Xpert MTB/RIF Implementation: Results, Impact and Lessons Learned for the Next Generation of Tests

Advanced TB Diagnostic Research

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Montreal

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Stop TB Partnership

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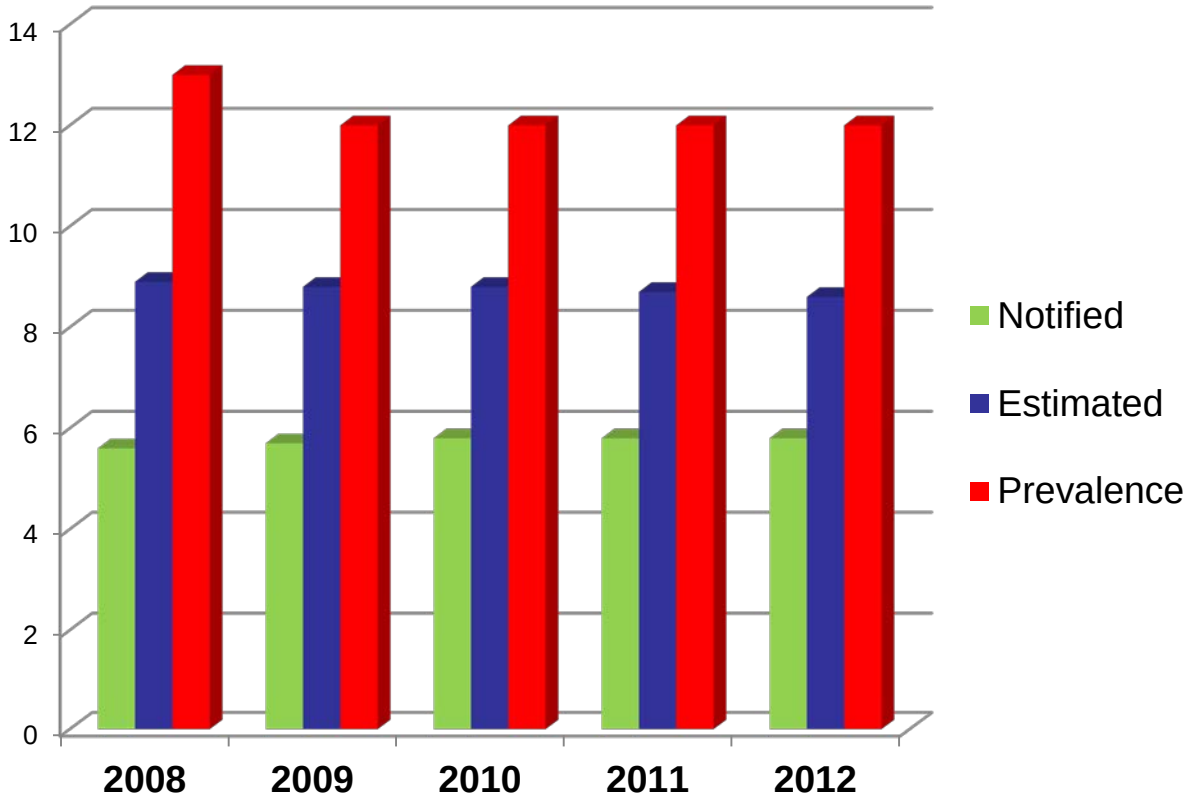
Outline

- Background on TB REACH
- Rationale for using Xpert MTB/RIF
- Xpert in TBR-supported projects
- Impact of Xpert on TB case detection
- M&E and DR-TB
- Conclusions

Why TB REACH?

New and Relapse TB Case Notifications Since 2008

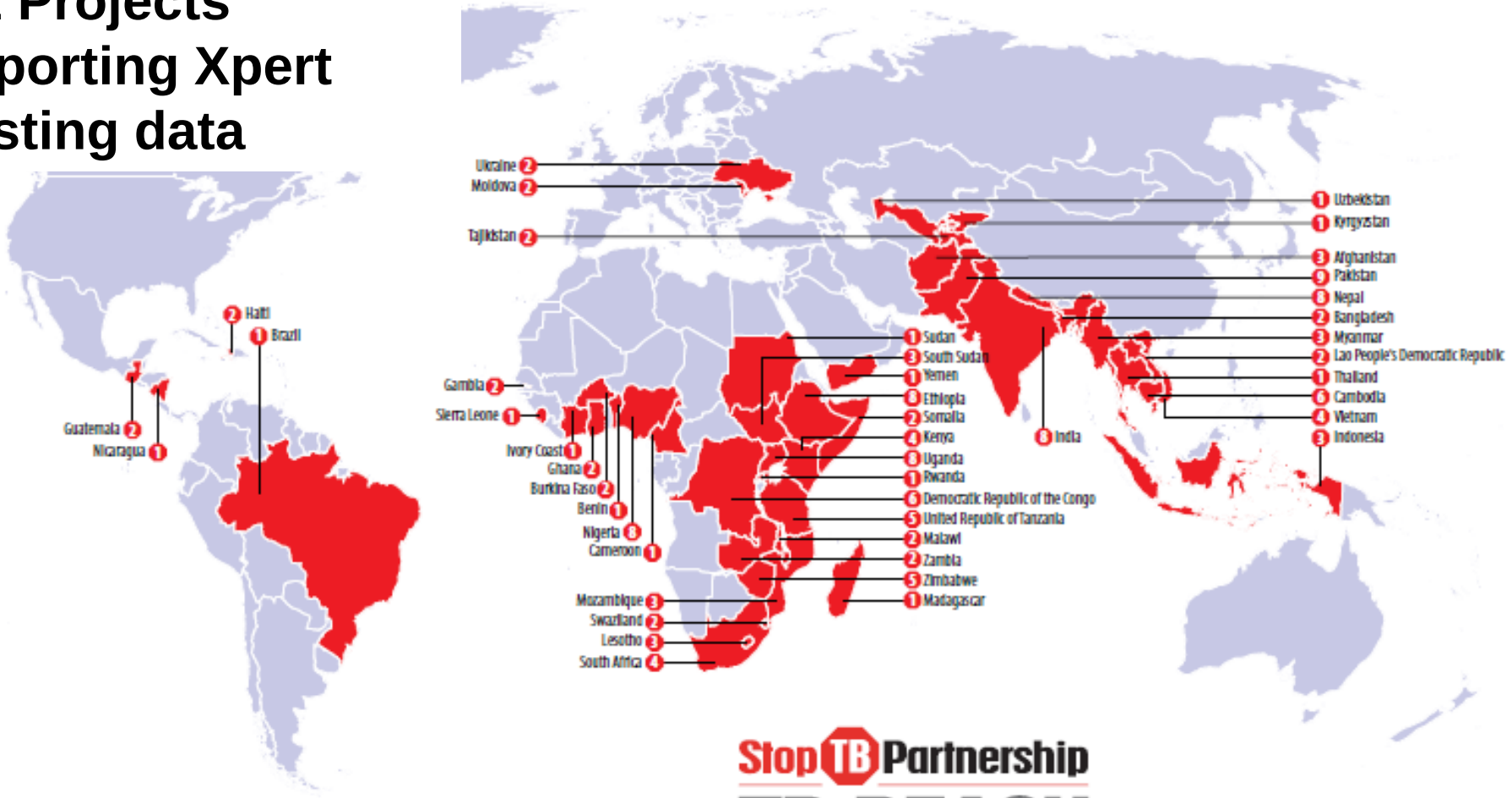


TB REACH

- Promotes **early** and **increased** TB case detection using **innovative** approaches
  - Especially in poor, underserved & vulnerable
- Supported by Canada (UNITAID for Waves 3 & 4)
- Administered by the Stop TB Partnership
- Provides grants to projects selected on a competitive basis
- External M&E using project and NTP data
- Provides programmatic evidence introducing new approaches in different settings

