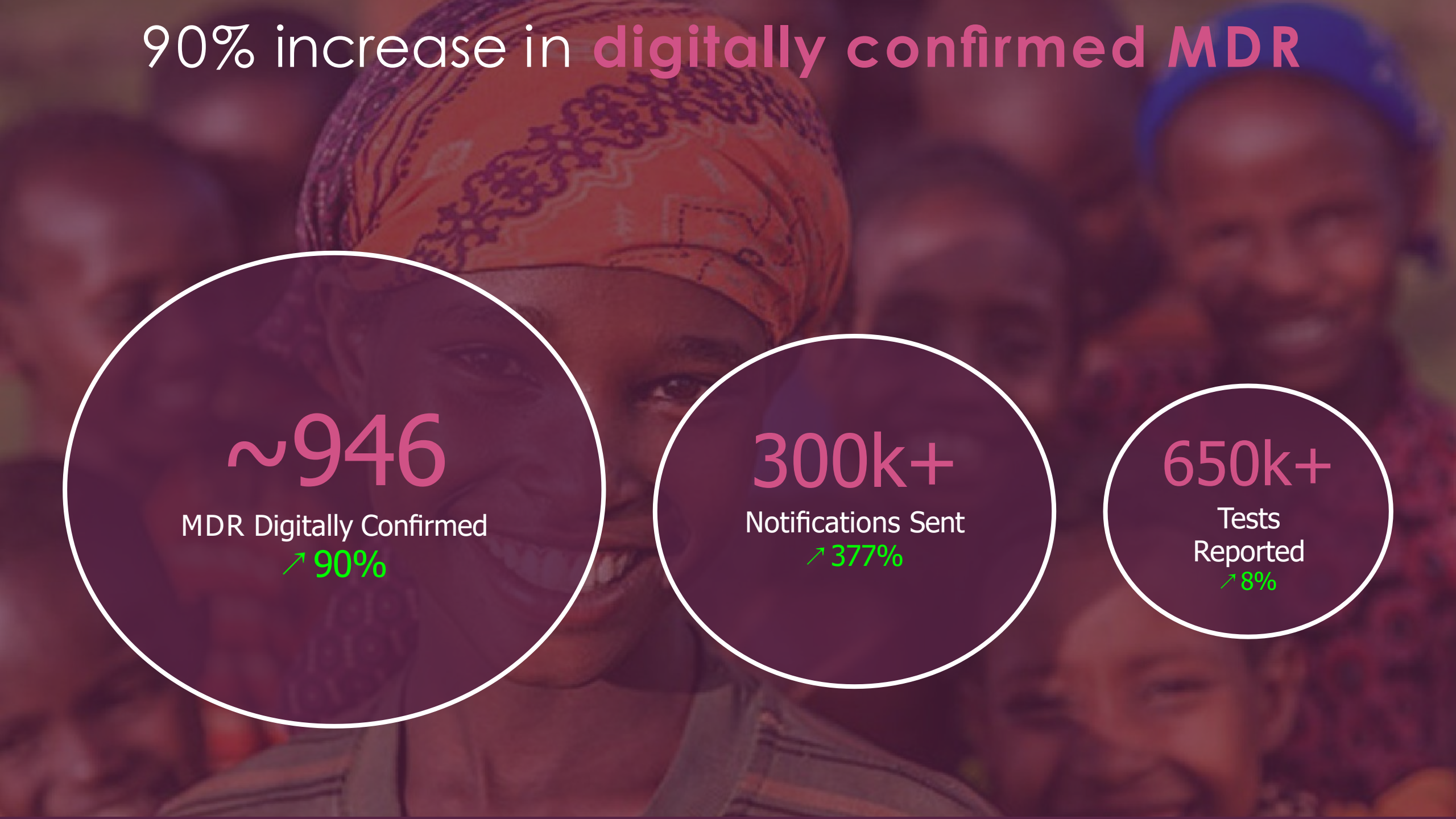
Stop TB

Reach
Innovate to Improve Community Development

Ethiopian Public Health Institute
የኢትዮጵያ የሕብረተሰብ ጤና ኢንስቲትዩት

medX
Interconnecting Health

90% increase in digitally confirmed MDR



~946
MDR Digitally Confirmed
↗ 90%

300k+
Notifications Sent
↗ 377%

650k+
Tests Reported
↗ 8%

53% increase equipment issues reported & resolved

~240
Issues Resolved
↗ 53% vs 2023

~295
Issues Reported
↗ 22%

~644
Machines Connected
↗ 48%

100% country owned

100% locally maintained

85+

System changes made by local software engineers

76%

Reduction in internet cost through negotiation between NTP & local telecom

Join The Sustainable TB Connectivity Revolution

Free Pilot Available

- 6 month Pilot
- <10% of equipment fleet
- 10,000 SMS included

https://medx.international
sales@medx.international
+256774290781

Acknowledgements

- STOPTB
- REACH Ethiopia
- USAID
- Eliminate TB
- MSH
- EPHI

Special Thanks

- Misikir Amare (Project Manager)
- Enanu Hunegnaw (LIS Coordinator)
- Mulugeta Worku (Software Engineer)
- Dinka Fidaku (Project Coordinator)

