# QUALITY: THE MISSING INGREDIENT IN TB CARE & CONTROL

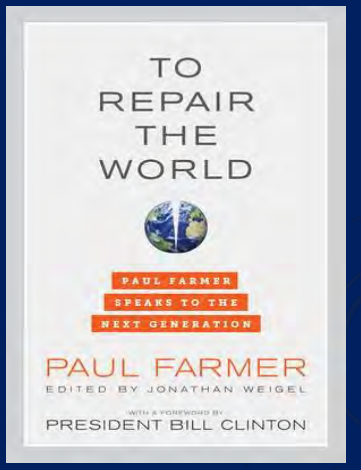
Madhukar Pai, MD, PhD
Director, McGill International TB Centre

Zelalem Temesgen, MD
Director, Mayo Clinic Tuberculosis Center

Alexander Kumar

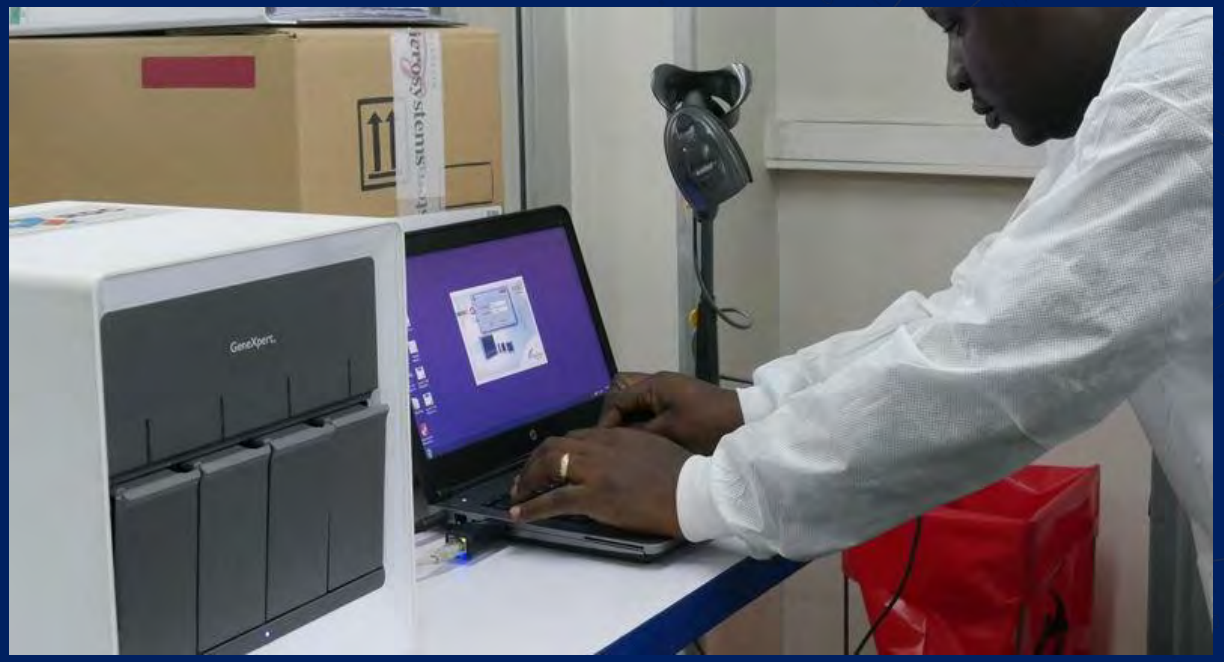

# “the biggest challenge in global health - failures of imagination”

Paul Farmer



# 2014-2016 EBOLA OUTBREAK IN WEST AFRICA

- 28,600 cases
- 11,325 deaths


SYLVANIA 300
SUNDAY, SEPTEMBER 27, 2015
GET TICKETS
OR CALL
844.292.6778

vital signs
with Dr. Sanjay Gupta

# WHO: Trials show new Ebola vaccine is 'highly effective'

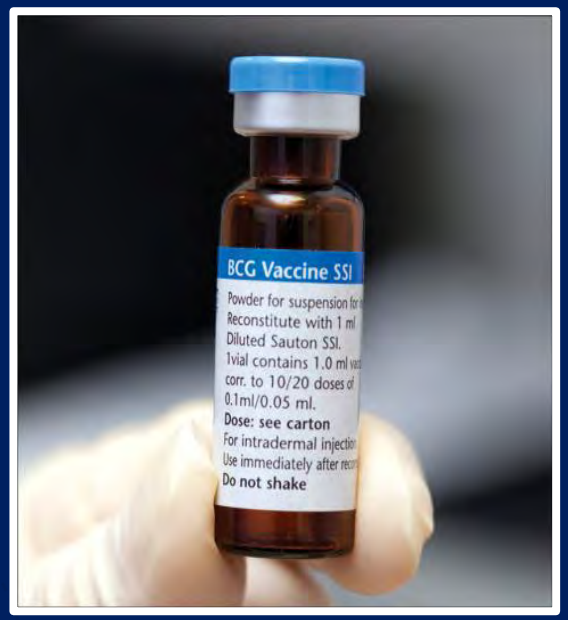
By Laura Smith-Spark, CNN
Updated 12:33 PM ET, Mon August 3, 2015




# A new Ebola va being tested in torn Congo

Oct 20, 2018 5:31 PM EDT

# TB AFFECTS 10M/Y & KILLS 1.6M/Y
# THIS IS OUR TOOLBOX




# MOST TB PROGRAMS STILL FOCUS ON COVERAGE, NOT QUALITY!

DOTS coverage


What about quality?

# COVERAGE DOES NOT EQUAL QUALITY!

HQSS

The Lancet Global Health Commission on High Quality Health Systems in the SDG Era

The Lancet Global Health Commission

## High-quality health systems in the Sustainable Development Goals era: time for a revolution

Margaret E Kruk, Anna D Gage, Catherine Arsenault, Keely Jordan, Hannah H Leslie, Sanam Roder-DeWan, Olusoji Adeyi, Pierre Barker, Bernadette Daelmans, Svetlana V Doubova, Mike English, Ezequiel García Elorrio, Frederico Guanais, Oye Gureje, Lisa R Hirschhorn, Lixin Jiang, Edward Kelley, Ephrem Tekle Lemango, Jerker Liljestrand, Address Malata, Tanya Marchant, Malebona Precious Matsoso, John G Meara, Manoj Mohanan, Youssoupha Ndiaye, Ole F Norheim, K Srinath Reddy, Alexander K Rowe, Joshua A Salomon, Gagan Thapa, Nana A Y Twum-Danso, Muhammad Pate

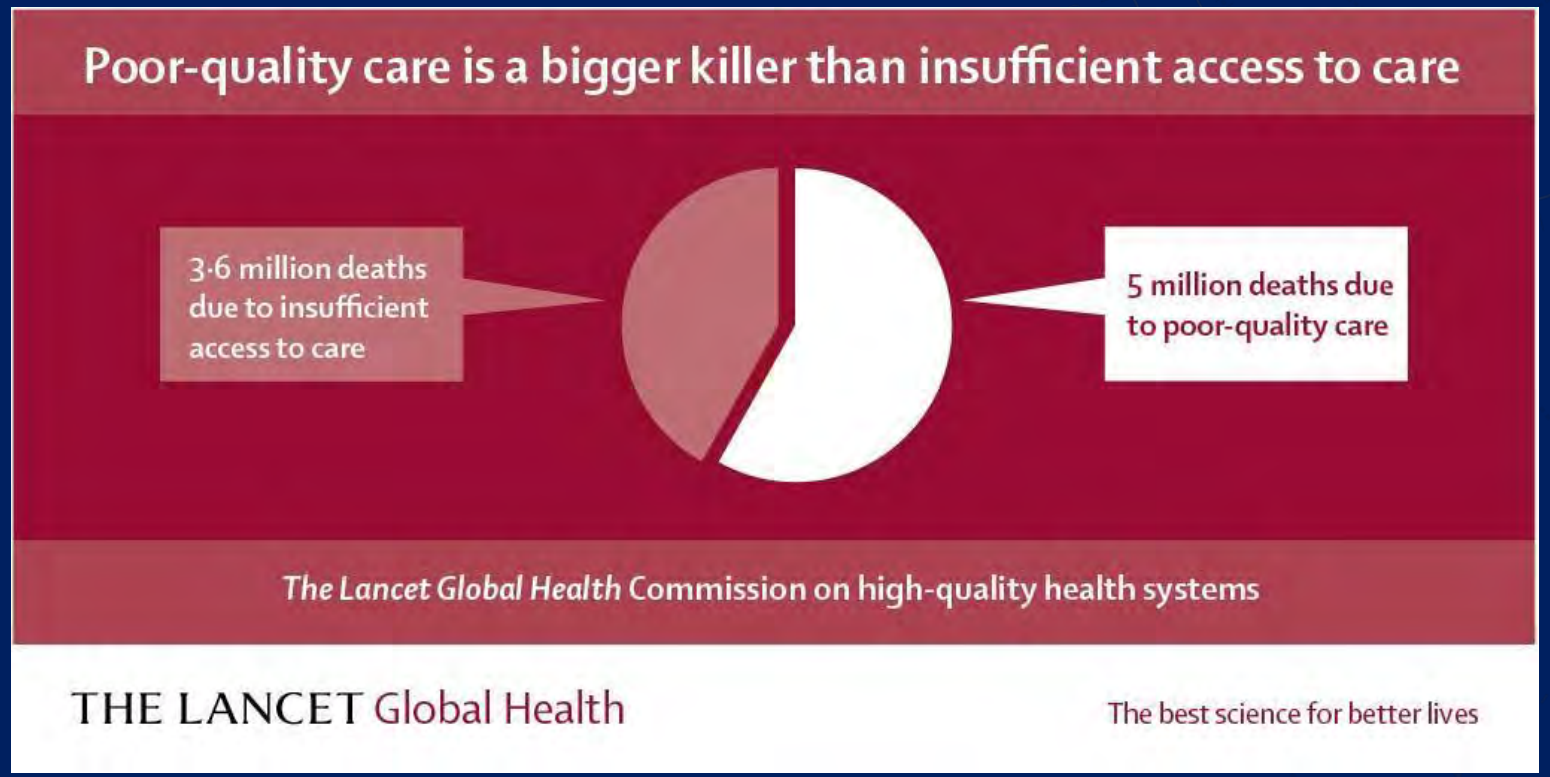
**Executive summary**

Although health outcomes have improved in low-income and middle-income countries (LMICs) in the past several decades, a new reality is at hand. Changing health needs, growing public expectations, and ambitious new health goals are raising the bar for health systems to produce better health outcomes and greater social value. But staying on current trajectory will not suffice to meet these demands. What is needed are high-quality health systems that optimise health care in each given context by consistently delivering care that improves or maintains health, by being valued and trusted by all people, and by responding to changing population needs. Quality should not be the purview of the elite or an aspiration for some distant future; it should be the DNA of all health systems. Furthermore, the human right to health is meaningless without good quality care because health systems cannot improve health without it.