4 Funding Waves 46 Countries 142 Grants and over 90 Million USD Committed

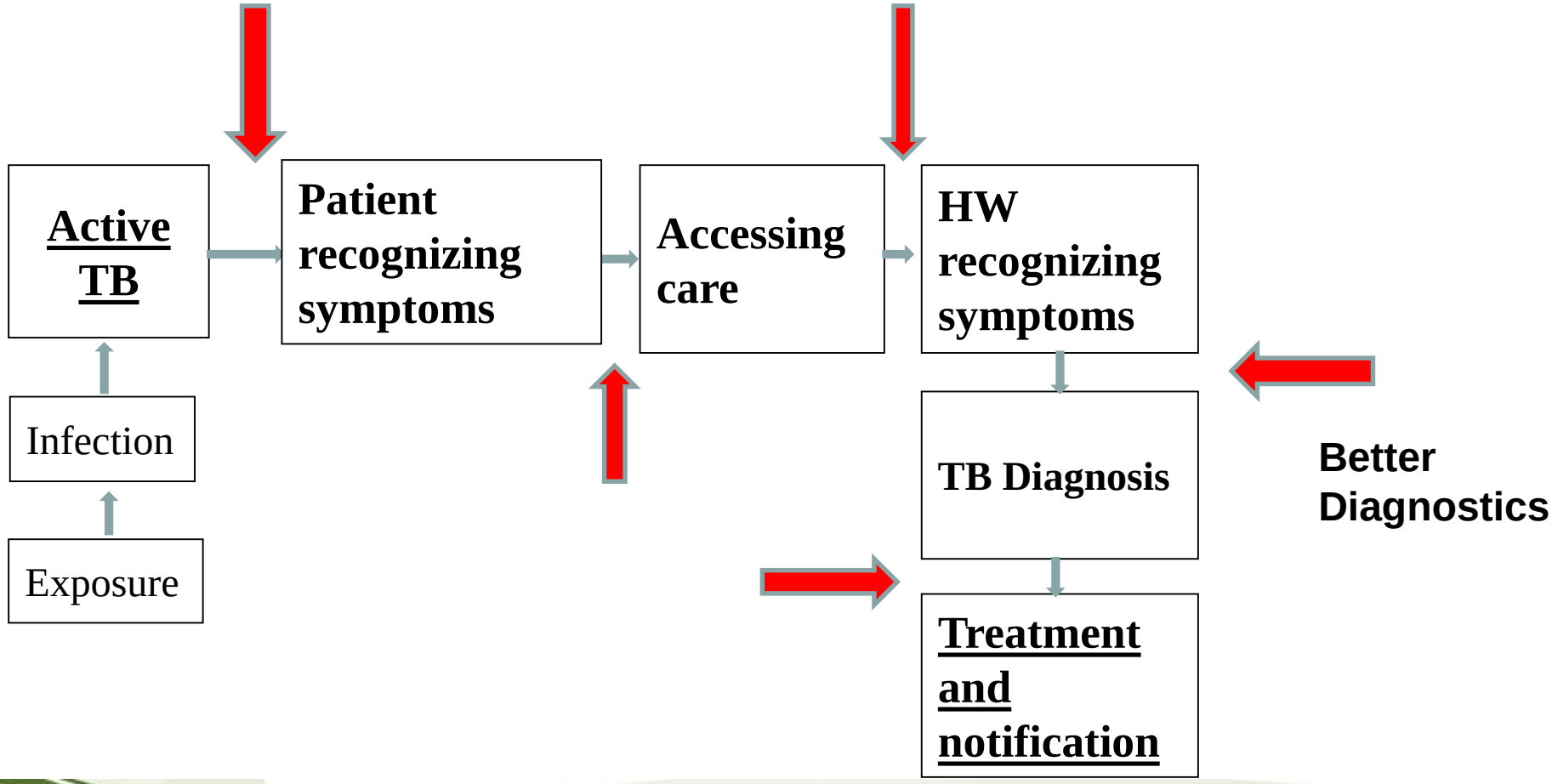
51 Projects reporting Xpert testing data



Stop TB Partnership

TB REACH

Reaching the Missed Cases



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PLOS ONE

A Multi-Site Evaluation of Innovative Approaches to Increase Tuberculosis Case Notification: Summary Results

Jacob Creswell[1]*, Suvanand Sahu[1], Lucie Blok[2], Mirjam I. Bakker[3], Robert Stevens[4], Lucica Ditiu[1]

1 Stop TB Partnership, Geneva, Switzerland, 2 Royal Tropical Institute (KIT), Health, Amsterdam, The Netherlands, 3 Royal Tropical Institute (KIT) Biomedical Research, Amsterdam, Netherlands, 4 HLSP, London, England

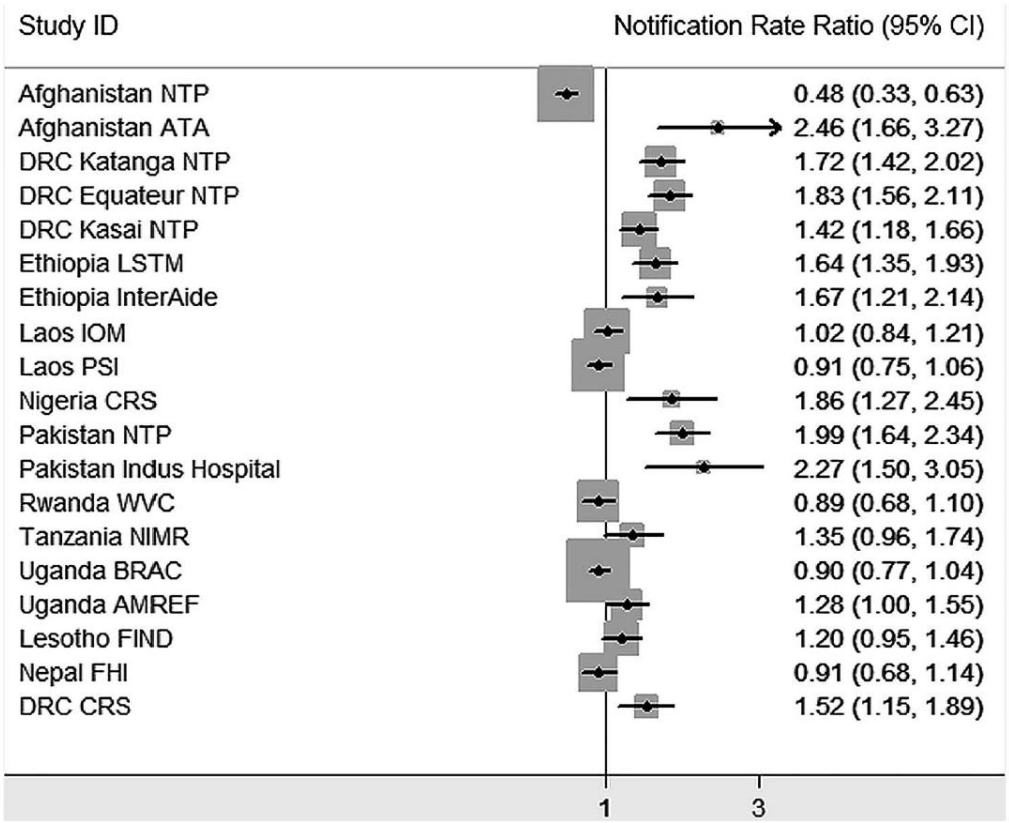


Figure 1. TB REACH Wave 1 forest plot of the notification rate ratios for projects with control populations.

SS+TB increased 36.9% in intervention areas and decreased 3.6% in control populations.

Slightly higher number of additional cases for all forms TB

Transforming the Fight
TOWARDS ELIMINATION OF TUBERCULOSIS

Using Xpert to Improve Case Detection

Xpert General Results

- Data from 51 projects
- Data reported to TB REACH through March 31, 2014
- **386,263 tests performed**
- Programmatic evidence in a variety of settings

BMC Infectious Diseases 2014, **14**:2

Results from early programmatic implementation of Xpert MTB/RIF testing in nine countries

Jacob Creswell[1*], Andrew J Codlin[2], Emmanuel Andre[3], Mark A Micek[4,5], Ahmed Bedru[6], E Jane Carter[7], Rajendra-Prasad Yadav[8], Andrei Mosneaga[9], Bishwa Rai[10], Sayera Banu[11], Miranda Brouwer[12], Lucie Blok[13], Suvanand Sahu[1] and Lucica Ditiu[1]

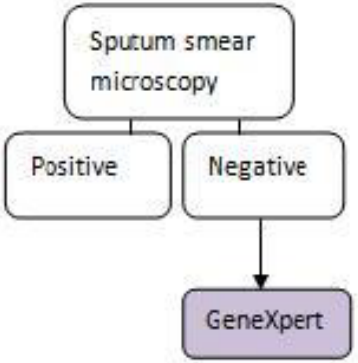
Xpert Placement

- Mobile vans
- Chest camps
- Private labs
- Prisons
- ART centers
- Health centers
- District hospitals
- Reference labs
- Private clincs

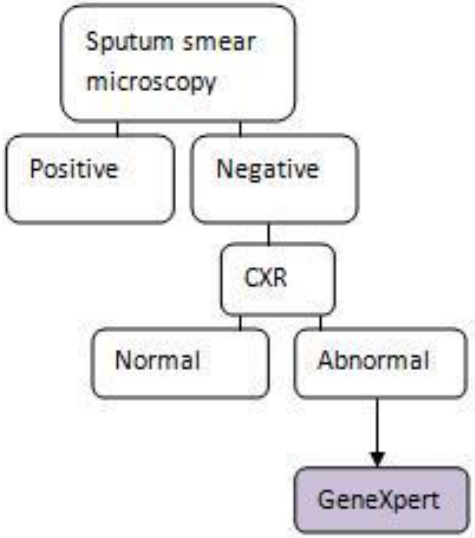
Testing Algorithms

- All with symptoms
- All HIV+
- All SS- (some using LED Mx)
- SS- with suggestive CXR
- **SS- and HIV+**
- All with abnormal/suggestive CXR
- Seriously ill, hospitalized

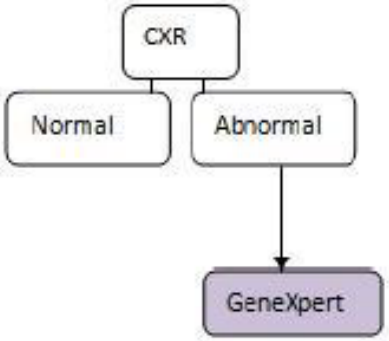
Algorithm one



Algorithm two



Algorithm three



Algorithm four

- Maximize throughput?
- Increase % yield?
- Conserve tests?
- Improve Turn-Around-Time?
- Detect Rif Res?
- POC test?