Stop TB Partnership

Innovations in TB case finding - Implementation experience from Nigeria

Dr Odume Bethrand – Executive Director, KNCV, Nigeria

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PROGRAM INNOVATIONS AND BEST PRACTICES – 2020 to date

- Knowledge Sharing
- CBT
- Tracking and Quality improvement mechanisms
- EWORS
- Commcare App
- Portable Digital Xray (PDX)
- TB LAMP
- XMAP
- Stool Based Xpert test
- Wellness on Keke

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Portable Digital X-ray (PDX) with AI and XMAP

- KNCV Nigeria partnered with Delft to pilot the use of PDX with AI and following a successful pilot, USAID funded the scale up with 7 additional PDX machines under the New Tools Project
- XMAP is a **digital web-based platform** with an automated process for digital x-ray reporting with inbuilt quality assurance system for optimized clinical TB diagnosis
- XMAP eases CXR interpretation and clinical TB diagnosis by specialist radiologists irrespective of the location where the TB services were provided and PDX machines are deployed
- In 2024 alone, **2,678 TB cases** (31.7%) were diagnosed from **8,441** identified presumptive TB with a negative TB Xpert test result.
- These TB cases would have easily been missed within the program without the use of the PDX and XMAP

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Wellness on Wheels (WoW)

The **Wellness on Wheels Truck "WoW"** is a motorized 20 feet container housing an Artificial Intelligence (AI) embedded digital x-ray machine, two 4 modular GeneXpert machines and a level 2 biosafety cabinet.

The WoW truck was introduced by KNCV with support from USAID in 2018, and integrates a CXR with AI, and 2 GeneXpert machines They were designed for mobile TB case finding targeting TB hot spots and hard to reach locations

Beyond testing for TB, the WOW truck is an excellent advocacy tool

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Wellness on Keke (WoK)

The **Wellness on Keke "WoK"** innovation is a local solution, a rickshaw assembled in Nigeria by Innoson Motors. The WoK houses a portable digital x-ray with AI, and TB Lamp or Truenat molecular diagnostic machine, and serves as a one-stop-shop for TB services

The WoK can work in remote rural locations without electricity as it comes with a rechargeable battery and is also solar powered. It is aimed at reducing the cost of WoW since it is smaller and require less resources to achieve comparable results

From May 2023 to June 2024, the WoK has screened **224,379** persons for TB, evaluated **34,155 presumptive TB cases** and diagnosed and diagnosed **2,693 TB cases.**

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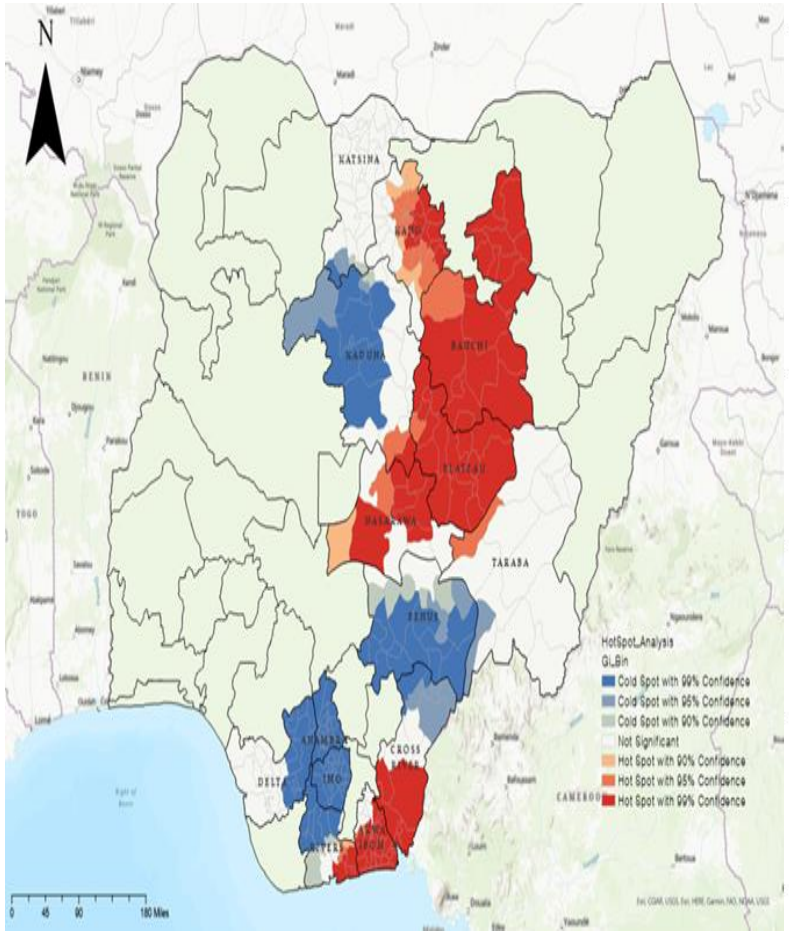
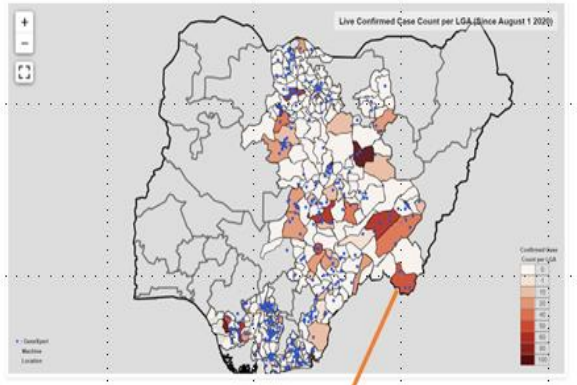
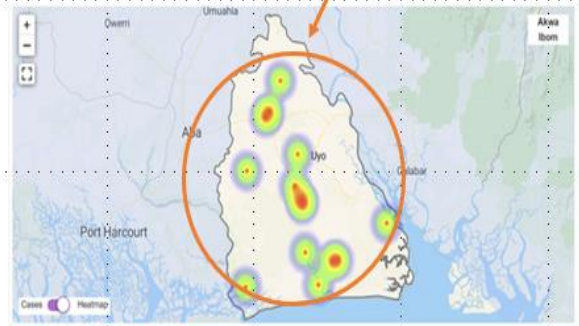
Early Warning Outbreak Recognition System (EWORS)