We propose that health systems be judged primarily on their impacts, including better health and its equitable distribution; on the confidence of people in their health and children receive less than half of recommended clinical actions in a typical preventive or curative visit, less than half of suspected cases of tuberculosis are correctly managed, and fewer than one in ten people diagnosed with major depressive disorder receive minimally adequate treatment. Diagnoses are frequently incorrect for serious conditions, such as pneumonia, myocardial infarction, and newborn asphyxia. Care can be too slow for conditions that require timely action, reducing chances of survival. At the system level, we found major gaps in safety, prevention, integration, and continuity, reflected by poor patient retention and insufficient coordination across platforms of care. One in three people across LMICs cited negative experiences with their health system in the areas of attention, respect, communication, and length of visit (visits of 5 min are common); on the extreme end of these experiences were disrespectful treatment and abuse. Quality of care is worst for vulnerable groups, including the poor, the less educated, adolescents, those with stigmatised

Lancet Glob Health 2018
Published Online September 5, 2018
http://dx.doi.org/10.1016/S2214-109X(18)30386-3

Harvard T H Chan School of Public Health, Boston, MA, USA (M E Kruk MD, A D Gage MSc, C Arsenault PhD, H H Leslie PhD, S Roder-DeWan MD); New York University College of Global Public Health, New York, NY, USA (K Jordan MSc); The World Bank, Washington, DC, USA (O Adeyi MD); Institute for Healthcare Improvement, Cambridge, MA, USA (P Barker MD); WHO, Geneva, Switzerland (B Daelmans MD, E Kelley MD); Mexican Institute of Social Security, Mexico City, Mexico (S V Doubova MD); KEMRI–Wellcome Trust Research Programme, Nairobi, Kenya (M English MD); Institute

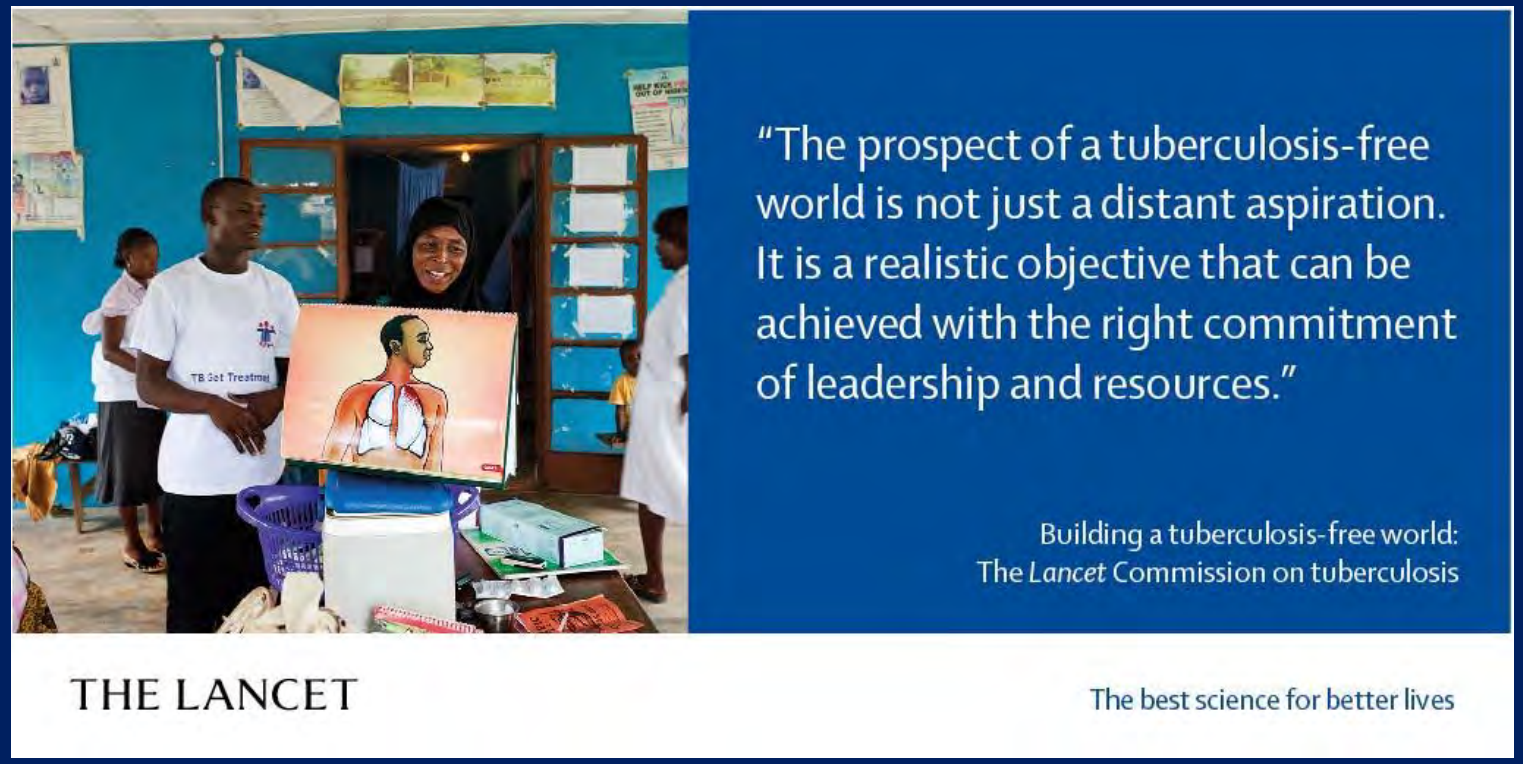


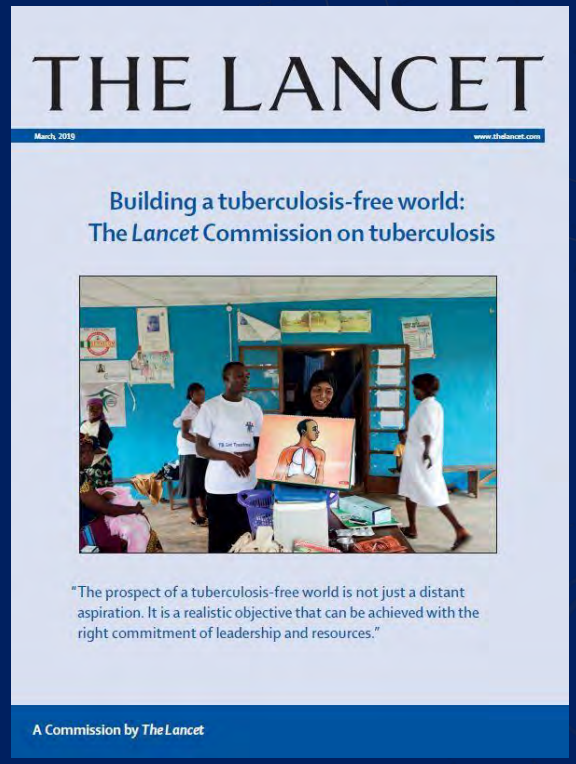

In 2016, 8.6 million deaths were avertable in the health system, including 5 million due to poor quality care.

https://www.thelancet.com/commissions/quality-health-systems

TB CARE IS DESIGNED FROM A HEALTH SYSTEM PERSPECTIVE & IS AIMED AT ‘DISEASE CONTROL’

# AN ATTEMPT TO COUNTER FAILURES OF IMAGINATION

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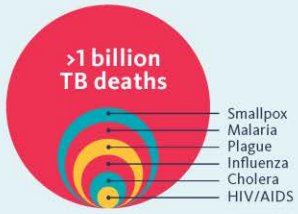
## THE PROBLEM

**TB: #1 infectious disease killer over the last 200 years**




*And >1.6 million TB deaths in 2017*

**We are failing to identify 4 out of 10 people with TB**

**65% of mortality occurs in 10 high-burden countries**

Bangladesh
DR Congo
India
Indonesia
Kenya
Mozambique
Nigeria
Pakistan
South Africa
Tanzania

**TB is a global health security threat extending far beyond high-burden countries**


## PRIORITIES IN SOLVING THE PROBLEM

**Priority 1**

**Provide patient-centered services to all seeking TB care**

**Priority 2**

**Reach high-risk people with screening & prevention programs**

**Priority 3**

**Develop new diagnostics, therapies & vaccines**

**Priority 4**

**Invest the funds necessary to end TB**

***ROI:***
*For every $ invested in intervention, up to $56 are returned*

**Priority 5**

**Hold countries & stakeholders accountable for making progress to end TB**


https://www.thelancet.com/commissions/tuberculosis-free-world

HQSS

The Lancet Global Health Commission on High Quality Health Systems in the SDG Era

A high quality health system optimizes health in a given context by

- **consistently** delivering care that improves or maintains health,
- being **valued and trusted by all** people,
- **responding** to changing population needs.

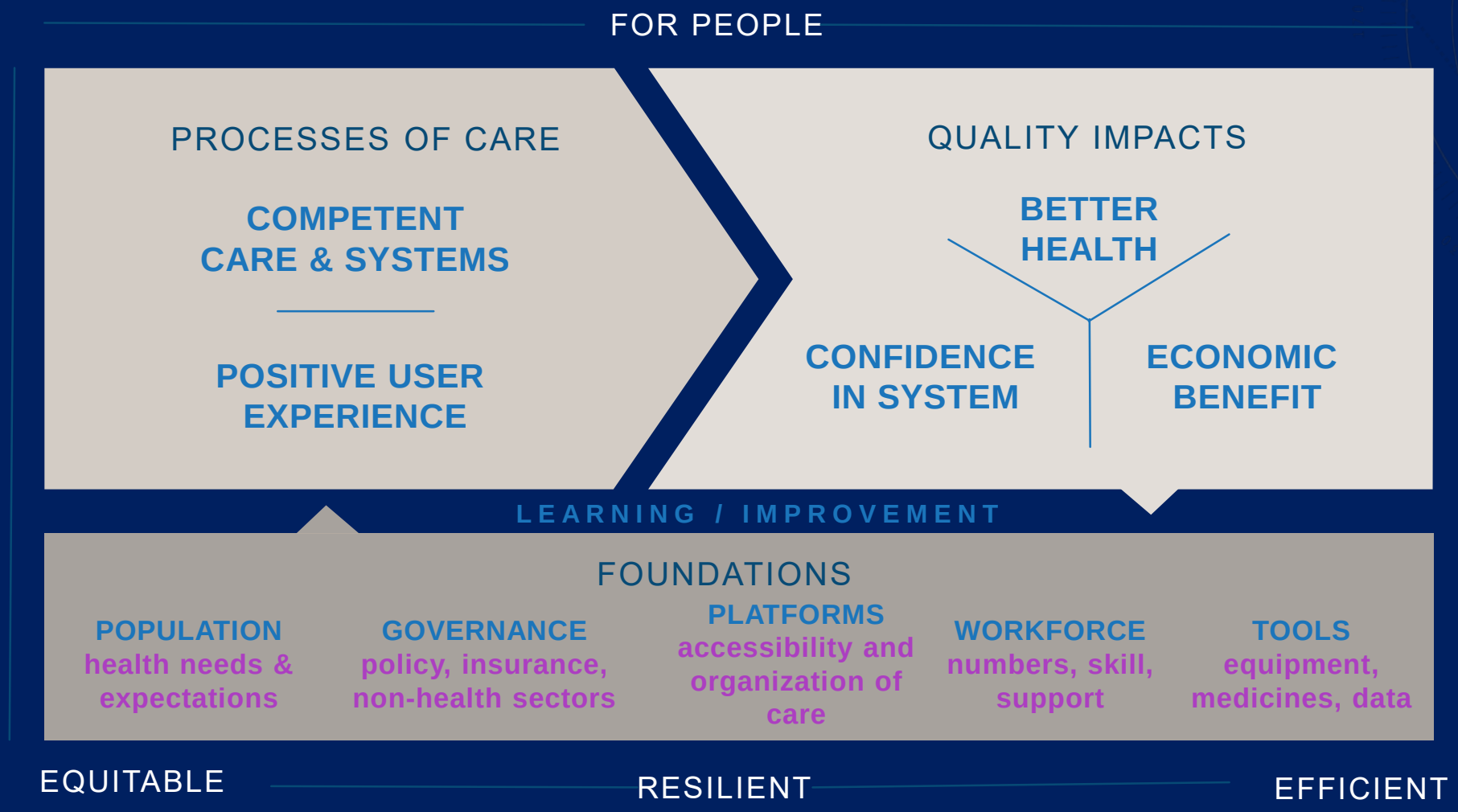


https://www.thelancet.com/journals/langlo/article/PIIS2214-109X(18)30386-3/fulltext