Xpert Test Results

- Highly heterogeneous
- Detected 48,705 MTB+ individuals
- Overall Crude Positivity 12.6%
- Rif Resistant 6,215 (1.7% of individuals tested)
  - Range per quarter (0-14.2%) - Median 0.9%
- Failed test Rate 7.9%
  - Decreasing (5.9% in last quarter) but variable
  - Range - project/quarterly (1.2-28.4%) - Median 6.9%

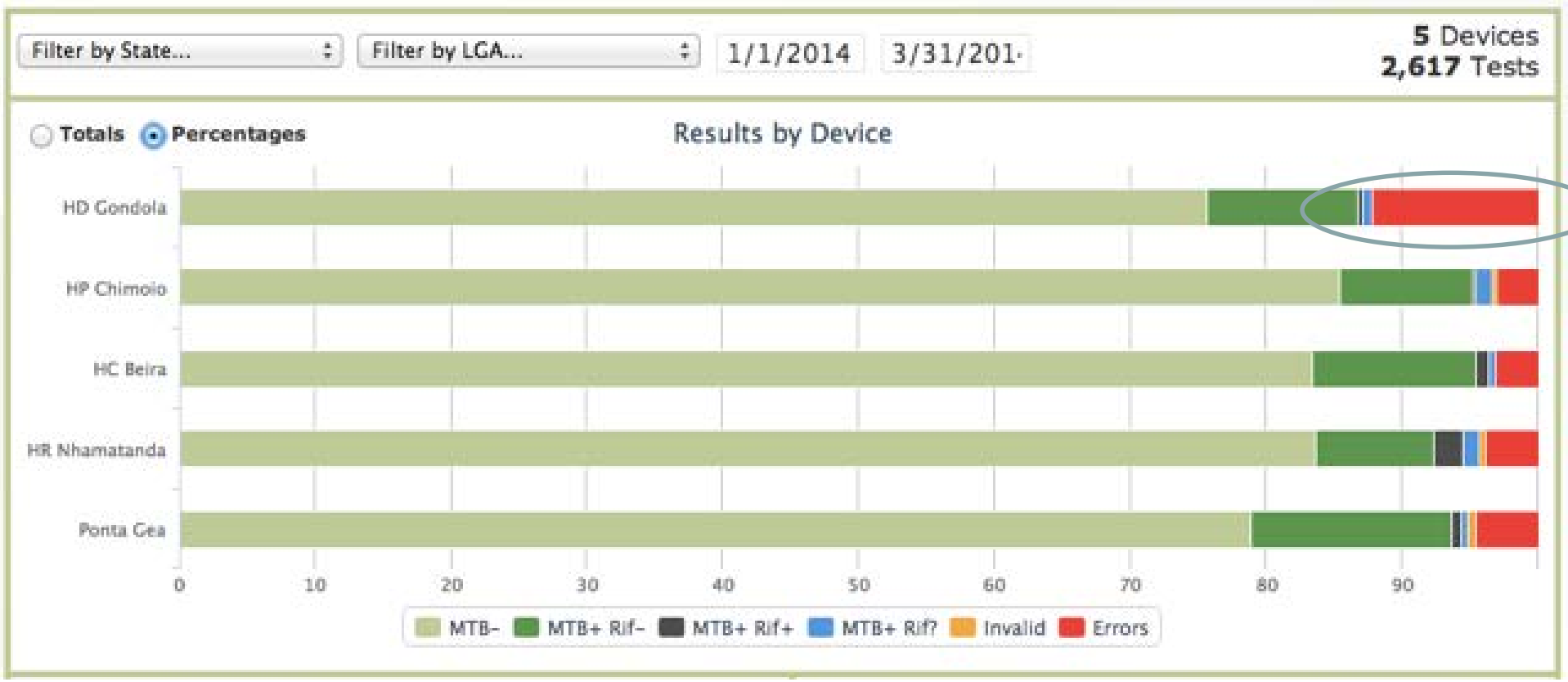
Cartridges and Calibration

- Biggest problem so far is expired tests
  - Restrictive algorithms, poor planning
  - Customs clearance – and storage
  - Sharing tests among sites is being done
- Failed tests have a large cost, tracking user stats and error codes is critical, sputum quality
- Calibration compliance has improved but still not 100%
- Vast variations in module failure (5-100%)
  - Depends on infrastructure, location, dust, electricity?

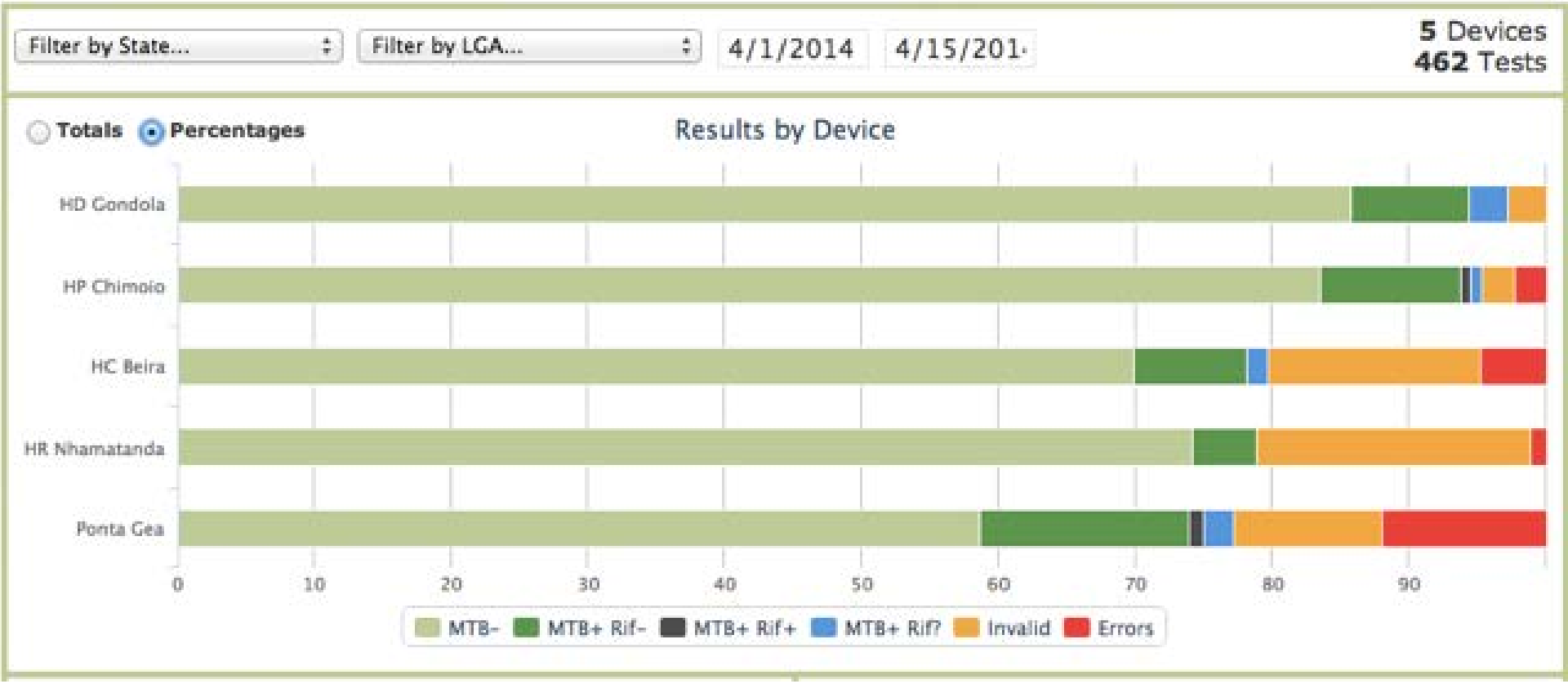
Automated Reporting

- Test with a computer
- Delivers rifampicin resistance results
- Increasingly decentralized
- Many partners supporting
- Short shelf life of cartridges
- Potential – and need for networked machines and reporting
- Current Cepheid system is difficult (terrible) for informing programs

Automated Reporting



What Happened?



Recoding and Reporting

- As more machines are placed in service, recording and reporting becomes more challenging
- Paper systems are cumbersome, slow and error-prone
- Automated reporting systems are needed – with useful data
- Important to link test/lab and clinical data