EWORS: LGA-level hotspots based on TB patient residence





Dynamic hotspot: Ward-level heat map (LGA level)

- Deployed by KNCV Nigeria for Community Active Case Finding under the USAID-funded TB LON Regions 1&2 in 14 states, 4 geo-political zones
- EWORS uses primary TB surveillance data for real-time **TB hotspot heatmaps and AI-based Alarms**
- This provides automated TB hotspot alarm email notification to TB teams with location-specific details; state, LGA and ward
- NTBLCP has now adopted EWORS nationwide for community active TB case-finding

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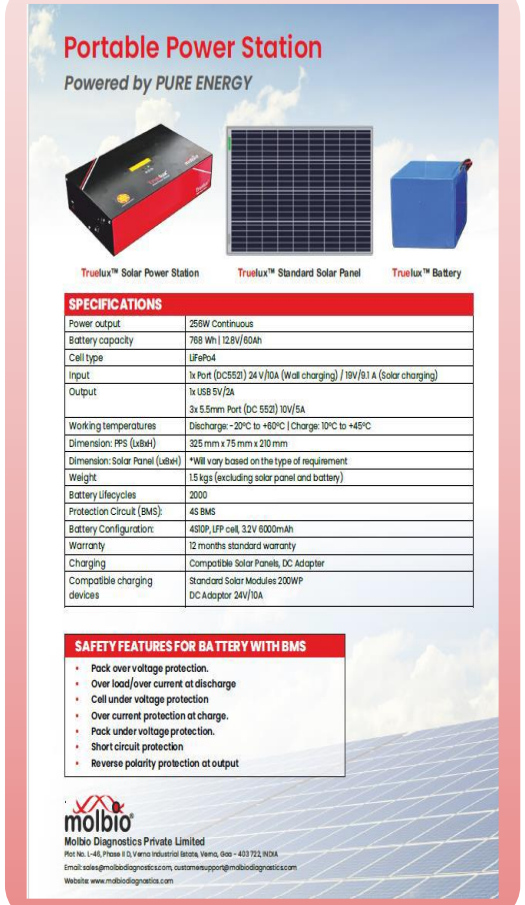
Truenat – battery and solar powered



- Truenat test is a near point-of-care (POC), PCR-based test that detects MTBC and RR-TB with an inbuilt battery system that requires minimal infrastructure without dependency on environmental temperature
- In 2021, Nigeria received 38 Truenat donations from USAID-funded New Tools project
- Due to inadequate supply of electricity to charge the battery, some facilities experience service interruptions
- KNCV Nigeria, in collaboration with Molbio and NTBLCP installed a portable Truelux power package in a Truenat facility in Kano State to provide alternative power

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Stool based GeneXpert test + PrimeStore

Nigeria commenced the implementation of **stool-based Xpert in 2020** in all GeneXpert laboratories nationwide

The stool test SOP stipulated that samples should be transported in cold chain and processed immediately in the lab preferably **within 3 hours** of collection for optimal results

KNCV Nigeria has recorded an **average TB yield of 5%** from the stool Xpert testing contributing **4,548 (18.4%) of 24,682** pediatric TB cases diagnosed from January 2021 to September 2024

Most rural settings lack the cold chain transportation system, and it can take between 1 to 5 days for stool specimens to get to the lab which **contributes to the low TB yield**

PrimeStore MTM is a transport medium designed and optimized for molecular testing allowing pathogenic samples to be collected, transported, and processed safely and efficiently

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The future - Oral swab - Pulse life, Multiplex testing for TB DST and other diseases

- The Pluslife Mini Dock platform is a rapid molecular point-of-care diagnostic system that uses isothermal amplification technology
- The product is portable, and user friendly with short Turn-around-time of 35 minutes
- It is a multiplex testing platform with capacity to test for TB, Influenza virus, Respiratory syncytial virus, HPV, Trichomonas, Strep, Hepatitis C, Monkeypox, TB, Dengue, MRSA etc
- It has potentials for detecting XDR-TB and can be used for sputum and tongue swab specimens
- KNCV plans to evaluate the performance of Pluslife in a routine program setting in Nigeria

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Conclusion

Our innovations were built on a strong partnership and collaboration with the NTP, contributed to an improved TB case finding and strengthened NTP TB program guidelines and policies

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Stop TB Partnership

From Implementation to Policy: Lessons from the Introducing New Tools Project (iNTP)