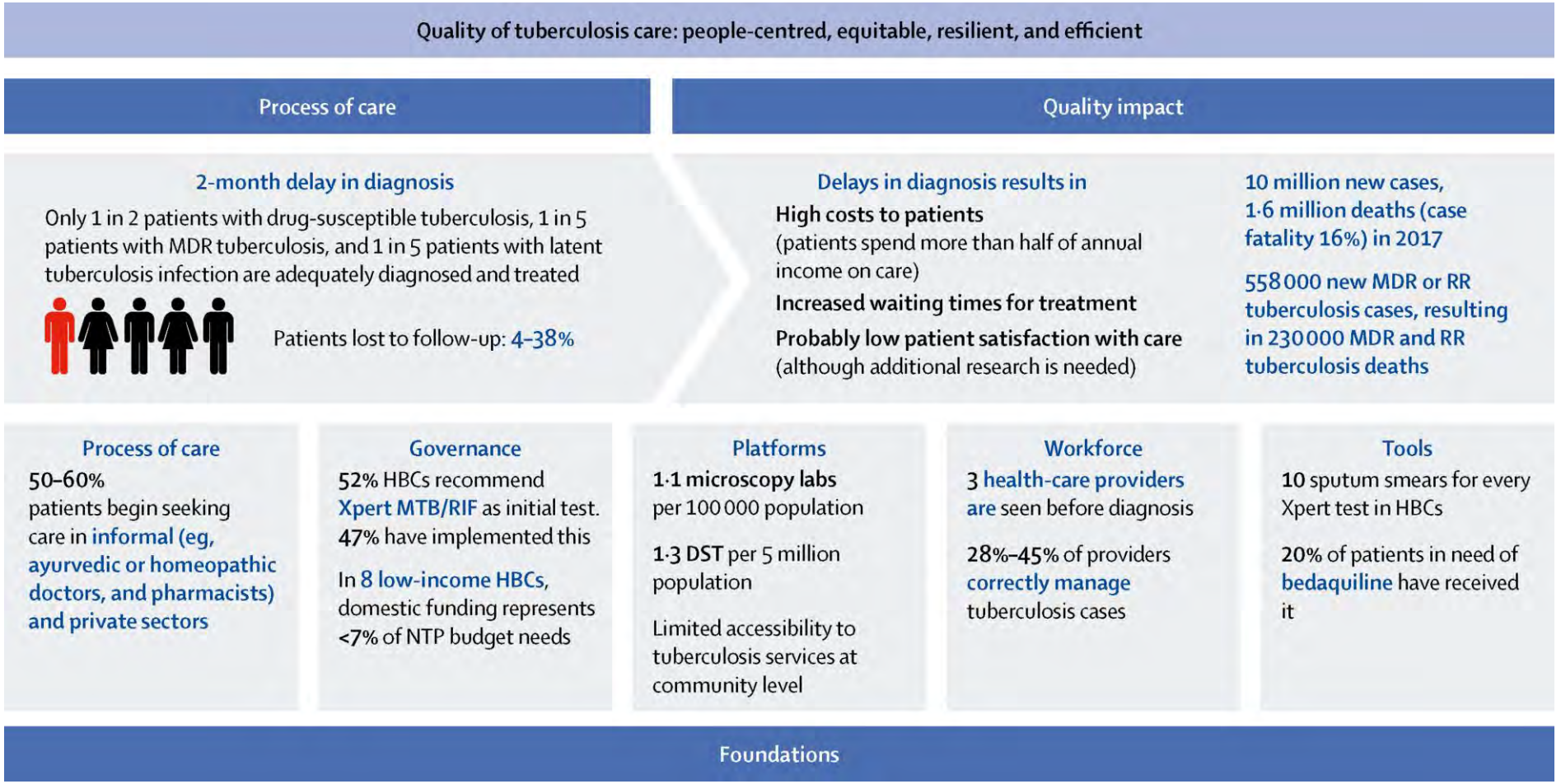
HQSS
The Lancet Global Health Commission on High Quality Health Systems in the SDG Era

# Utilization x Quality = Health

# HIGH QUALITY HEALTH SYSTEM FRAMEWORK



# QUALITY OF TB CARE: HQSS FRAMEWORK

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# UNDERSTANDING PATIENT PATHWAYS

# Long, complex patient pathways: 13 countries

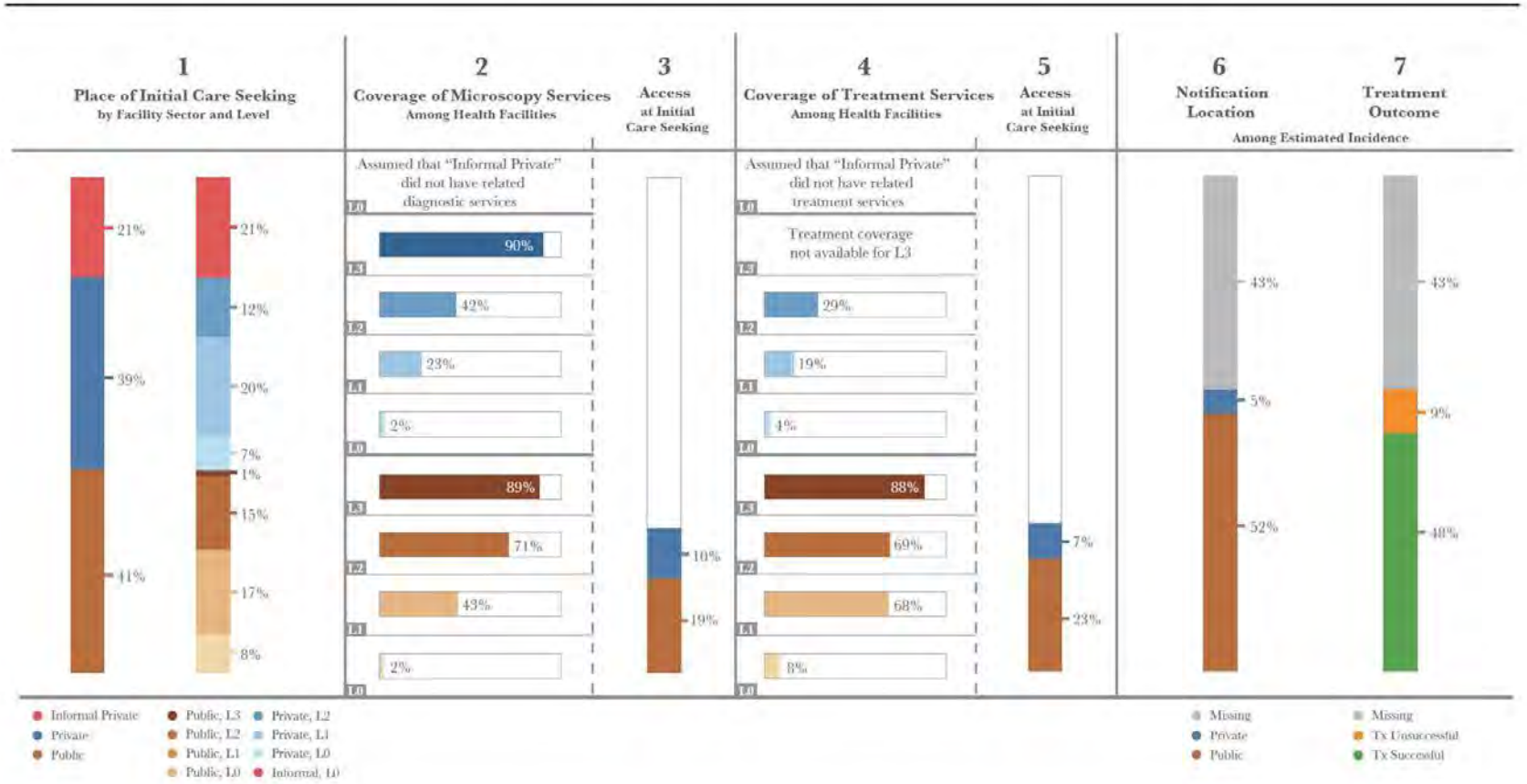
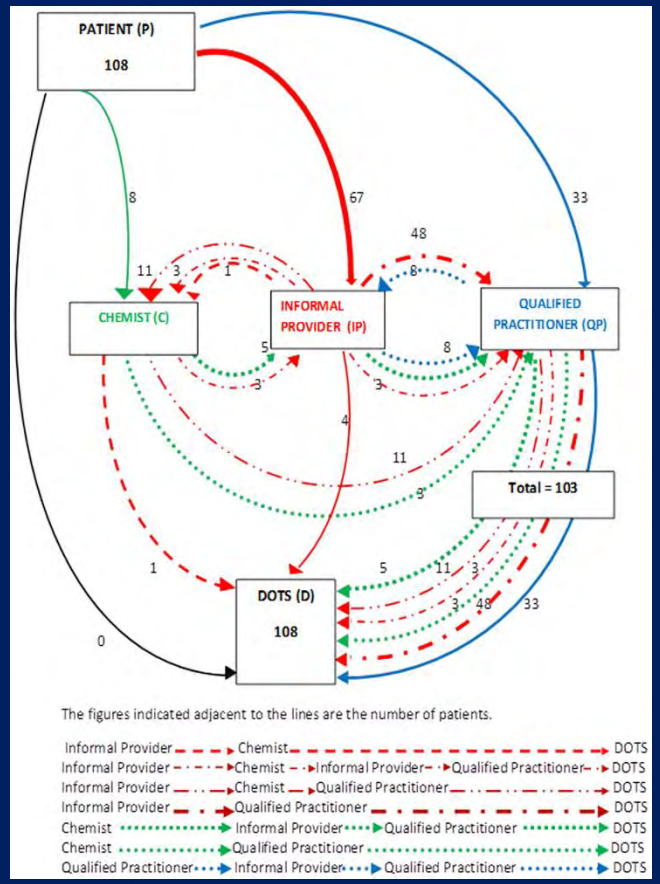



**Figure 2.** Combined 13-country patient pathway analysis. Countries include India, Indonesia, China, Nigeria, Pakistan, South Africa, Bangladesh, Philippines, Democratic Republic of the Congo, Ethiopia, Myanmar, Mozambique, and Kenya. In the formal public and private sectors, L0 refers to community level care and pharmacies; L1 refers to clinics and primary health care centers; L2 refers to lower-level hospitals; L3 refers to referral hospitals. In the informal sector, L0 refers to traditional healers and drug sellers.

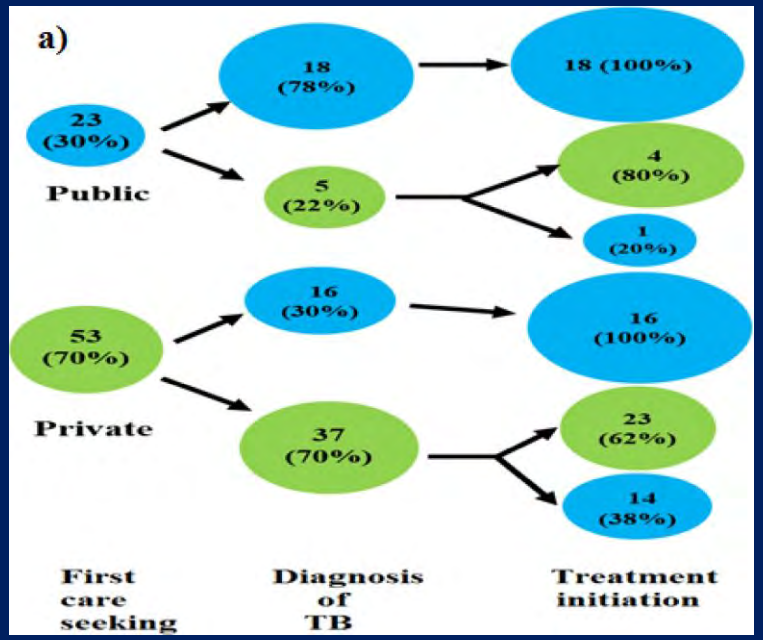
# Multiple providers are seen before TB is detected
# ~2 months diagnostic delay in most HBCs