Xpert Impact on TB Notifications

Two Case Studies

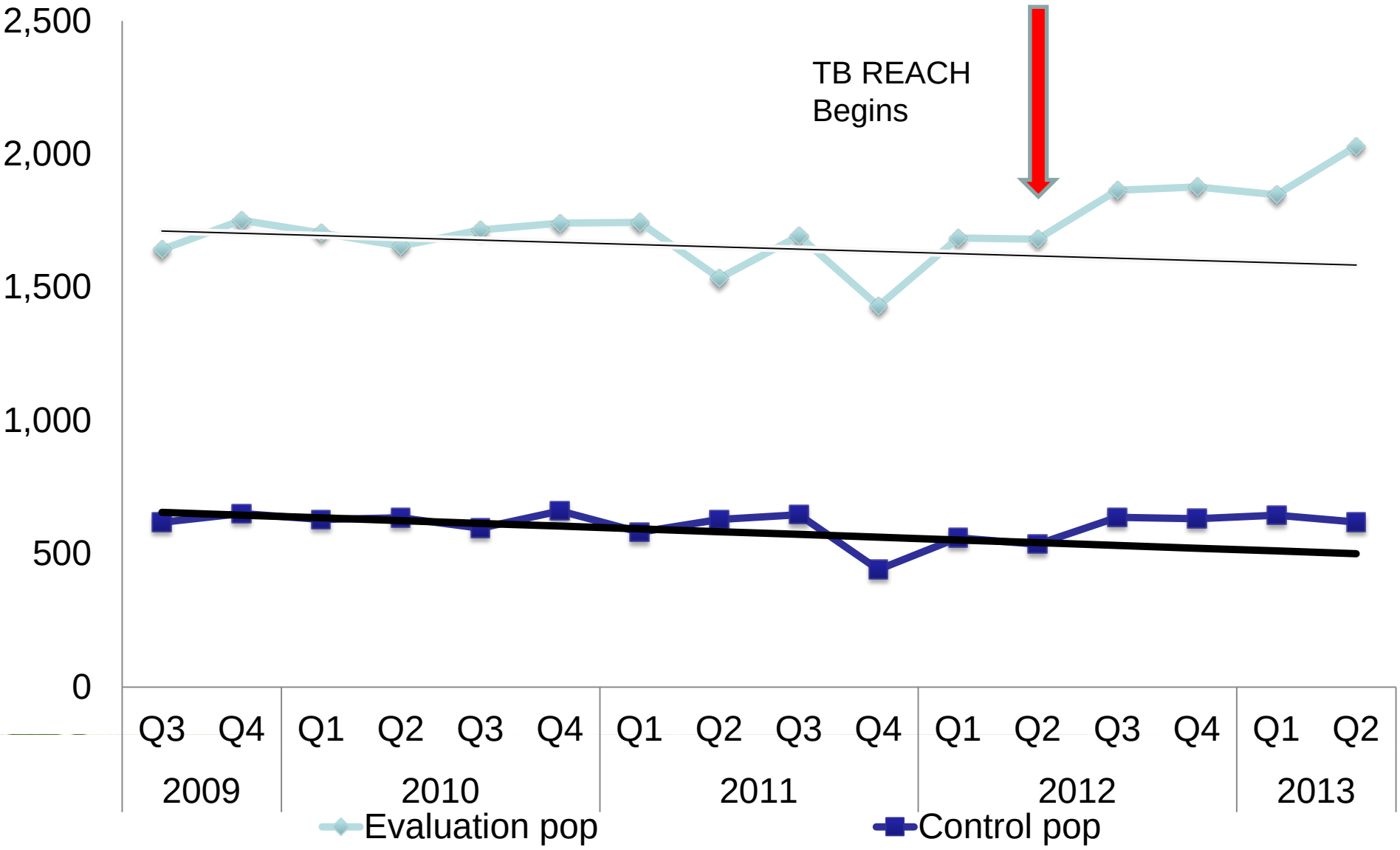
DRC

- Covering 15 facilities and 7 more with referrals
- Algorithm: 3 SSM Neg -> Xpert

Nepal

- Covering 9 districts and 9 more with referrals
- Algorithm: 3 SSM Neg -> CXR Sug -> Xpert

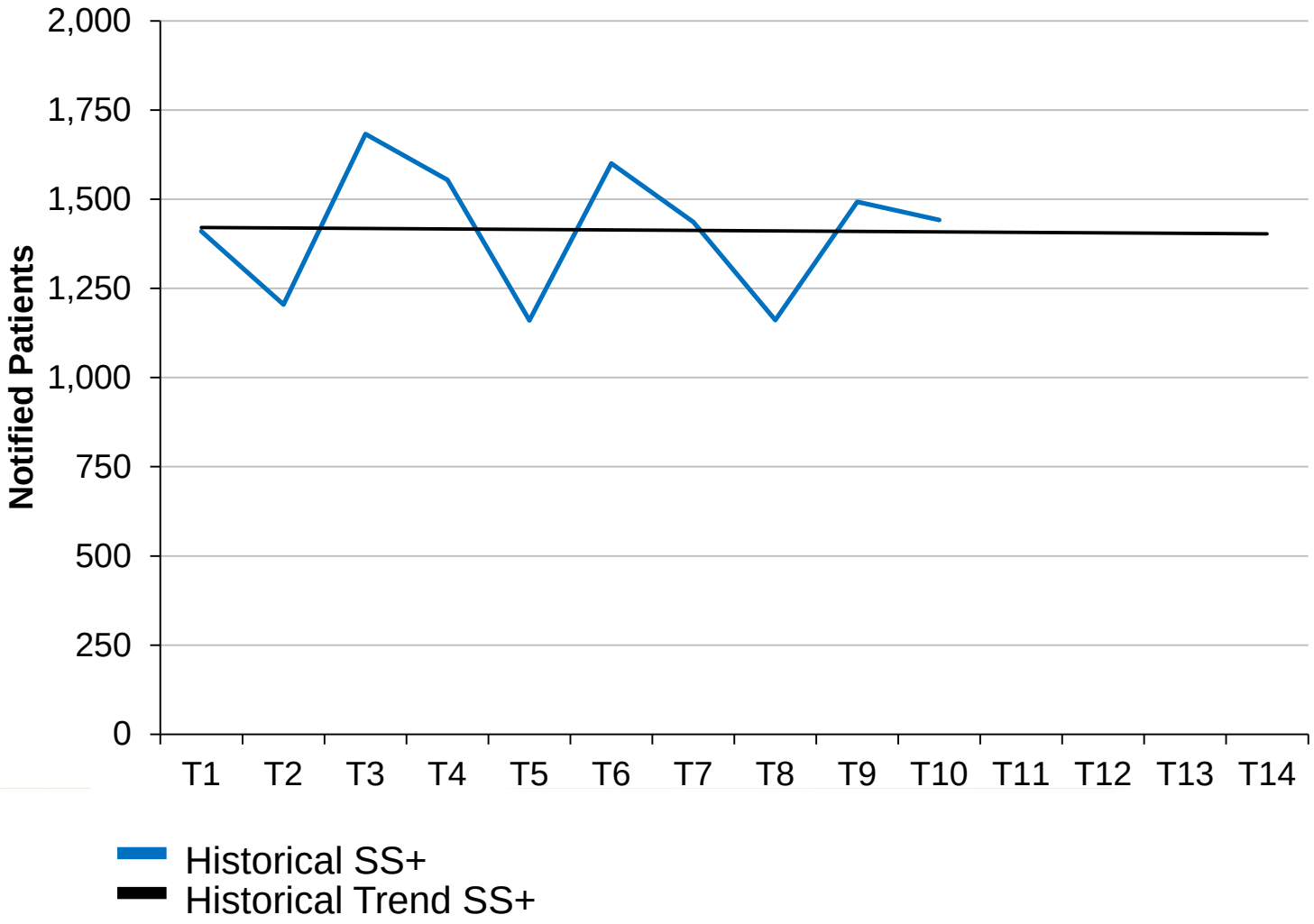
Quarterly B+ Case Notifications with Xpert MTB/RIF Introduction, Kinshasa