Dr. Lorraine Mugambi-Nyaboga - Centre for Health Solutions - Kenya (CHS)

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38th BOARD MEETING

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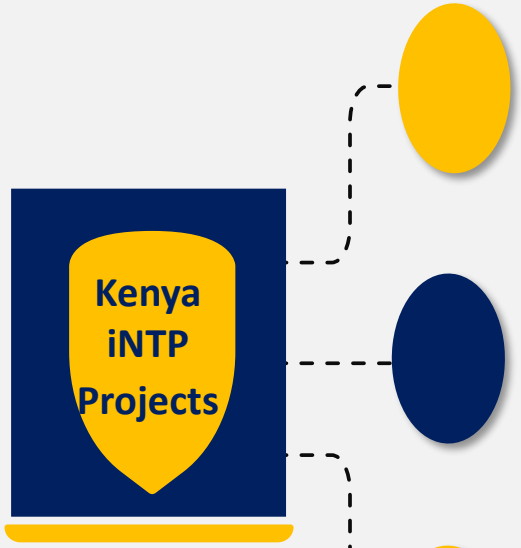
Background

The Introducing New Tools Project (iNTP)-Kenya with funding from USAID and STOP TB Partnership (2021-2023)



Digital Adherence Technology (DAT)
2 Counties

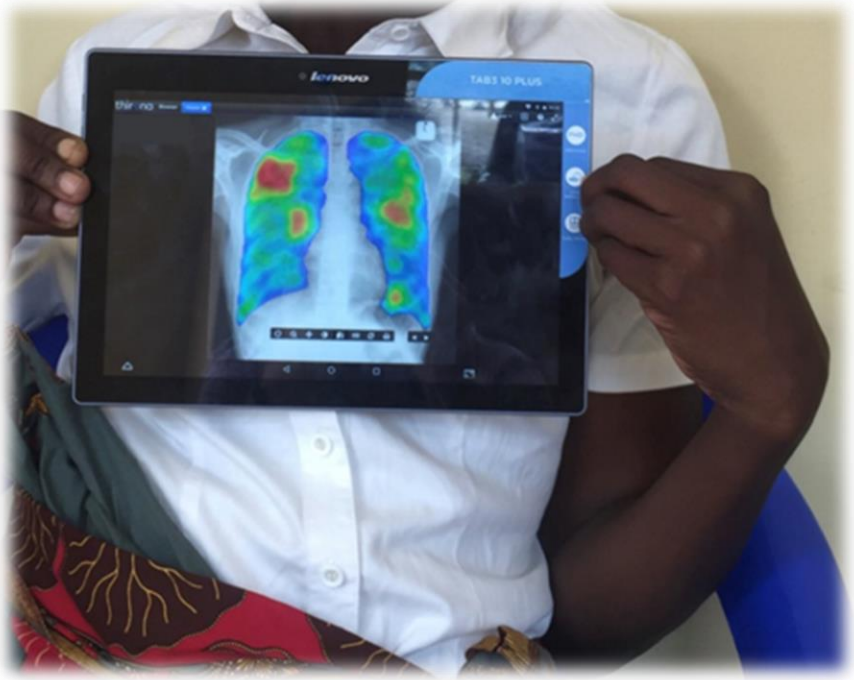
TPT scale up (3RH/3HP)-*47 counties*

TIBULIMS – Diagnostic connectivity project-*national*

Diagnostics

1. **Trunat**-*33 counties*
2. **IGRA**-*2 counties*
3. **AI-enabled Digital CXR** -*8 facilities*

Implementing AI-enabled Digital Chest Xrays in Kenya

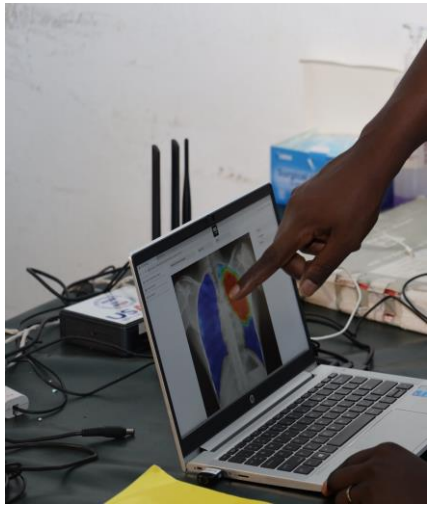


Digital Chest X-ray and CAD4TB

Preferred Partner for Health Solutions

Prioritized Settings/populations

- Hard to Reach (outreach settings)
- Faith Based Organization
- Fisher folk community
- Immigrant/Refugee polulations population
- Urban Informal settlements
- Urban- setting IVDU
- High TB/HIV settings



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TB ARC II
Accelerated Response and Care