DELHI



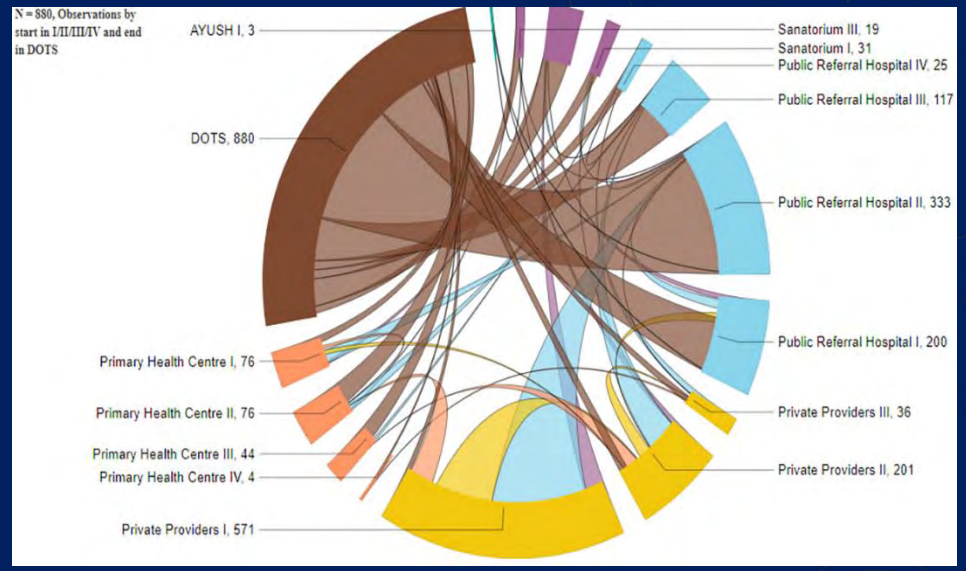

Kapoor et al. PLoS ONE 2012

MUMBAI




Mistry et al. PLoS ONE 2016

TAMIL NADU




Veesa et al. PLoS ONE 2018

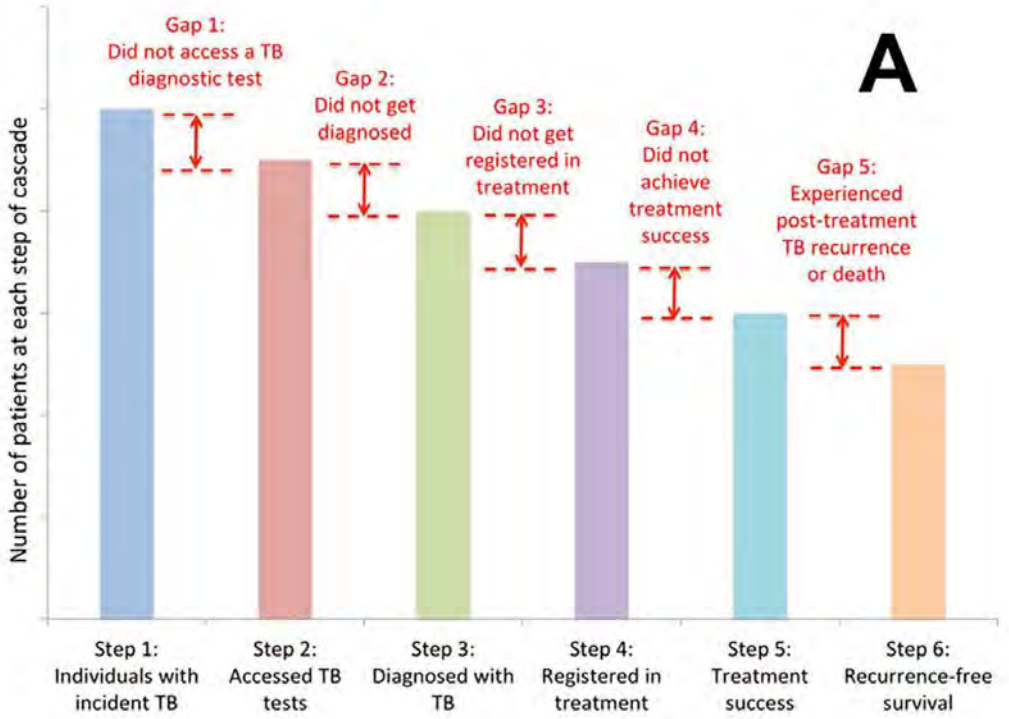
# UNDERSTANDING CASCADES OF CARE

PLOS | MEDICINE

GUIDELINES AND GUIDANCE

# Constructing care cascades for active tuberculosis: A strategy for program monitoring and identifying gaps in quality of care

Ramnath Subbaraman[1,2*], Ruvandhi R. Nathavitharana[3], Kenneth H. Mayer[3,4], Srinath Satyanarayana[5], Vineet K. Chadha[6], Nimalan Arinaminpathy[7], Madhukar Pai[8]

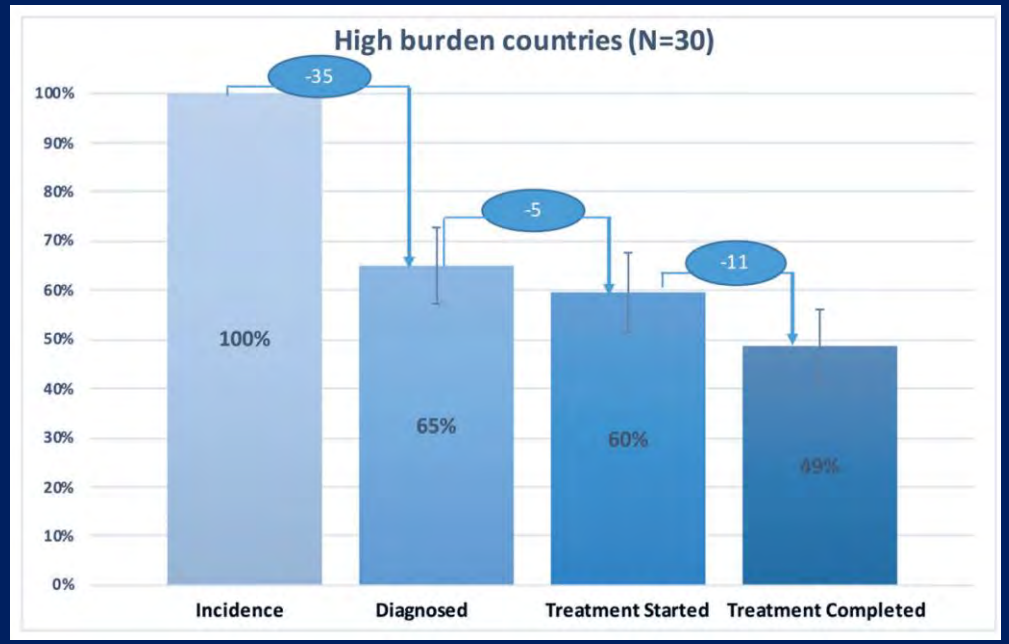


# Cascade of care

**30 High burden countries**

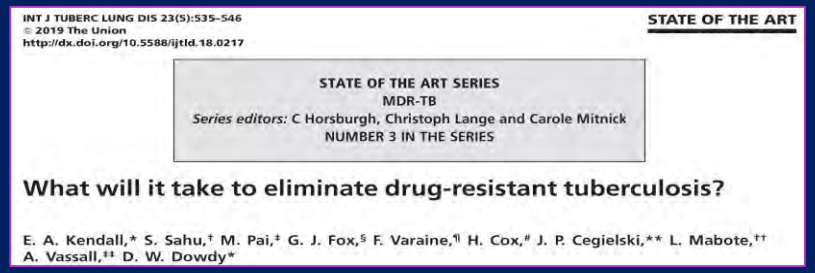
journal of global health

Health systems performance in managing tuberculosis: analysis of tuberculosis care cascades among high-burden and non-high-burden countries




# Cascade of care: DR-TB

**Global**



INT J TUBERC LUNG DIS 23(5):535–546
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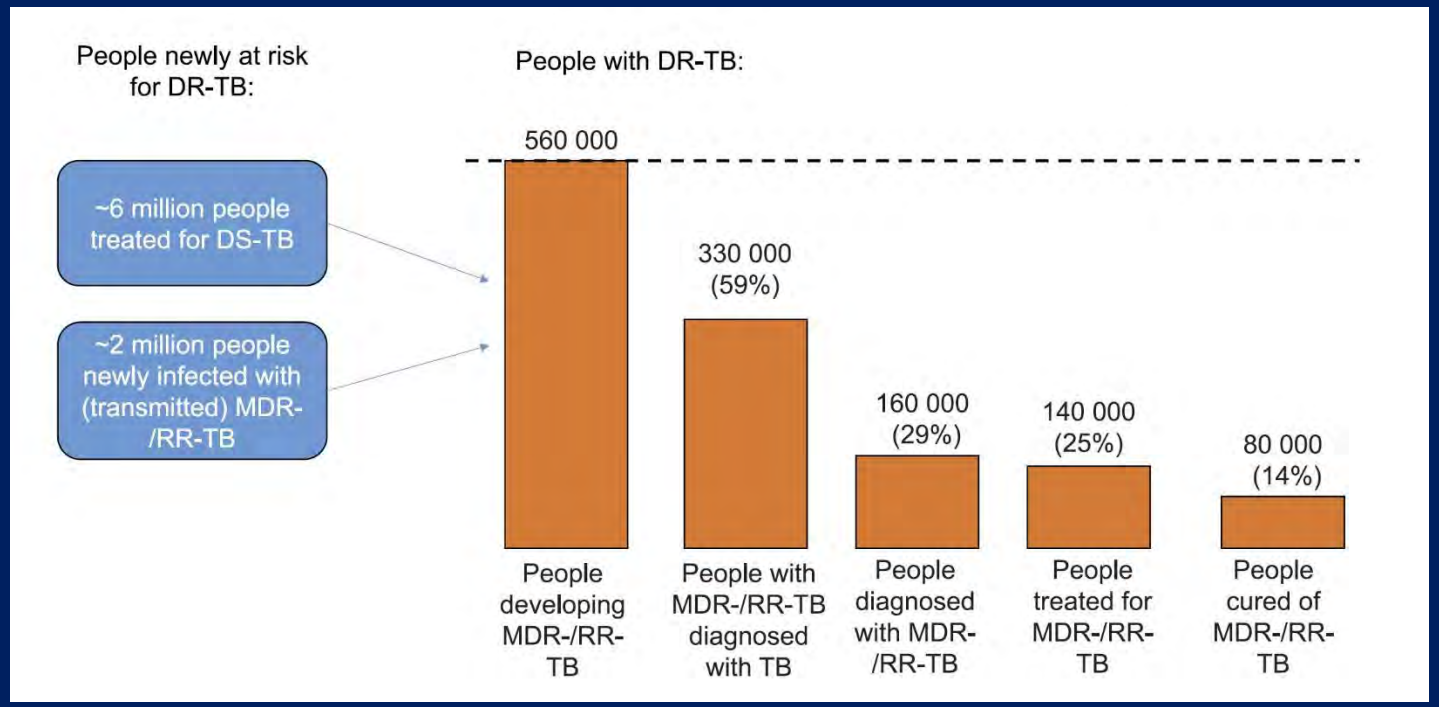
http://dx.doi.org/10.5588/ijtld.18.0217

STATE OF THE ART

STATE OF THE ART SERIES
MDR-TB
*Series editors:* C Horsburgh, Christoph Lange and Carole Mitnick
NUMBER 3 IN THE SERIES

**What will it take to eliminate drug-resistant tuberculosis?**

E. A. Kendall,* S. Sahu,† M. Pai,‡ G. J. Fox,§ F. Varaine,¶ H. Cox,# J. P. Cegielski,** L. Mabote,††
A. Vassall,‡‡ D. W. Dowdy*




# Cascade of care

## India

PLOS | MEDICINE

RESEARCH ARTICLE

### The Tuberculosis Cascade of Care in India's Public Sector: A Systematic Review and Meta-analysis

Ramnath Subbaraman[1,2]*, Ruvandhi R. Nathavitharana[3,4], Srinath Satyanarayana[5,6], Madhukar Pai[5], Beena E. Thomas[7], Vineet K. Chadha[8], Kiran Rade[9], Soumya Swaminathan[10], Kenneth H. Mayer[3,11]