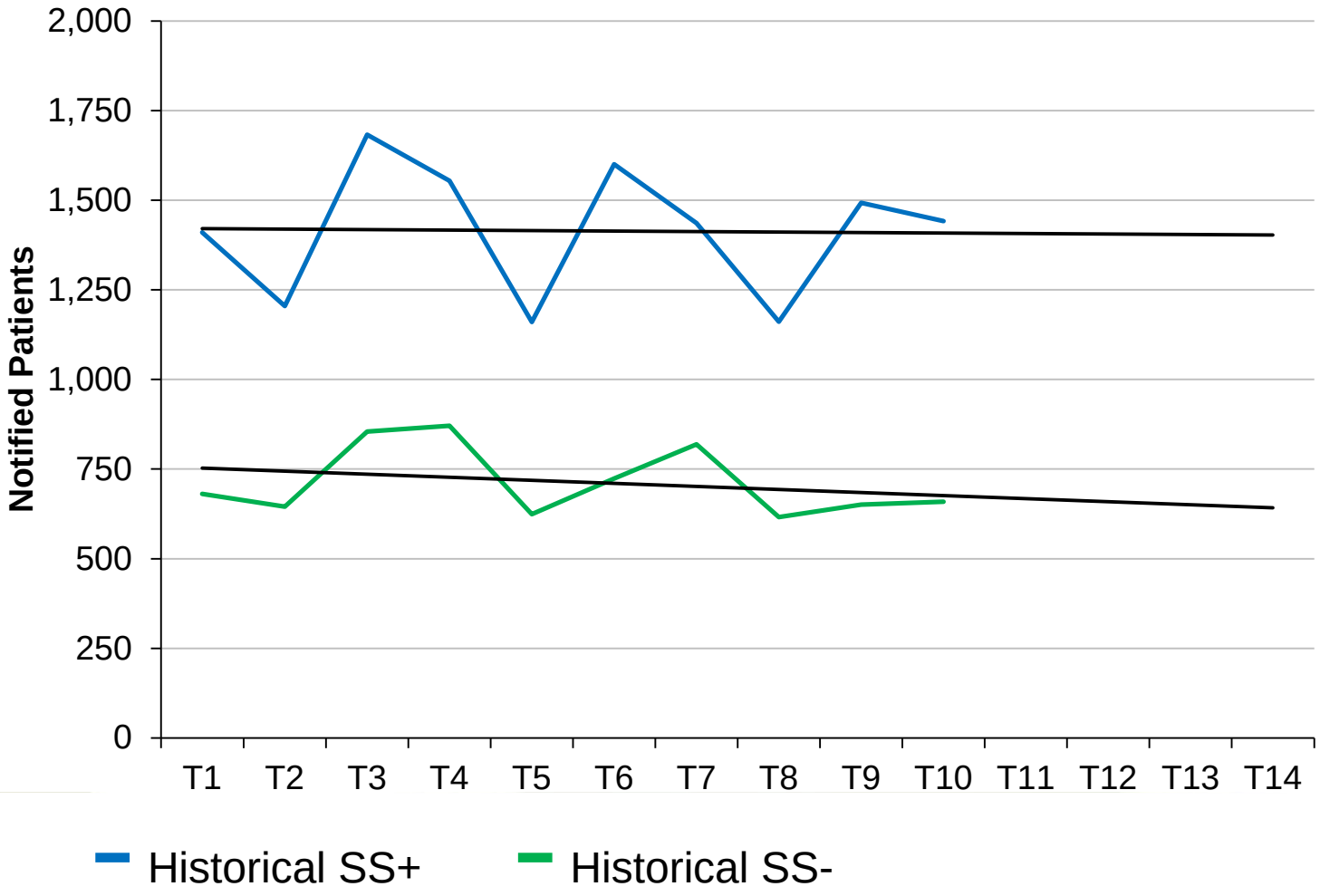
DRC and Xpert

- ~45% of people eligible were tested with Xpert
- 8,770 Xpert tests – 1,254 MTB+
  - 140 Rif+
- 24% improvement on B+ cases on treatment
- 51% of results were returned during the same day
- ~25% of patients received results 3 or more days after sputum collection
- Intervention area All forms increased 6% while in the control areas increased 13%