PEPFAR

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Centre for Health Solutions - Kenya
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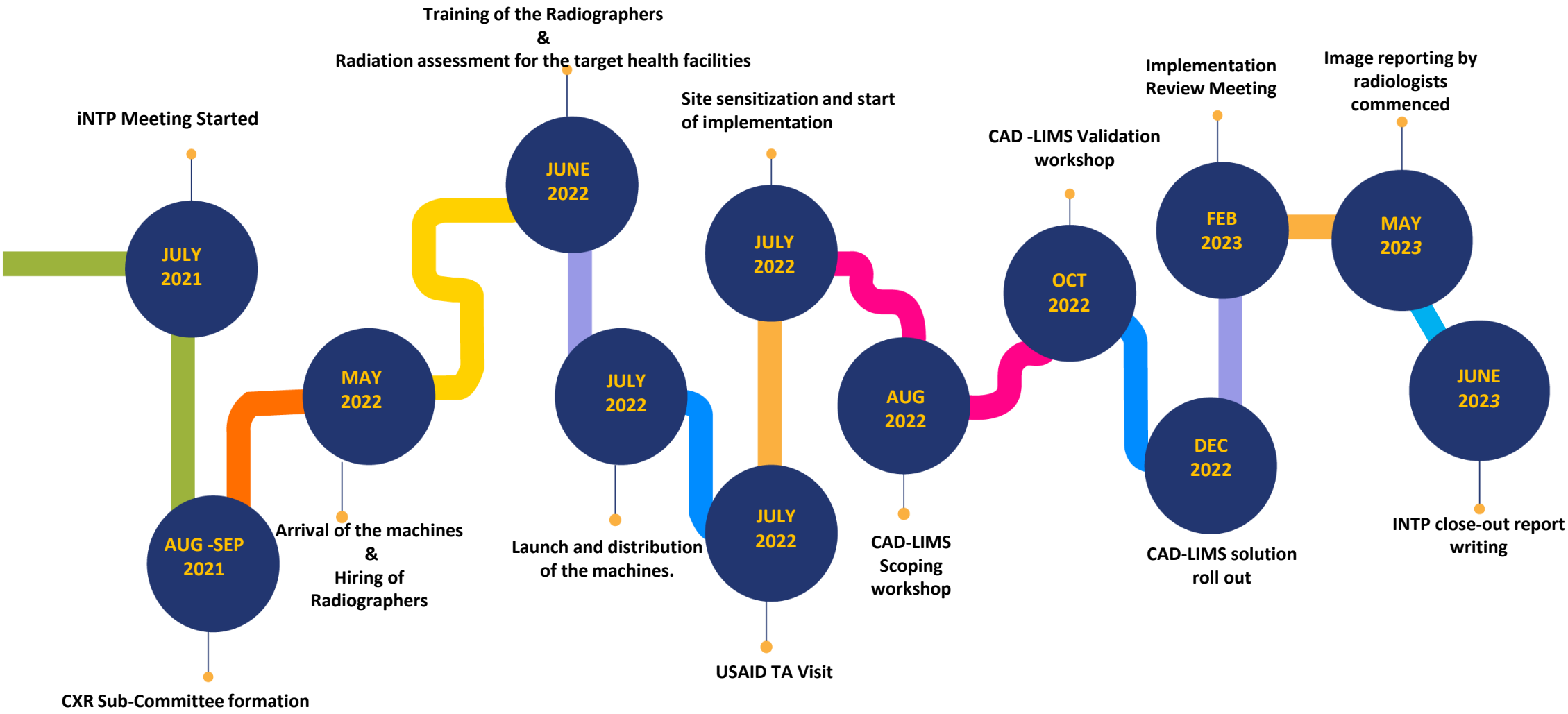
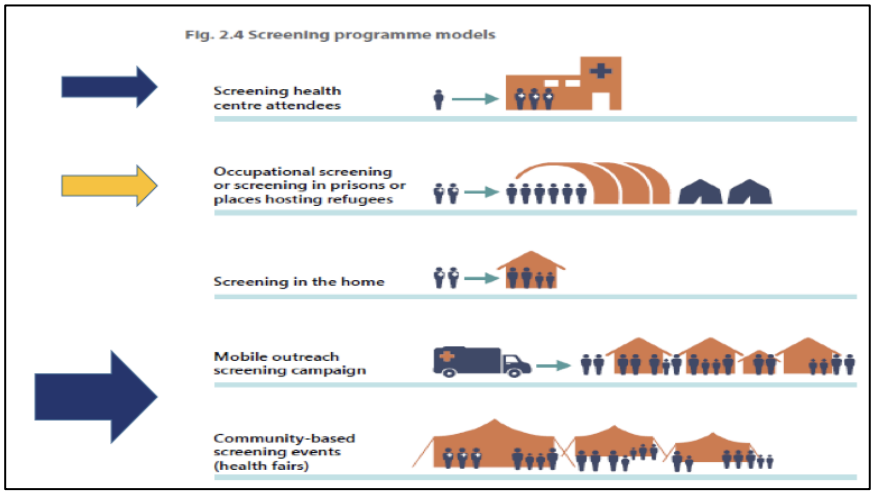
Key Processes