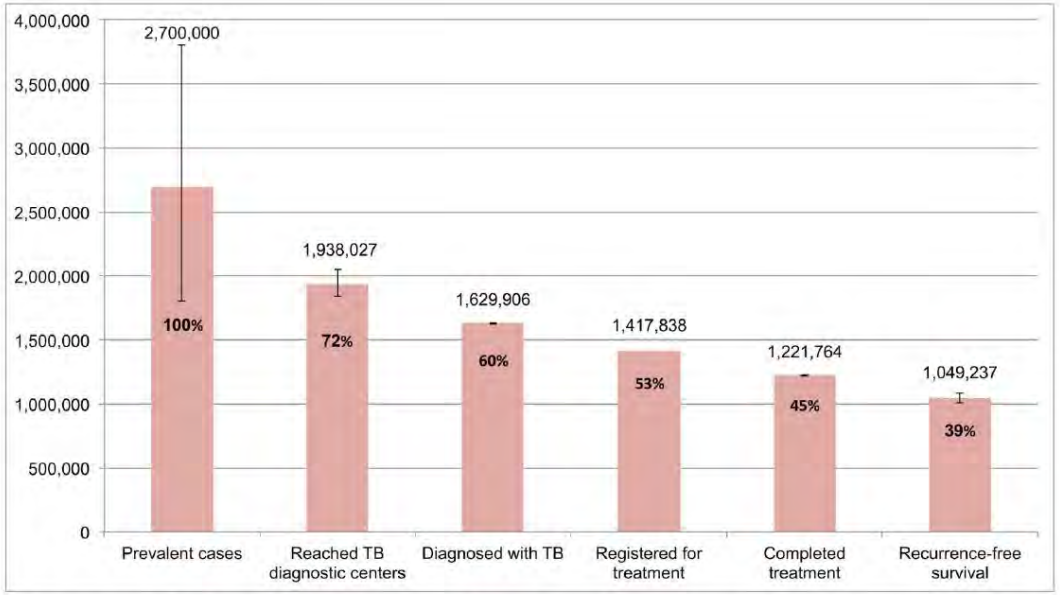




**Fig 7. The cascade of care for all forms of tuberculosis in India's Revised National Tuberculosis Control Programme (RNTCP) in India, 2013.** Error bars depict 95% confidence intervals.

doi:10.1371/journal.pmed.1002149.g007

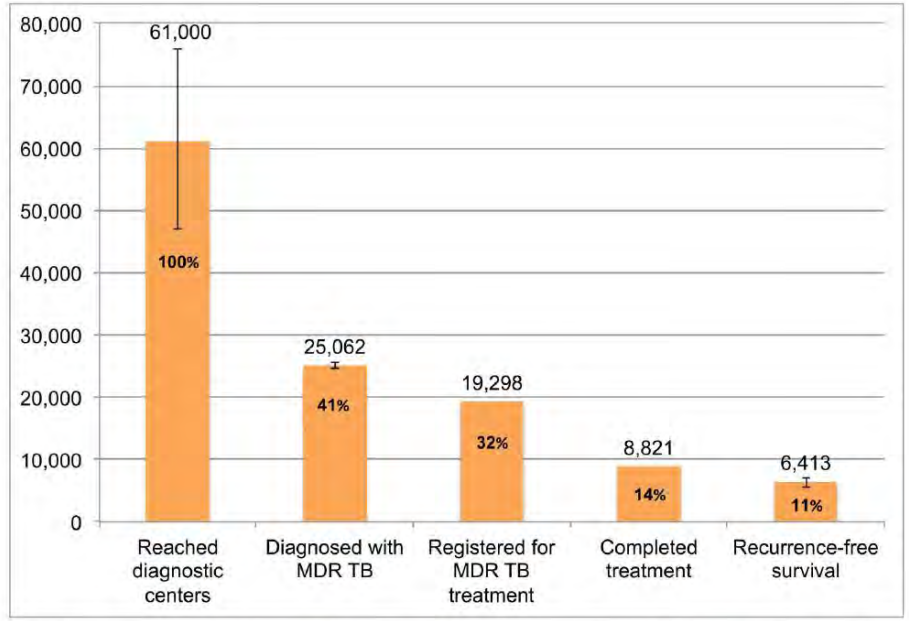



**Fig 11. The tuberculosis cascade of care for multidrug-resistant tuberculosis (MDR TB) patients detected and treated by the Revised National Tuberculosis Control Programme (RNTCP) in India, 2013.** Error bars depict 95% confidence intervals for each estimate.

doi:10.1371/journal.pmed.1002149.g011

# Cascade of care

## South Africa

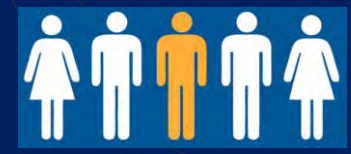

*The Journal of Infectious Diseases*

SUPPLEMENT ARTICLE

IDSA Infectious Diseases Society of America · hivma hiv medicine association · OXFORD

### The South African Tuberculosis Care Cascade: Estimated Losses and Methodological Challenges

Pren Naidoo,[1,8] Grant Theron,[2,3] Molebogeng X. Rangaka,[4,9] Violet N. Chihota,[5,6,a] Louise Vaughan,[2,3] Zameer O. Brey,[8] and Yogan Pillay[7]



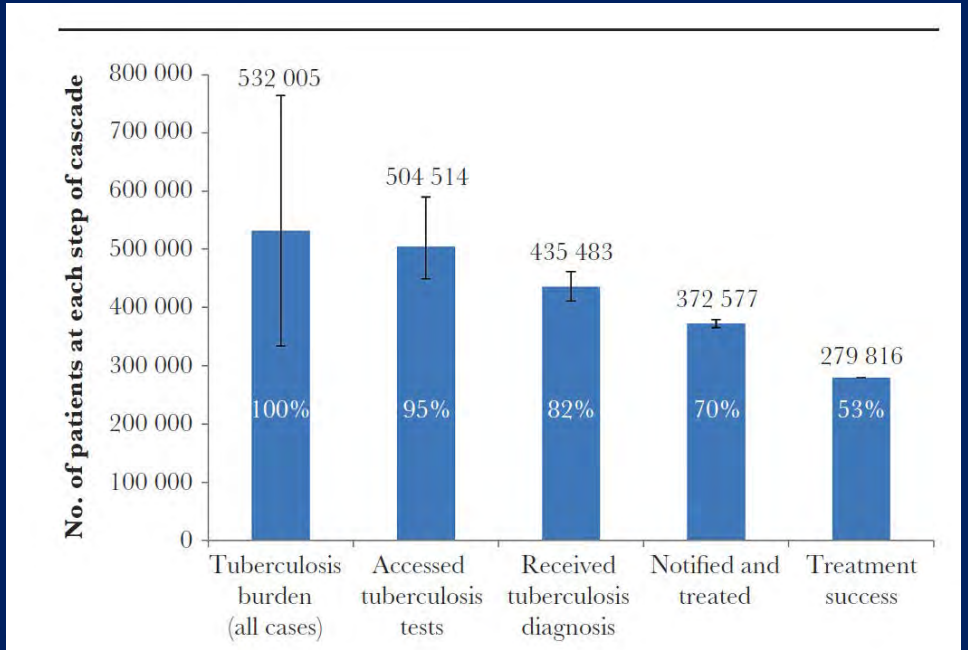



**Figure 3.** Care cascade for all patients with tuberculosis. This cascade includes

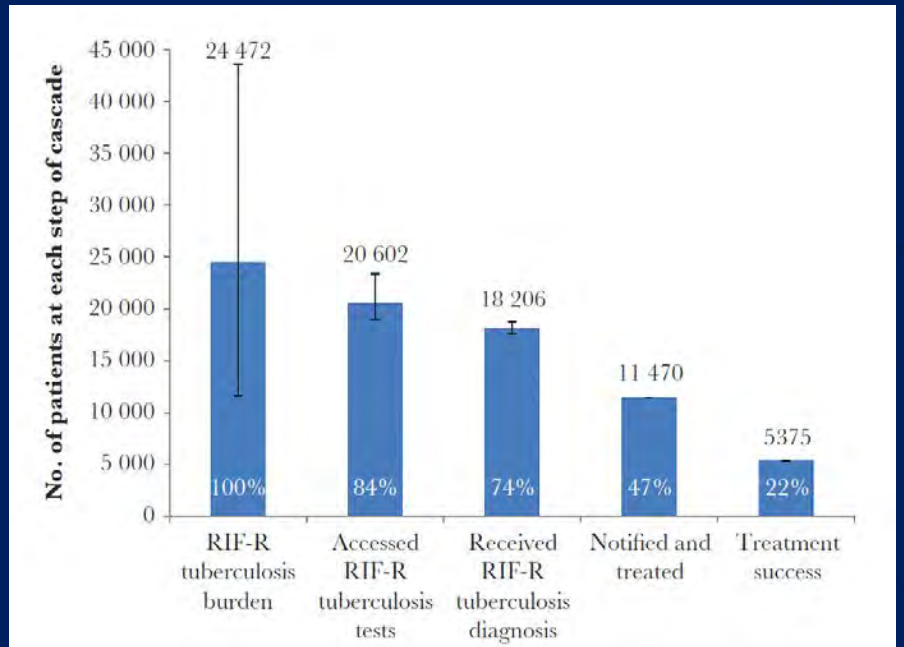



**Figure 6.** Care cascade for patients with rifampicin-resistant (RIF-R) tubercu-

# Cascade of care: Children

J Clin Tuberc Other Mycobact Dis 9 (2017) 24–29

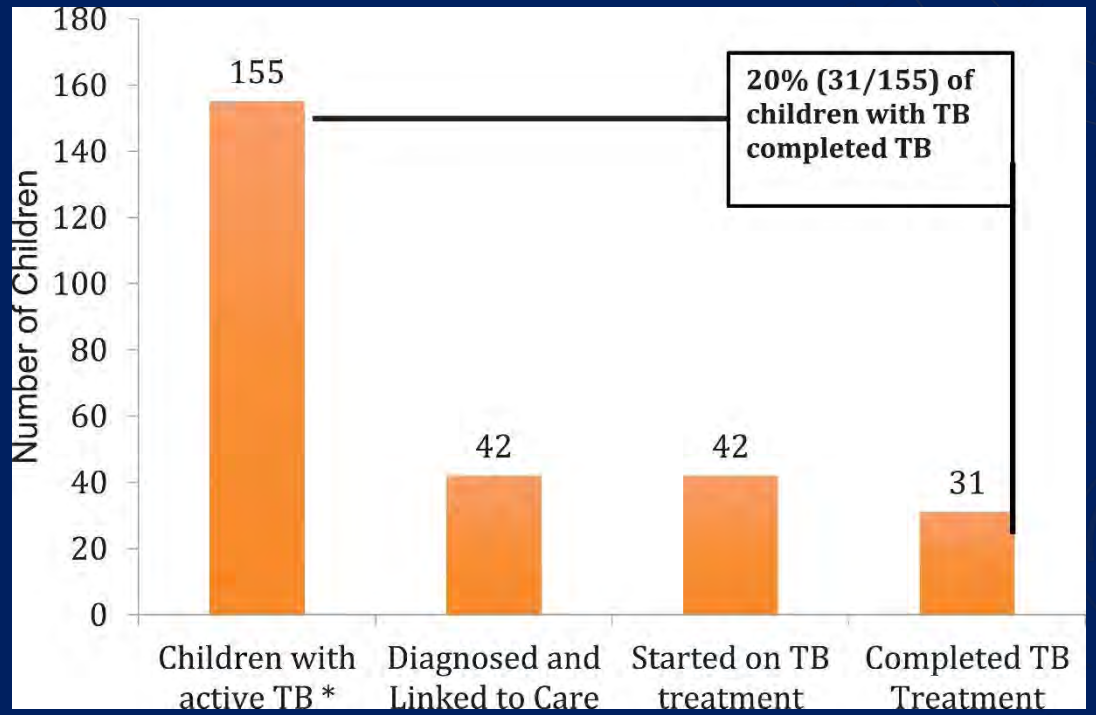
Contents lists available at ScienceDirect

J Clin Tuberc Other Mycobact Dis

journal homepage: www.elsevier.com/locate/jctube

Gaps in the child tuberculosis care cascade in 32 rural communities in Uganda and Kenya☆