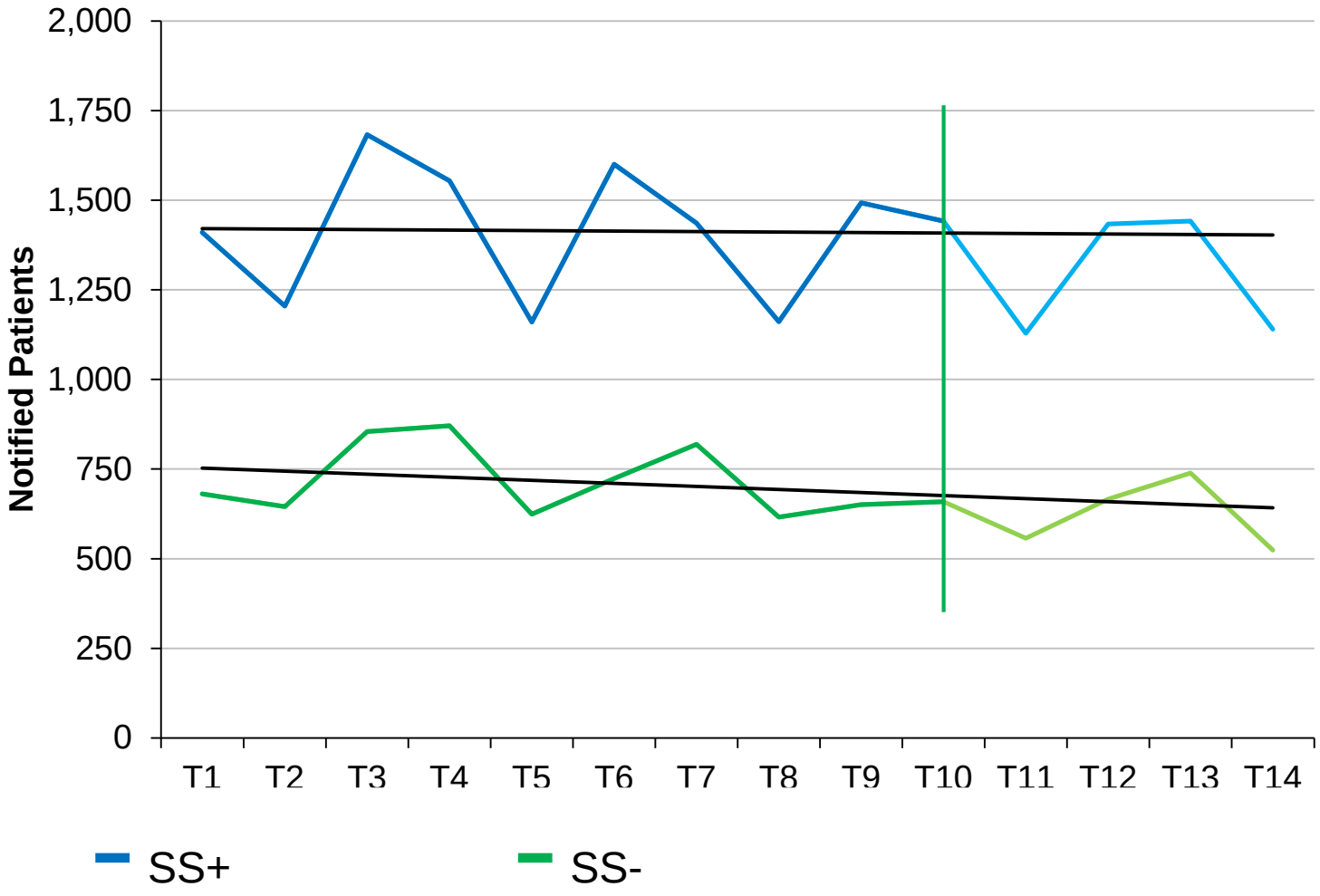
Nepal: Historical pTB Notifications



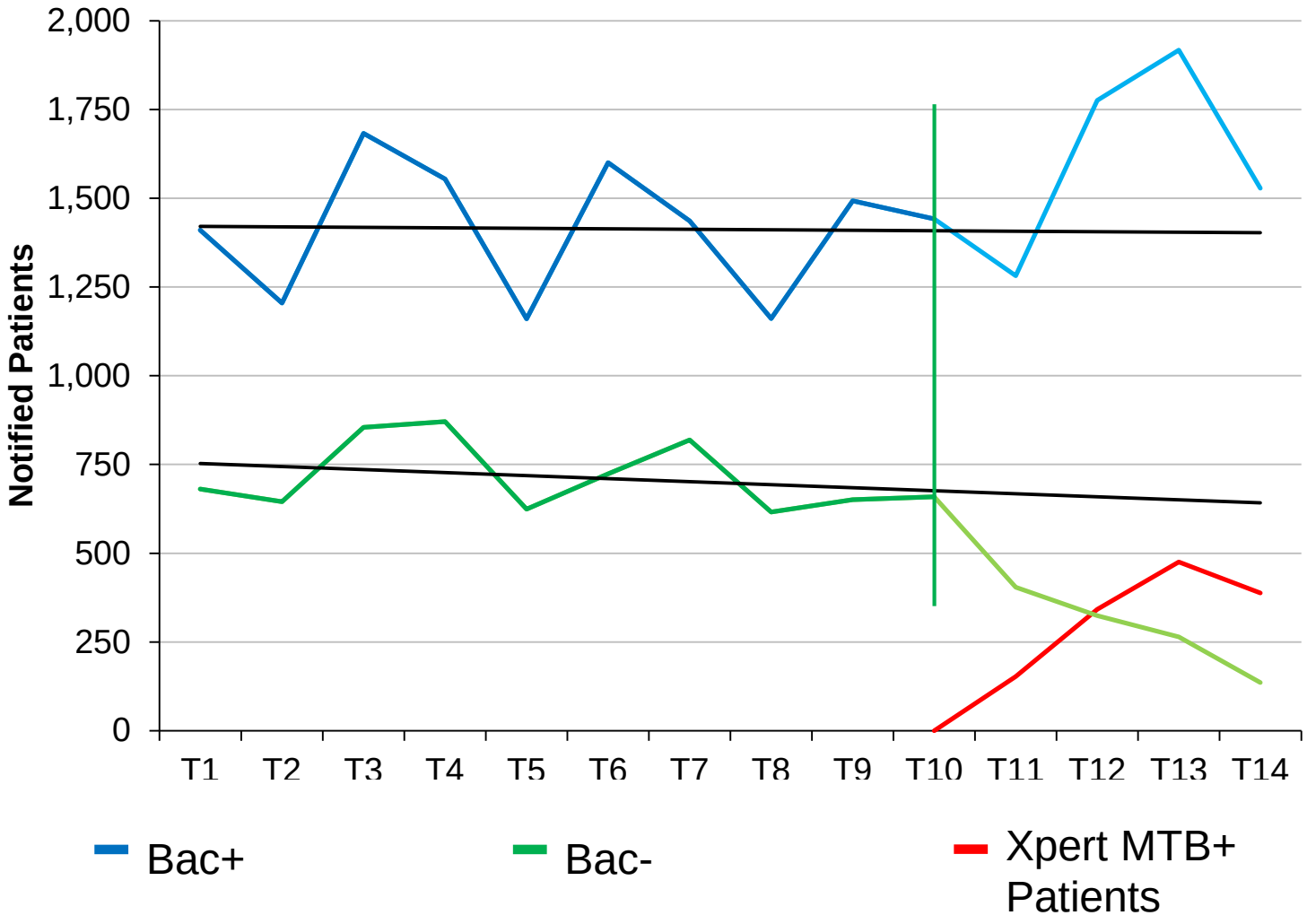
Historical pTB Notifications



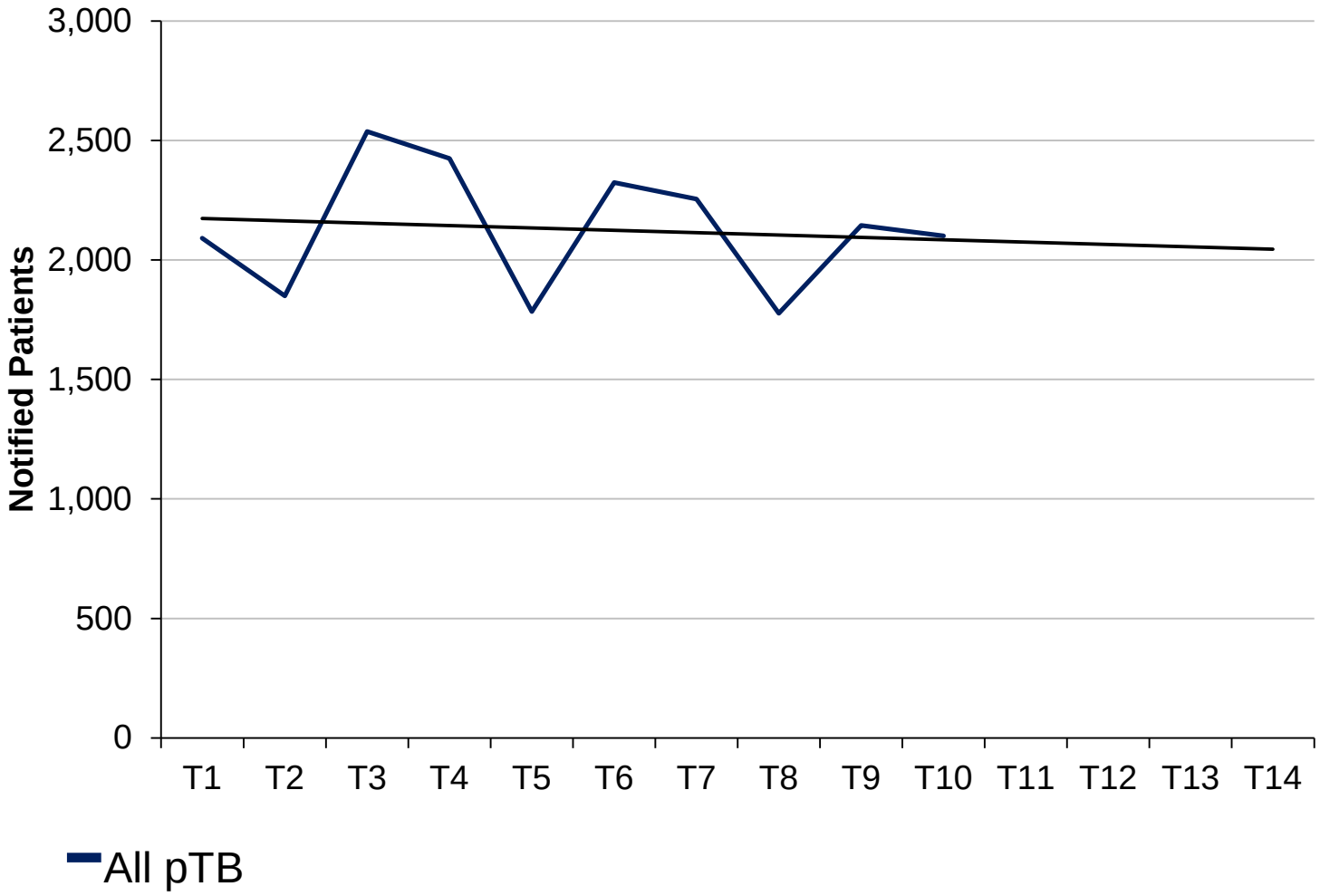
Historical + Intervention pTB Notifications