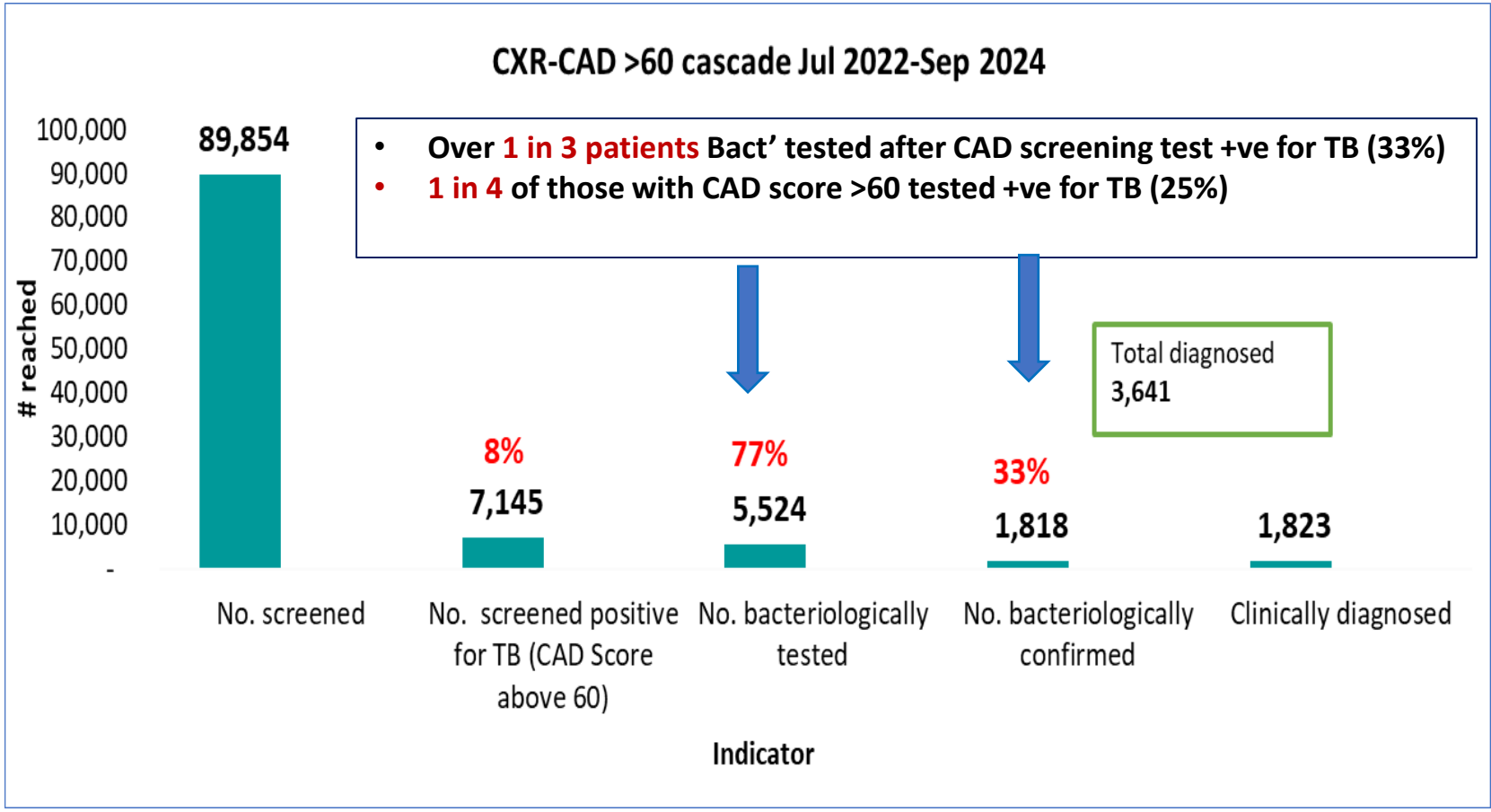
Key Results



Comparing yield from Community Outreaches Vs Facilities

CAD Score	Outreaches n (%)	Facility n (%)	P value*
		6268	
CAD score <60	28429 (95.4%)	(86.5%)	<0.001
CAD score ≥60	1370 (4.6%)	980 (13.5%)	
Total Screened	29799	7248	

*Chi-square test



- Over 1 in 3 patients Bact' tested after CAD screening test +ve for TB (33%)
- 1 in 4 of those with CAD score >60 tested +ve for TB (25%)

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Impact on Policy

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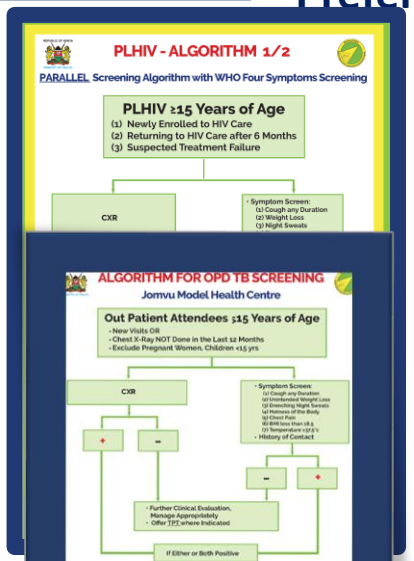
Lessons Learnt and Impact on Policy

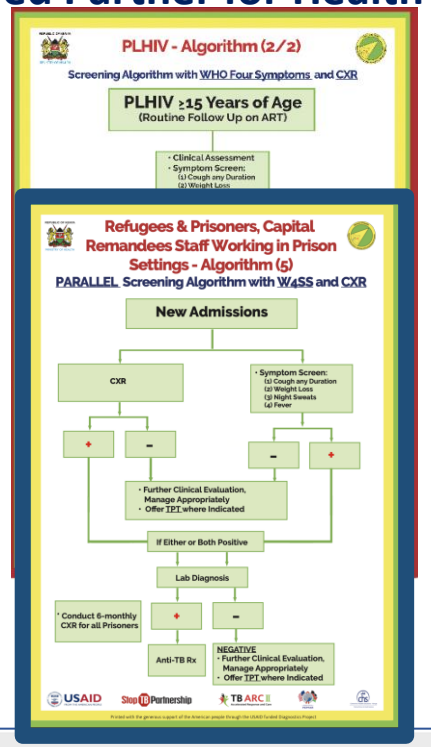
- Defining Algorithms for different populations (algorithms are context specific)