Florence Mwangwa[a], Gabriel Chamie[b], Dalsone Kwarisiima[a,c,d], James Ayieko[e], Asiphas Owaraganise[a], Theodore D. Ruel[f], Albert Plenty[b], Khai Hoan Tram[g], Tamara D. Clark[b], Craig R. Cohen[h], Elizabeth A. Bukusi[e], Maya Petersen[i], Moses R. Kamya[a,d], Edwin D. Charlebois[j], Diane V. Havlir[b], Carina Marquez[b,*]



# Cascade of care: Latent TB Infection

Articles

**The cascade of care in diagnosis and treatment of latent tuberculosis infection: a systematic review and meta-analysis**

*Hannah Alsdurf, Philip C Hill, Alberto Matteelli, Haileyesus Getahun, Dick Menzies*

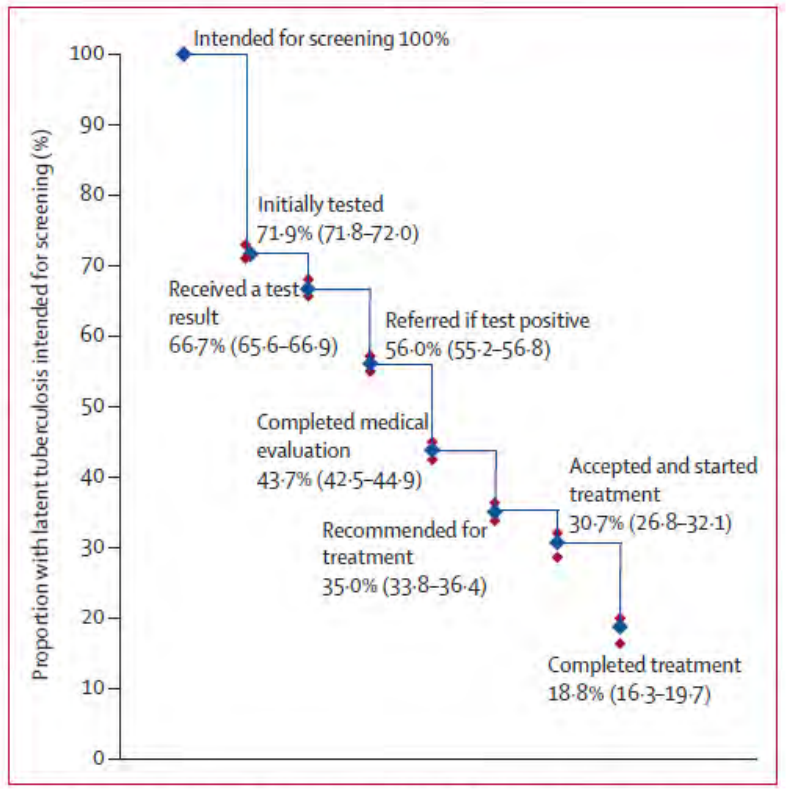



*Figure 2:* **Losses and drop-outs at each stage of the cascade of care in latent tuberculosis**

Numbers in parentheses are 95% CIs. The value for each level is calculated as the product of the value from the preceding step, multiplied by the pooled estimate for that step (from fixed-effects analysis).


# Competent care

Pioneered the use of simulated or standardized patients to assess quality of TB care

https://www.qutubproject.org

Partners

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McGill International TB Centre
BILL & MELINDA GATES foundation
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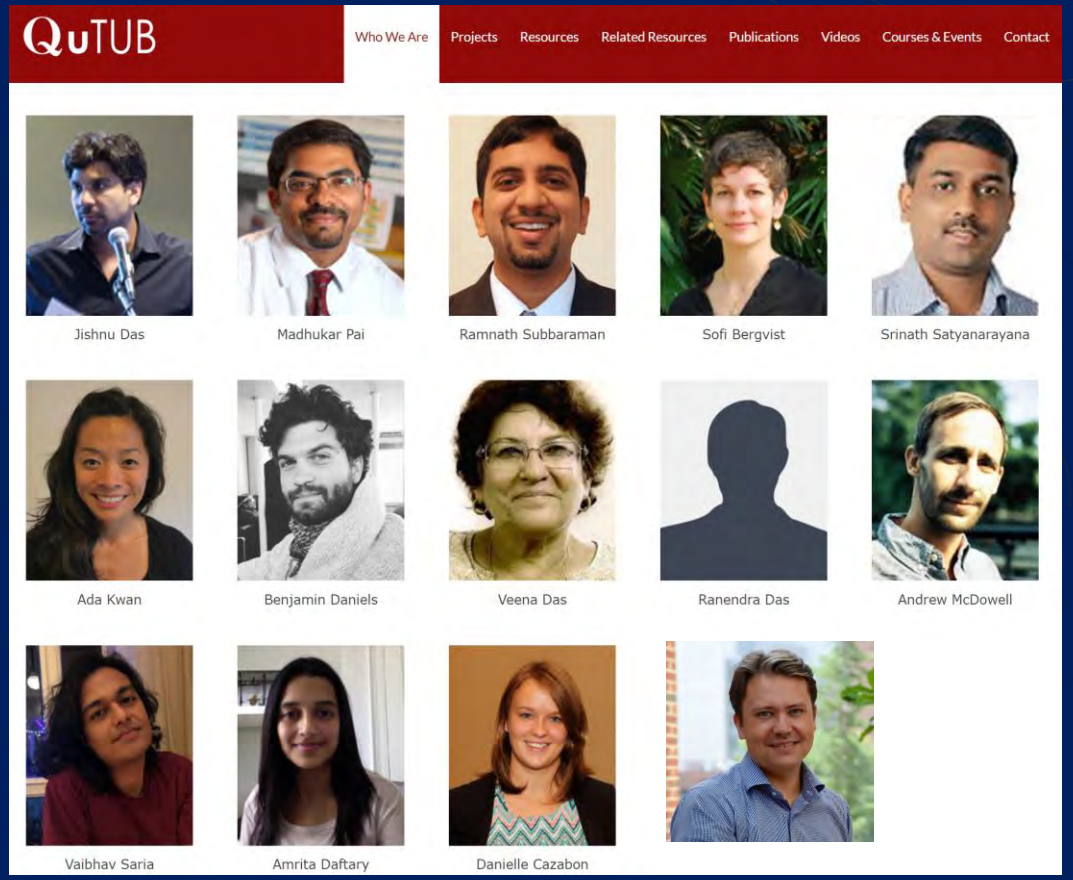


# Simulated patient studies in 4 countries: India, China, Kenya & South Africa

Use of standardised patients to assess quality of tuberculosis care: a pilot, cross-sectional study

Jishnu Das, Ada Kwan, Benjamin Daniels, Srinath Satyanarayana, Ramnath Subbaraman, Sofi Bergkvist, Ranendra K Das, Veena Das, Madhukar Pai

PLOS MEDICINE

RESEARCH ARTICLE

Variations in the quality of tuberculosis care in urban India: A cross-sectional, standardized patient study in two cities

Ada Kwan[1,2☯‡], Benjamin Daniels[1☯‡], Vaibhav Saria[3], Srinath Satyanarayana[4], Ramnath Subbaraman[5], Andrew McDowell[6], Sofi Bergkvist[7], Ranendra K. Das[3], Veena Das[8], Jishnu Das[1,9☯], Madhukar Pai[10,11☯*]

International Journal of Environmental Research and Public Health

MDPI

*Article*

**Measuring Quality Gaps in TB Screening in South Africa Using Standardised Patient Analysis**

Carmen S. Christian [1,2,*], Ulf-G. Gerdtham [3,4], Dumisani Hompashe [2,5], Anja Smith [2] and Ronelle Burger [2]

Use of standardised patients to assess gender differences in quality of tuberculosis care in urban India: a two-city, cross-sectional study

Benjamin Daniels*, Ada Kwan*, Srinath Satyanarayana*, Ramnath Subbaraman, Ranendra K Das, Veena Das, Jishnu Das†, Madhukar Pai†

Use of standardised patients to assess antibiotic dispensing for tuberculosis by pharmacies in urban India: a cross-sectional study

Srinath Satyanarayana, Ada Kwan, Benjamin Daniels, Ramnath Subbaraman, Andrew McDowell, Sofi Bergkvist, Ranendra K Das, Veena Das, Jishnu Das*, Madhukar Pai*

Research

BMJ Global Health

**Use of standardised patients to assess quality of healthcare in Nairobi, Kenya: a pilot, cross-sectional study with international comparisons**

Benjamin Daniels,[1] Amy Dolinger,[1] Guadalupe Bedoya,[1] Khama Rogo,[2] Ana Goicoechea,[3] Jorge Coarasa,[2] Francis Wafula,[2,4] Njeri Mwaura,[2] Redemptar Kimeu,[5] Jishnu Das[1,6]

PLOS MEDICINE

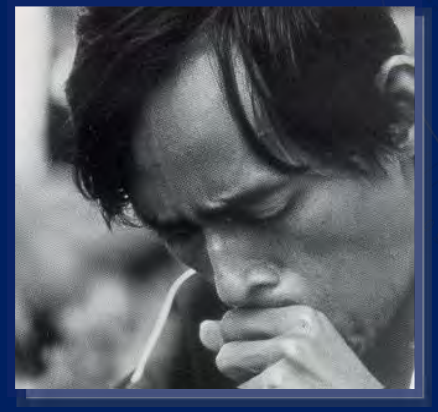
RESEARCH ARTICLE

Tuberculosis detection and the challenges of integrated care in rural China: A cross-sectional standardized patient study

Sean Sylvia[1], Hao Xue[2], Chengchao Zhou[3]*, Yaojiang Shi[2], Hongmei Yi[4], Huan Zhou[5], Scott Rozelle[6], Madhukar Pai[7], Jishnu Das[8]

www.qutubproject.org

# SIMULATED PATIENT:
CLASSIC CASE OF SUSPECTED TB



(2-3 WEEKS OF PRODUCTIVE COUGH, FEVER, WEIGHT LOSS – “PRESUMED TB”)

# RESULTS: SP WITH SUSPECTED TB

| Setting - Sector | % Correctly Managed | % Referred |
|---|---|---|
| **Delhi, India –** *private sector* | 21% | 10% |
| **Mumbai, India –** *private sector* | 37% | 15% |
| **Patna, India –** *private sector* | 33% | 10% |
| **Nairobi, Kenya –** *public & private* | 33 – 40%<br>Public: 79% asked for sputum test<br>Private: 36% asked for sputum test | 4% - 10% |
| **Rural China (3 provinces) -** *public* | 28%, village clinics<br>38%, township centers<br>90%, county hospitals | 28%, village clinics<br>18%, township centers<br>5%, county hospitals |
| **South Africa –** *public*<br>**(Western & Eastern Cape)** | 43% got TB and HIV tests<br>84% got sputum TB tests | |
| **South Africa –** *private*<br>**(KZN)** | 35% | 26% |



Das et al. (2015); Kwan et al. (2018); Daniels et al. (2017); Sylvia et al. (2017); Christian et al. (2018); Daftary et al. (unpublished)

# EMPIRICAL TREATMENT IS THE NORM

INT J TUBERC LUNG DIS 20(4):000–000
© 2016 The Union
http://dx.doi.org/10.5588/ijtld.15.0562

## Treatment as diagnosis and diagnosis as treatment: empirical management of presumptive tuberculosis in India

A. McDowell, M. Pai

McGill International TB Centre & Department of Epidemiology, Biostatistics and Occupational Health, McGill University, Montreal, Quebec, Canada

*Trans R Soc Trop Med Hyg* 2016; **110**: 192–198
doi:10.1093/trstmh/trw009

## Alternative medicine: an ethnographic study of how practitioners of Indian medical systems manage TB in Mumbai

**Andrew McDowell and Madhukar Pai***

*McGill International TB Centre & Department of Epidemiology, Biostatistics and Occupational Health, McGill University, 1020 Pine Avenue West, Montreal, QC, Canada H3A 1A2*

# HOW CAN WE ADDRESS THESE PROBLEMS?

- Upgrade our toolbox
- Use human-centered design to make TB care people-centric
- Improve quality of care in both private & public sectors
- Address system-wide issues & foundations

**Dr. Madhukar Pai**
Professor & Director of Global Health, McGill University

***THE BLOG***

# We Need To Science The Shit Out Of Tuberculosis

For too long, TB patients and care providers have been fighting a protracted battle with antiquated, inefficient tools, diagnostics, vaccines and drug regimens.