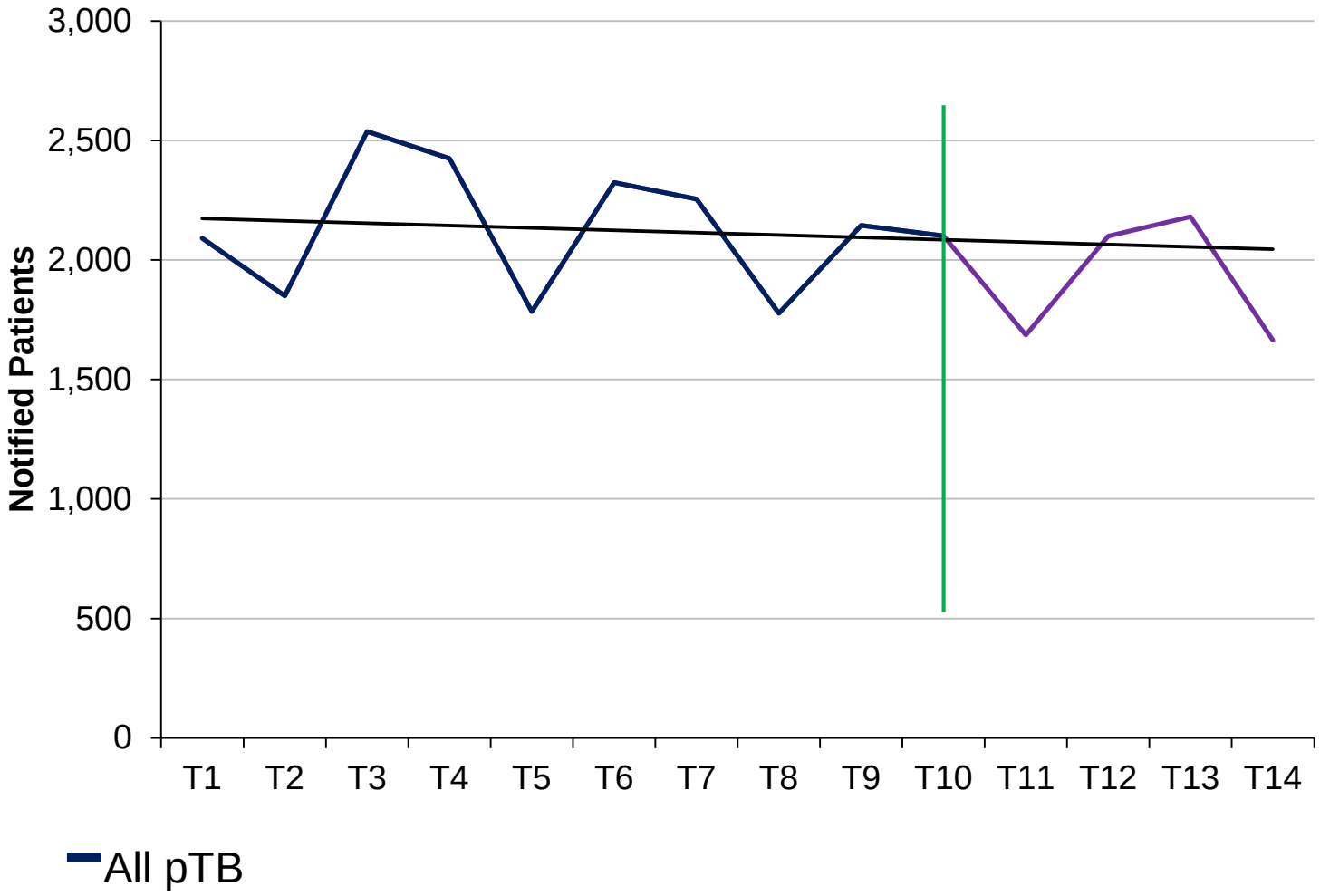
pTB Notification - new reporting system



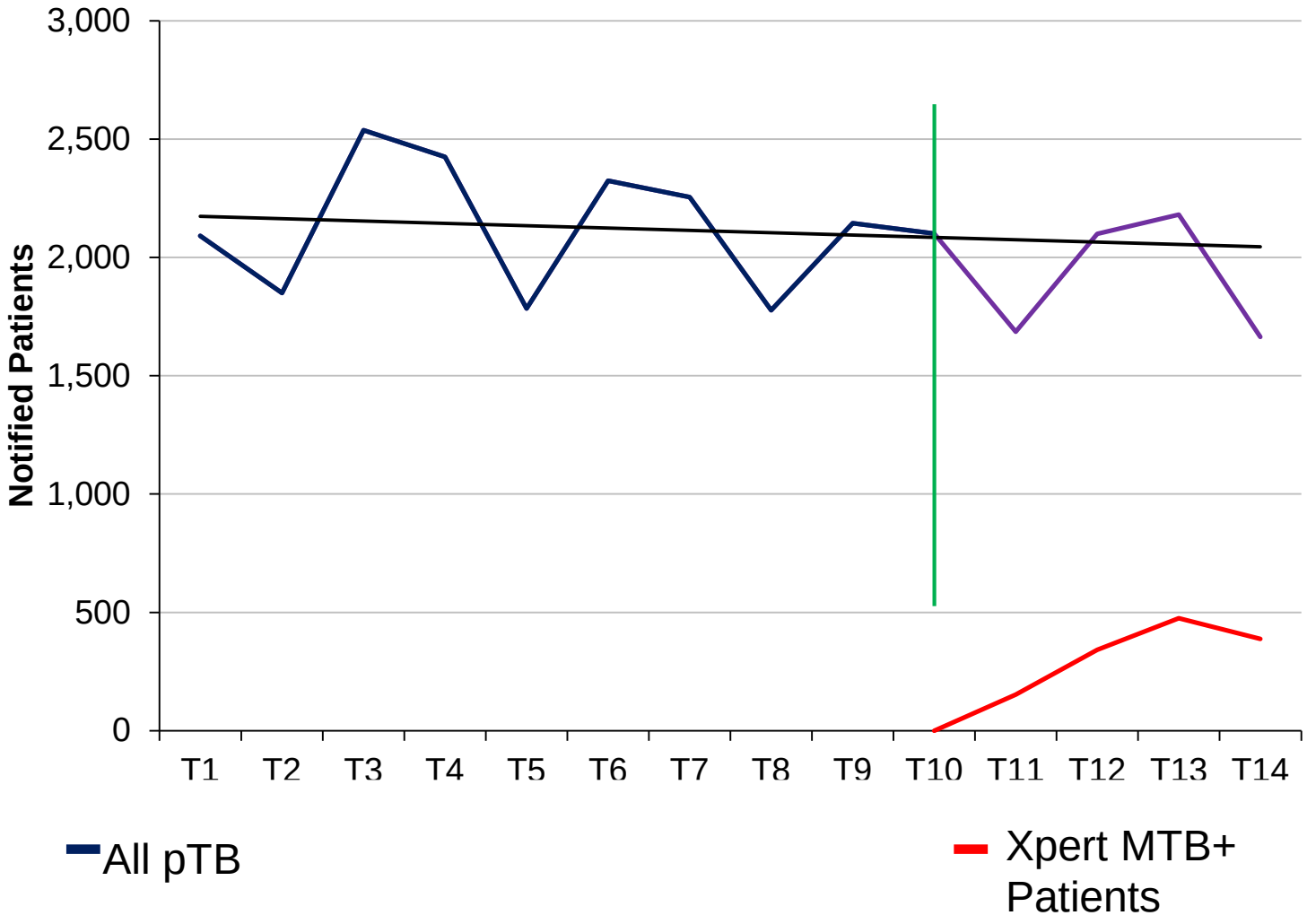
Historical pTB Notifications



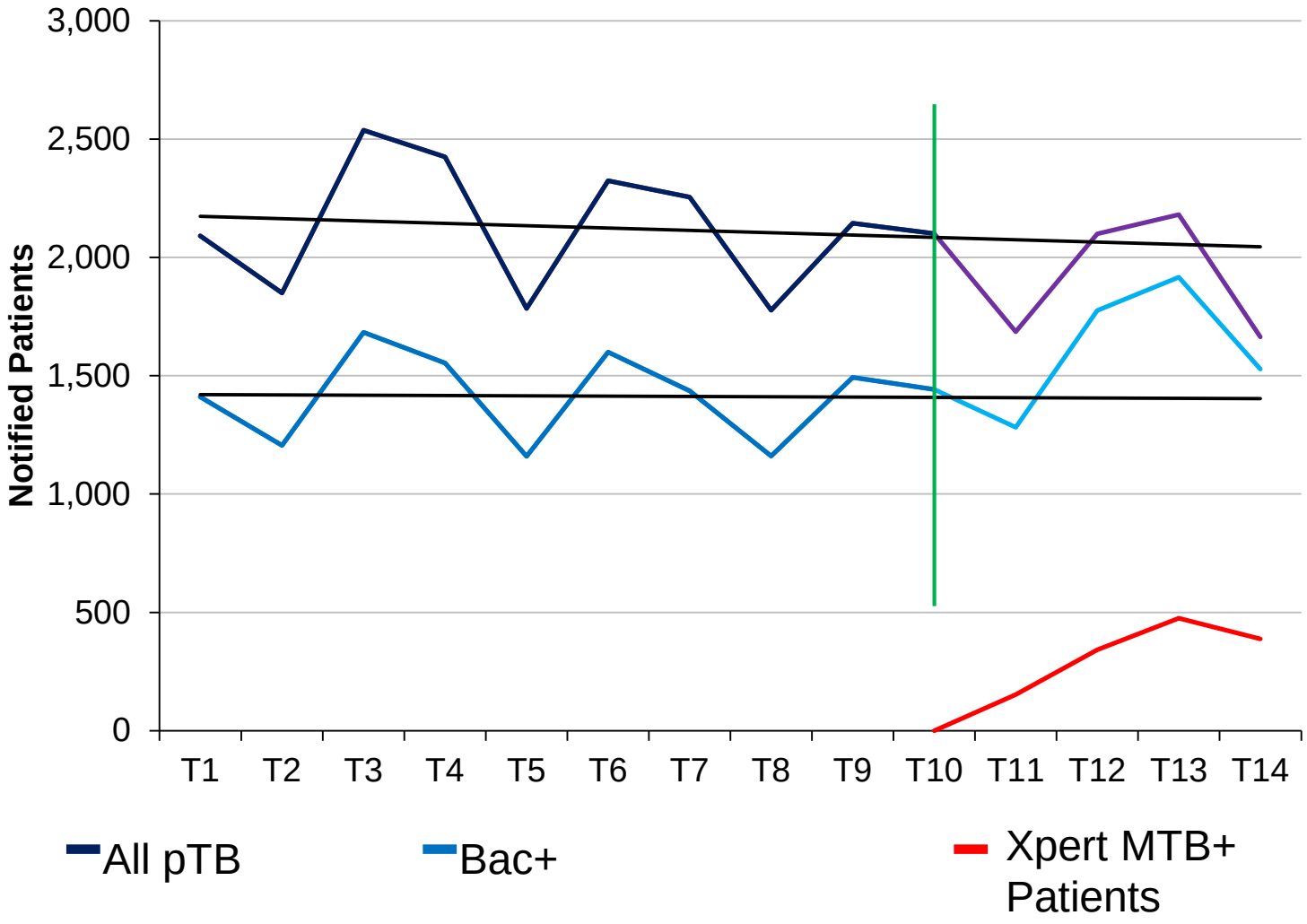
pTB Notifications



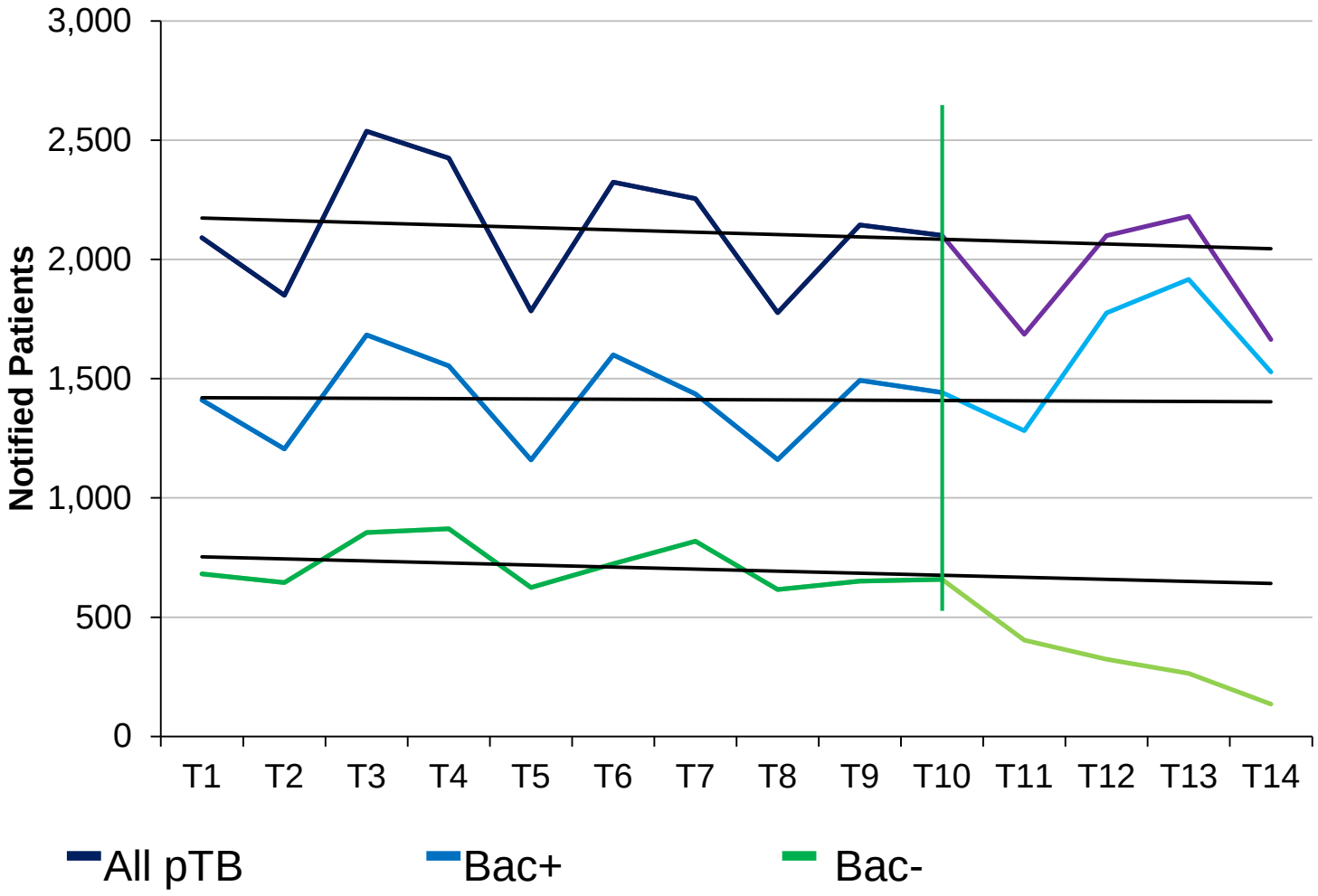
pTB Notifications



pTB Notifications



pTB Notifications



Nepal Summary

- 9,723 tests performed
  - 1,878 MTB+ tests including
  - 123 Rif Resistant results
- 1,530 (81.5%) were enrolled on treatment in intervention areas
- 21% increase in B+ notifications
- Proportion of B+ among pulmonary TB increased from 66% -> 86%
- However – no impact overall on people on ATT