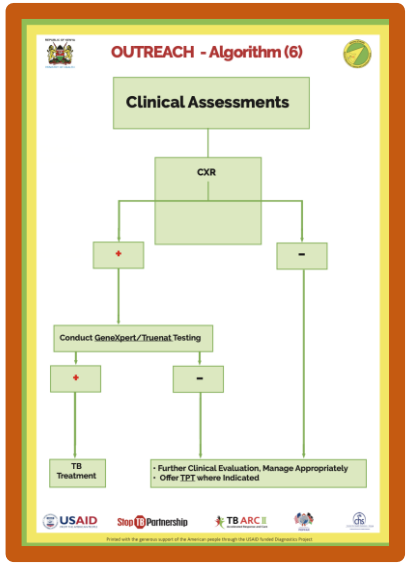
- Integrating with **MOH surveillance systems**, is useful to provide collated data to inform policy and planning

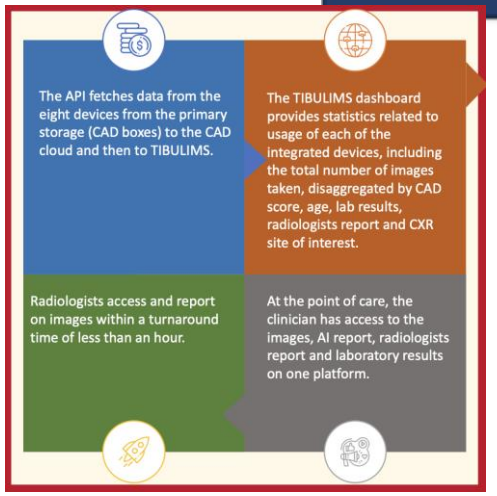
- Integrating dCXR systems to **TIBULIMS (diagnostic connectivity platform)** through an Artificial Programming Interface (API)
  - device performance visibility,
  - access of images for reporting
  - generation of reports

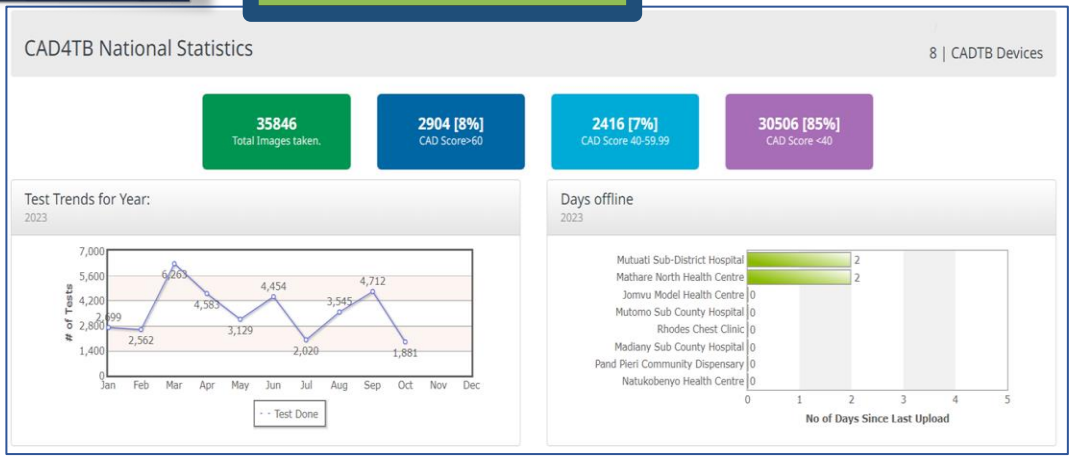
- The **clinical diagnostic interface**-minimizing leakages in cascade: The critical role of linkage assistants.











Lessons Learnt and Impact on Policy

Impact on **Case finding** (up to **62% increase** in some facilities)

Diagnostic efficiency (>30%) of those dCXR+VE tested positive: The **positive yield on bacteriological testing** for those with high threshold scores is high

Roll out of the CAD-CXR screening paired with an mWRD is a **high yield intervention**.

If not TB then what? **Integrating TB and other Lung Diseases**;

-CXR picks additional **abnormalities other than TB**

Prevention to End TB: The correlation between **LTBI testing and TPT uptake**

Global Fund **scale up** considerations;

-Availability of an **in-country agent to reduce** the TAT for replacement of parts.