06/07/2018 14:31 EDT | **Updated** 06/07/2018 14:31 EDT


WADE HOWARD, INTERACTIVE RESEARCH AND DEVELOPMENT SOUTH AFRICA (IRD), USED WITH PERMISSION OF THE PHOTOGRAPHER AND THOSE IN THE IMAGE

We simply cannot end the TB epidemic with our current tools and approaches. We need to invest in science, develop new tools, and implement the best tools we have today. To ensure impact, the TB research agenda must be led by those who are most affected.

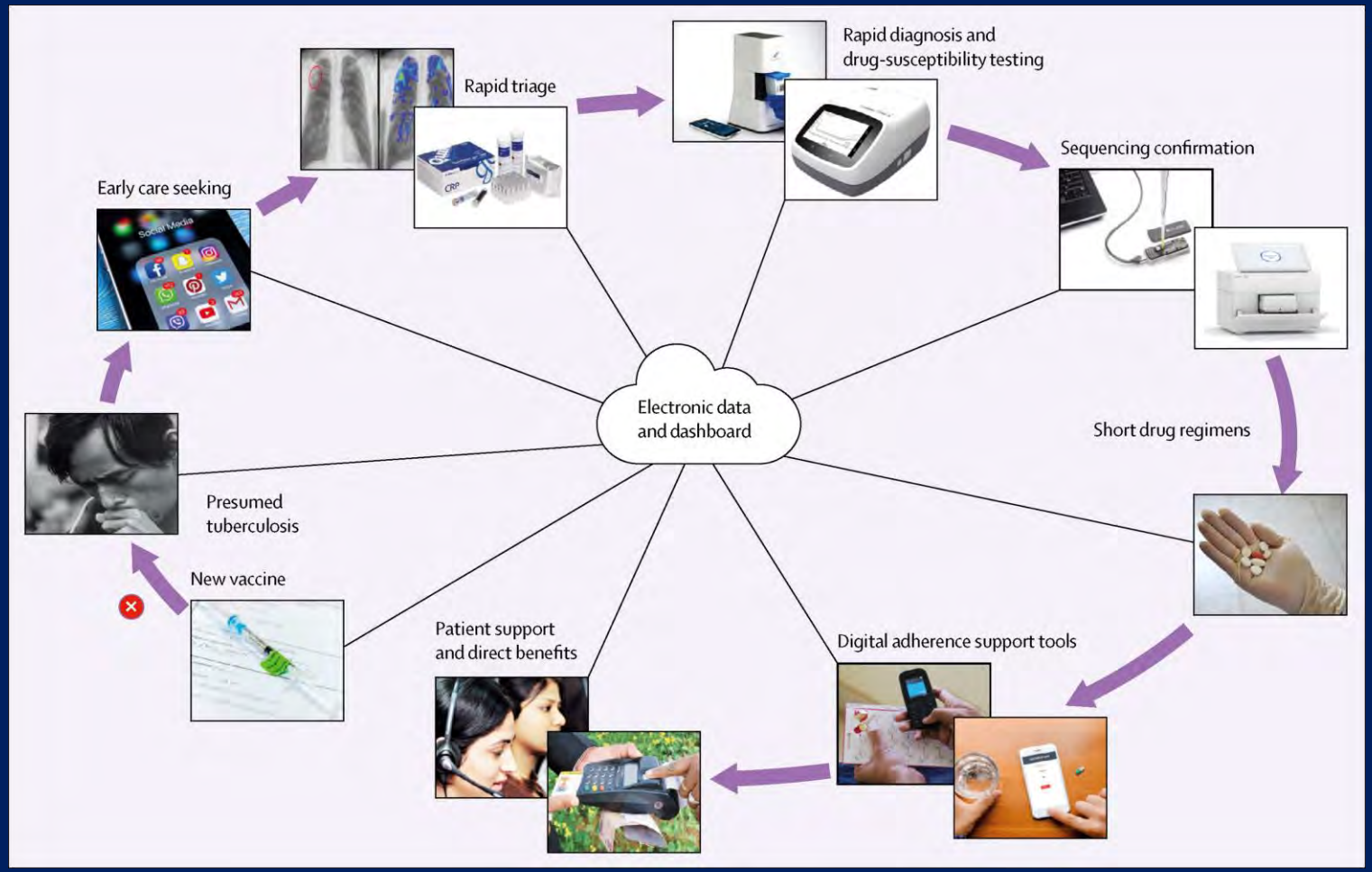


https://www.huffingtonpost.ca/dr-madhukar-pai/tuberculosis-cure-treatment-research_a_23449596/?utm_hp_ref=ca-blogs

Seminar

# Tuberculosis

*Jennifer Furin, Helen Cox, Madhukar Pai*




Furin J, Cox H, Pai M. Lancet 2019

# ACTIVE TB CARE: REIMAGINED


Systematic screening

Presumed TB


Early care seeking & clinical assessment


Rapid Triage


Rapid Dx & DST

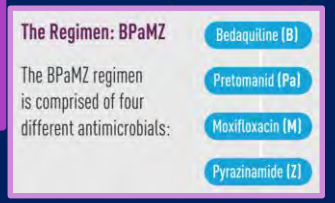
Sequencing confirmation

New vaccine

eTB ICT & dashboard

Test for treatment response & cure

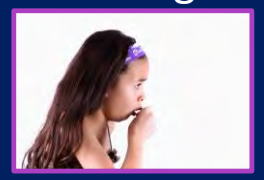
Patient support & benefits, adverse event management




Short drug regimens

# CHILDHOOD TB CARE: REIMAGINED


Contact & systematic screening



Possible TB


Early care seeking & clinical assessment

Rapid Triage


Sputum and non-sputum based rapid Dx & DST for PTB and EPTB

Sequencing confirmation

New vaccine

eTB ICT & dashboard

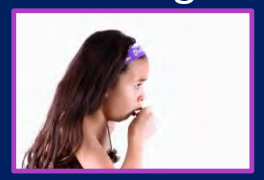
Test for treatment response & cure

Adherence, nutritional & family support

Short drug regimens
Child-friendly formulations

# CHILDHOOD TB CARE: REIMAGINED


Contact & systematic screening



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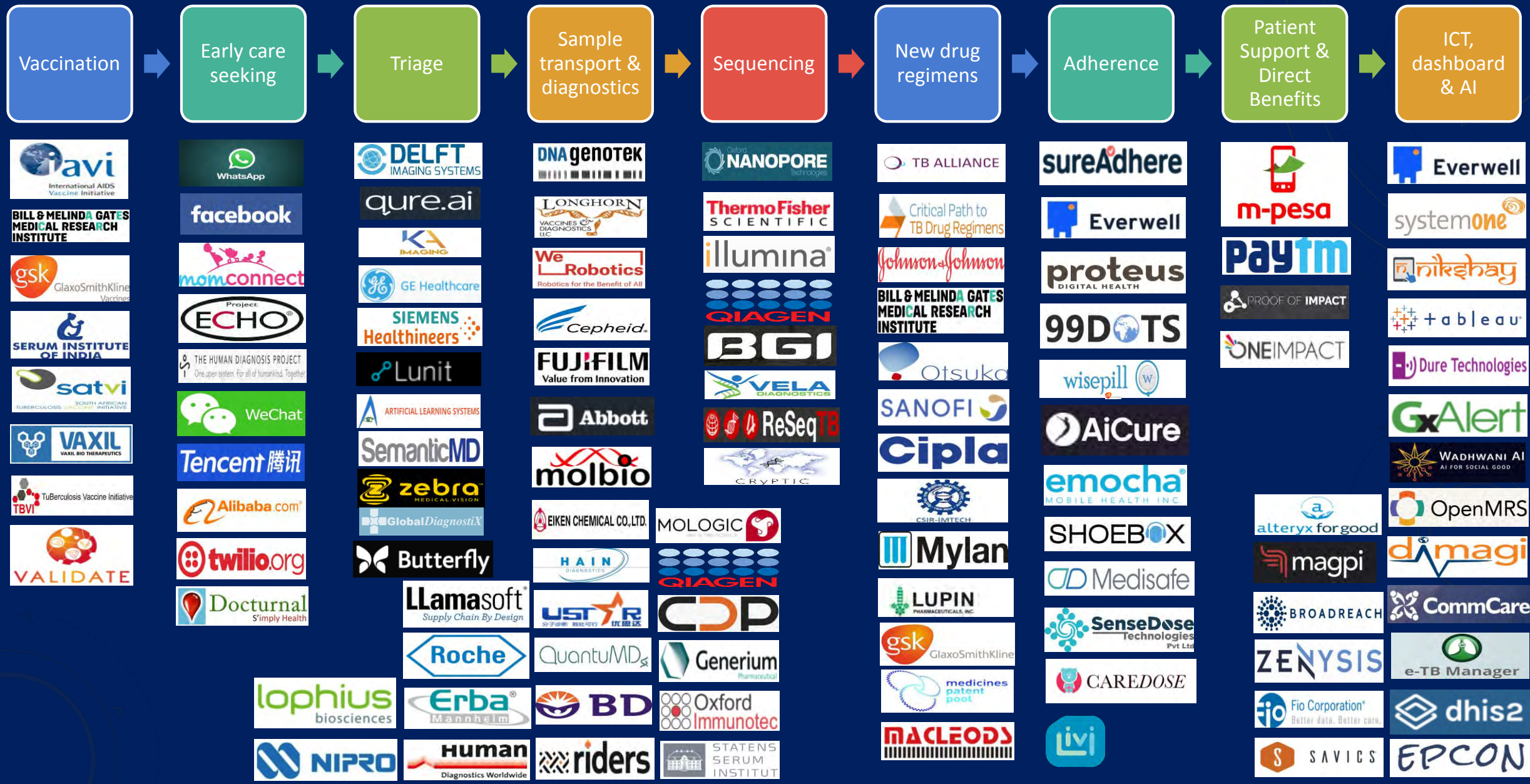
# PRODUCT ECOSYSTEM