Programmatic M&E for Xpert

- Different systems, algorithms are found within same areas - inhibits proper monitoring of impact
- TB REACH projects were among first implementers in many countries – guinea pigs
  - Steep learning curve
  - Restrictive algorithms
- No standard recording and reporting
  - Yield is easy (% positive)
  - Tracking patients is hard (linking to treatment)

Basic Indicators to Monitor

A. Number of people eligible for screening

B. Number of people screened

- Proportion of people screened among those eligible (B/A)

C. Number of suspected TB patients identified

- Proportion of people suspected TB patients identified among those screened (C/B)

D. Number of people tested/evaluated for TB disease

- Proportion of people tested/evaluated for TB among suspected patients (D/C)

E. Number of people diagnosed with TB and

- Proportion of people diagnosed among those screened (E/B) and tested (E/D)

F. Number of patients initiated on treatment

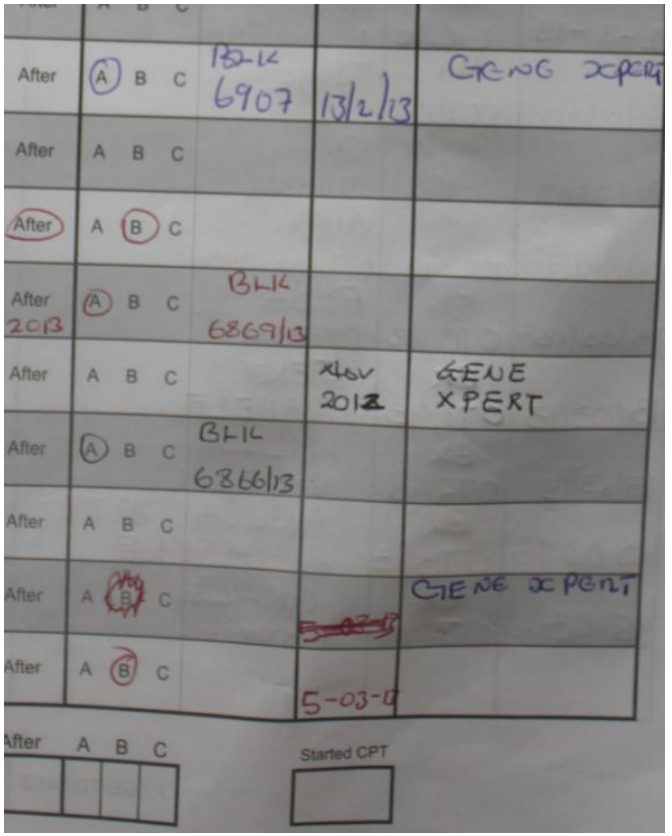
- Proportion of people initiated on treatment among those diagnosed (F/E)

G. Number of patients successfully completing treatment

- Proportion among those initiated (G/F)

Basic Indicators to Monitor

- Quarterly number of diagnostic tests conducted (historical and prospective)
- Quarterly historical and prospective disaggregated notification data (SS+, Bac+, SS-, EPTB)
- Quarterly cohort treatment outcomes



Xpert and DR-TB

- Clearly a possible game changer for improving detection
  - Impact on mortality? Treatment outcomes?
  - Scale up for MDR is a clear global and country priority but…
  - Need smart testing strategies – and…
- Links to DST and treatment are a challenge
- Treatment capacity, drugs, as well as laboratory capacity are still issues
- Cost?

A Note on Costs

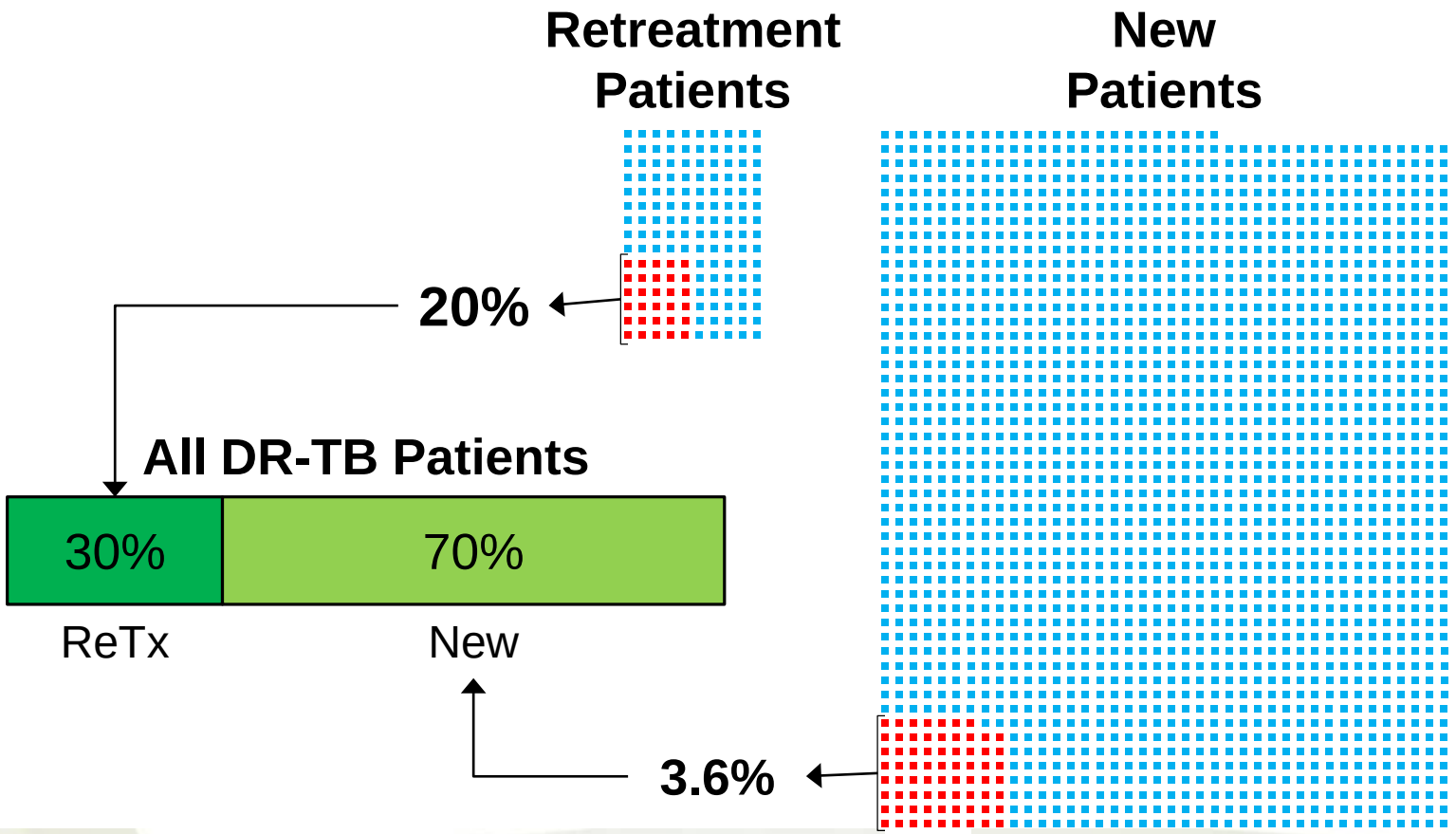
- Not 9.98 USD
- Costs include machine and tests +, +, +
  - Port clearance, infrastructure, warranty, training, maintenance, reporting, transport networks
- How many tests do you do a year per machine?
- How many machines do you have?

Country	Retreatment Cases	HIV+ TB Inc (Est)
DRC	7,492	16,000
Ethiopia	4,089	23,000
Nigeria	7,548	46,000

Running 500 tests a year costs you easily 60 USD per test in year one

Most machines are not running at full capacity (or even near it)

Testing Strategies for DR-TB



Conclusions

- Many lessons learned for next generation of rapid tests
- Training – automated reporting - and good algorithms are critical
- NTPs need to be able to access useful data that may not always be RCTs
- Lab interventions alone are unlikely to increase number of people put on TB treatment - unless it allows greater access than SSM
- Who are we missing? People in or outside of health care system?
- Adjunct strategies are needed to test more people to increase case detection

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TB REACH

In This Section

- About TB REACH
- Wave 1
- Wave 2
- Wave 3
- Results
- Xpert MTB/RIF

TB REACH Fact Sheet [.pdf]

Examples of how TB REACH grantees are reaching vulnerable population groups

TBREACH Wave 1 Report

Thank You!