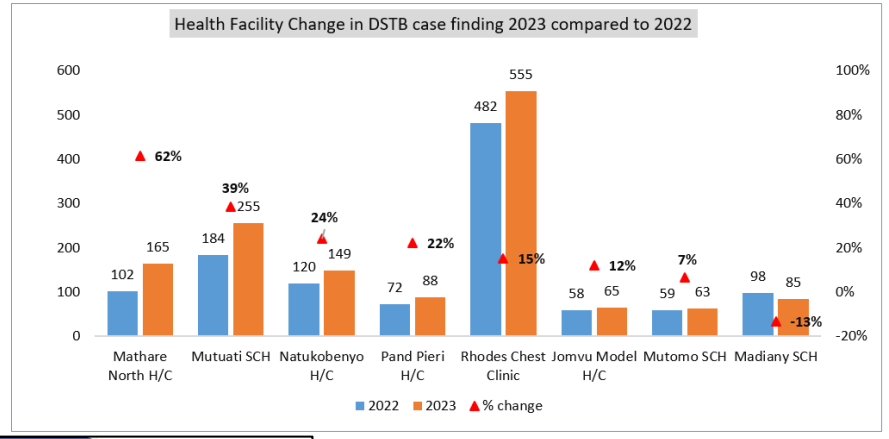
-Engagement of **sub-national leadership** for ongoing support supervision necessary for **sustainability**.

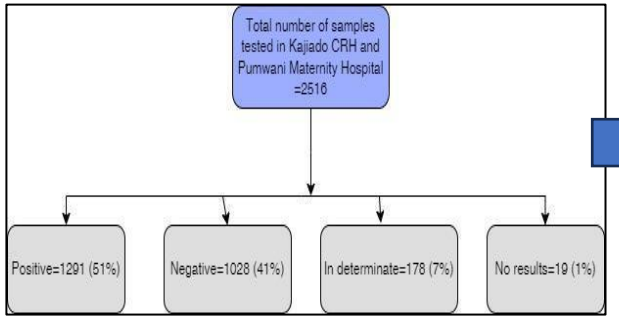
-For real impact, minimum of **1 dCXR/Subcounty paired with a mWRD**

-X ray specifications, portability, software capabilities, conformity with regulatory processes

-Sustainability at sub-national levels

-Radiologists and Quality Control; Radiologists added value for CAD4TB scores **between 40-60**





Among those tested IGRA +ve, TPT uptake was **100%**

Table 2 Prevalence of potentially relevant radiological

Radiological findings	Prevalence n=1123	Prevalence %, 95% CI
Cardiomegaly	259	23.1% (20.6% to 25.6%)
Cardiomegaly with heart failure	17	1.5% (0.9% to 2.4%)
Suspected cardiac failure	21	1.9% (1.2% to 2.8%)
Mild/moderate post-TB lung disease (*Old/latent TB with=<2 lobe damage*)	85	7.6% (6.1% to 9.3%)
Non-specific opacification/interstitial pattern	52	4.6% (3.5% to 6.0%)
Active PTB	40	3.6% (2.6% to 4.8%)
Suspected emphysema/COPD	36	3.2% (2.3% to 4.4%)
Severe post-TB lung disease (*Bronchiectasis and or destroyed lung*)	16	1.4% (0.8% to 2.3%)
Mediastinal mass (excluding goitre/ TB)	9	0.8% (0.4% to 1.5%)

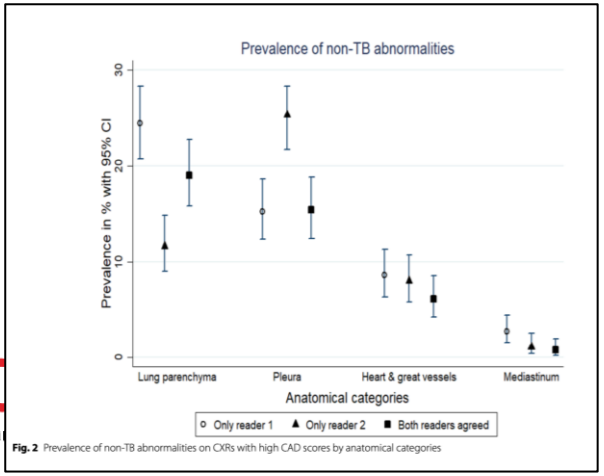


Fig. 2 Prevalence of non-TB abnormalities on CXRs with high CAD scores by anatomical categories

We propose a tiered screening approach that integrates AI-dCXR and symptomatic screening, that pairs dCXR screening with mWRDs, and prioritizes the management of those screened +ve but **do not** have TB…..for holistic, person-centric care

Acknowledgement

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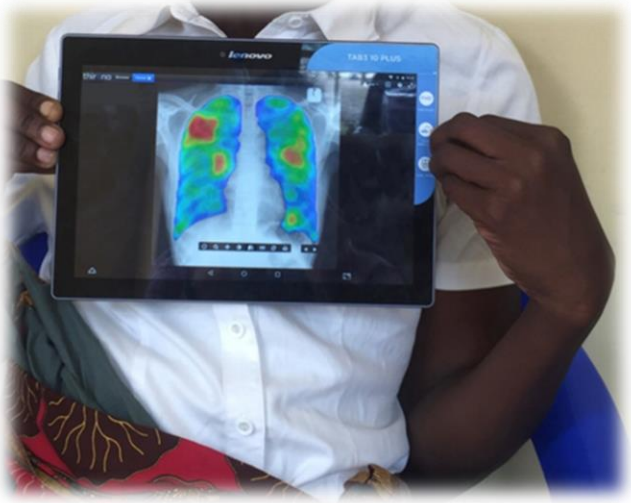

Asante Sana!