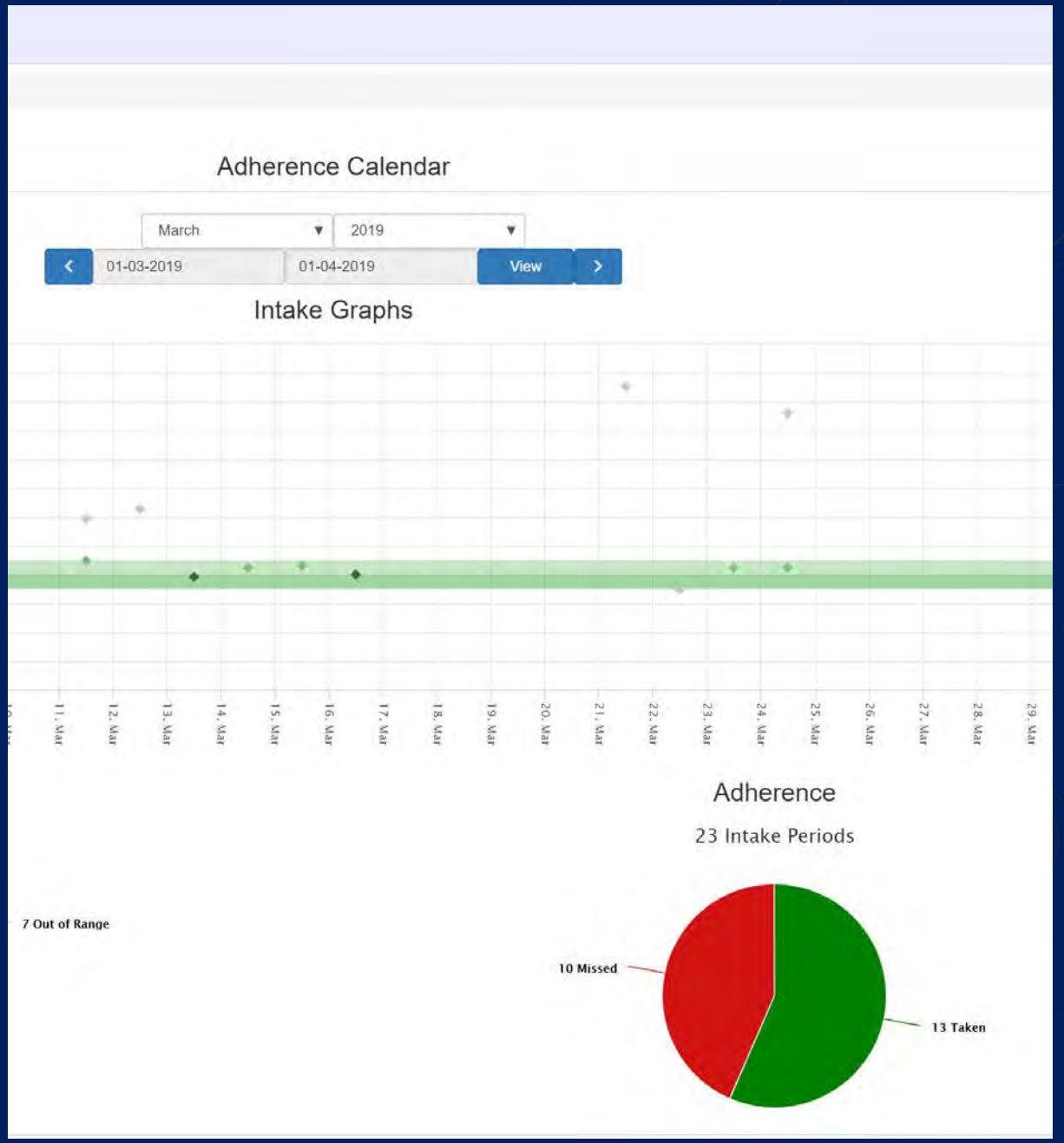
# IS TB CARE HUMAN-CENTERED?


Saturday 7:00 AM

Please remember to take your medication.

Yesterday 7:00 AM

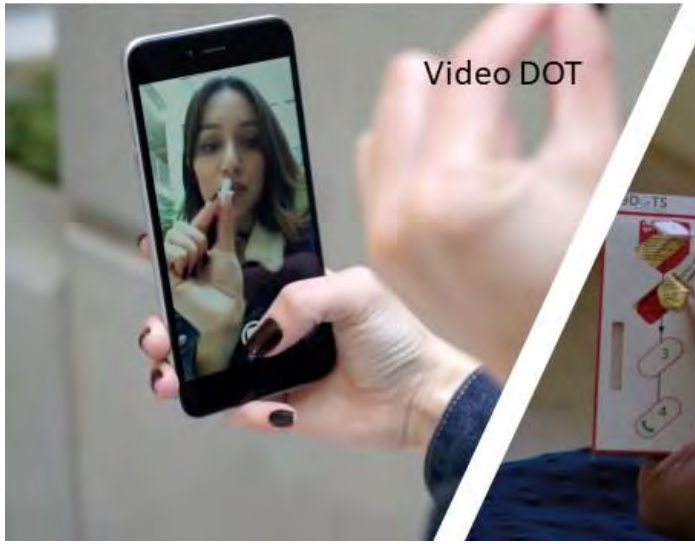
Please remember to take your medication.



Call centers




Smart pill boxes



Video DOT

99DOTS

DOT


# HUMAN-CENTERED DESIGN TO IMPROVE TB CARE

# PATIENTS' *WISH LIST* FOR TB CARE

# HUMAN-CENTERED DESIGN

Care close to home

Awareness via social media

Rehab after Rx

Peer support & mental health care

Pre-test counseling

Shorter, non-toxic regimens based on DST

Individualized support

- Counseling before TB testing
- Non-sputum based rapid diagnostic test
- Rapid DST test, if found to have TB
- Test results to patients via mobiles + link to f-up
- Counseling about test results, screening for other conditions
- Rx with shorter, best regimens at the same site of Dx
- Shared plan for Rx, including managing adverse effects
- Individualized plan for treatment support
- Access to patient navigators and/or peer support during Rx
- Access tol follow-up, including mental health services
- Social benefits & security (e.g. cash transfers, nutrition)
- Post-treatment employment & rehab
- Awareness about TB via social & other media
- Access to affordable, community-based care

# MOST TB PROGRAMS STILL FOCUS ON COVERAGE, NOT QUALITY!

DOTS coverage


What about quality?

The Science of Improvement: TB Cannot Afford to Lag Behind


**The Science of Improvement: TB Cannot Afford to Lag Behind**

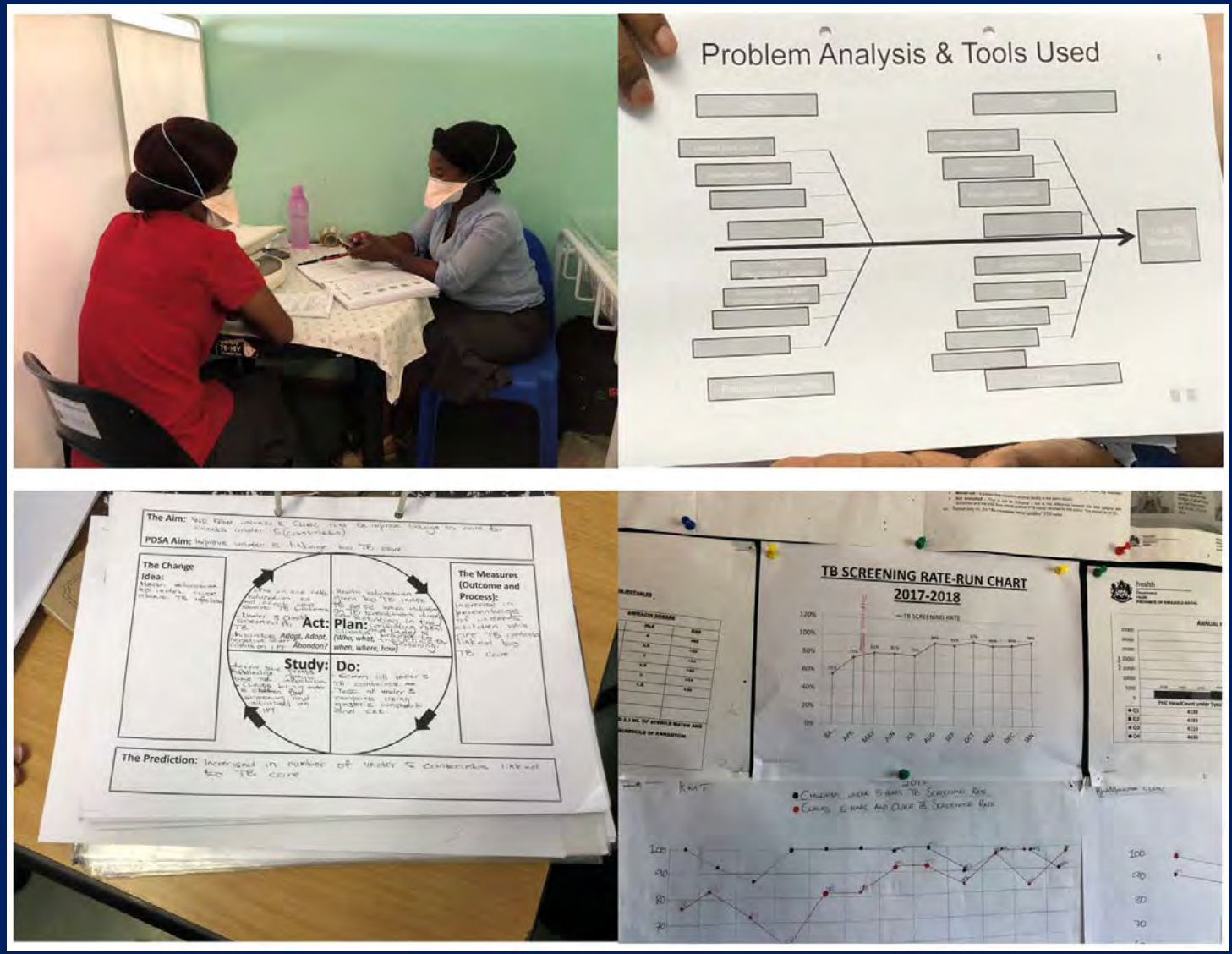
At a recent conference, I learnt about the Science of Improvement, and was struck by the lack of an improvement culture within my field of tuberculosis...

naturemicrobiologycommunity.nature.com



https://naturemicrobiologycommunity.nature.com/users/20892-madhukar-pai/posts/32859-science-of-improvement-tb-cannot-afford-to-lag-behind

# SOUTH AFRICA'S QI PROGRAM IN PUBLIC SECTOR



# PPIA PROGRAMS IN MUMBAI AND PATNA

## INDIA: PRIVATE PROVIDER ENGAGEMENT MODEL

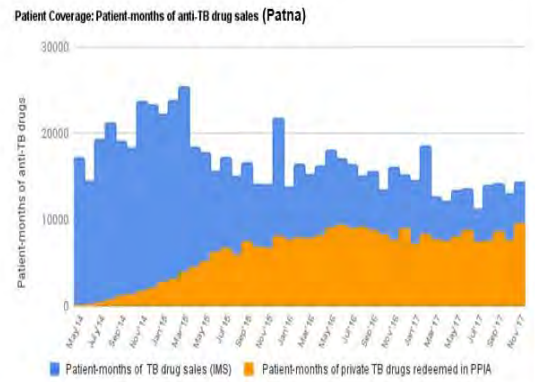
Attract TB notifications with services

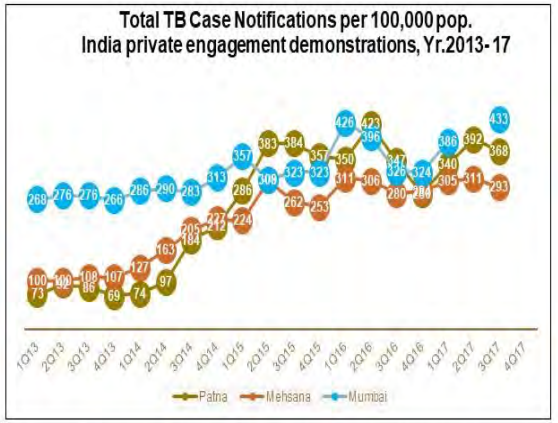
Sustain treatment

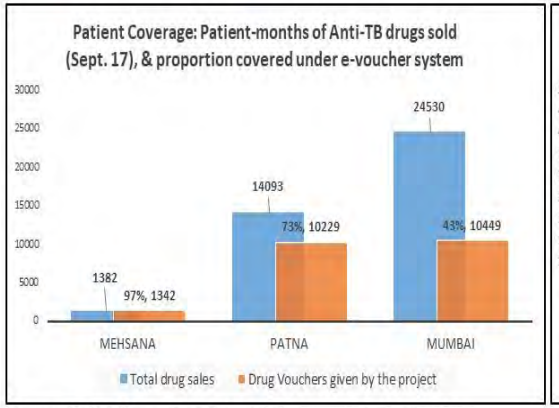
Monitor & improve quality

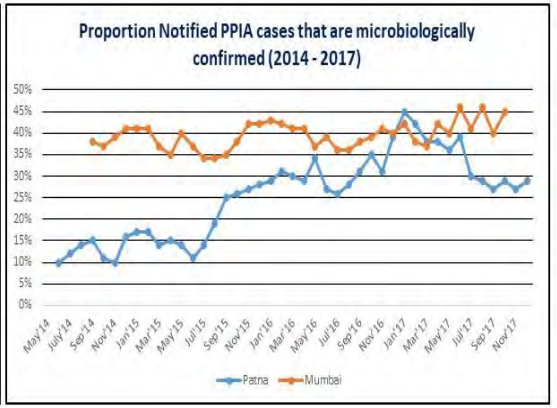




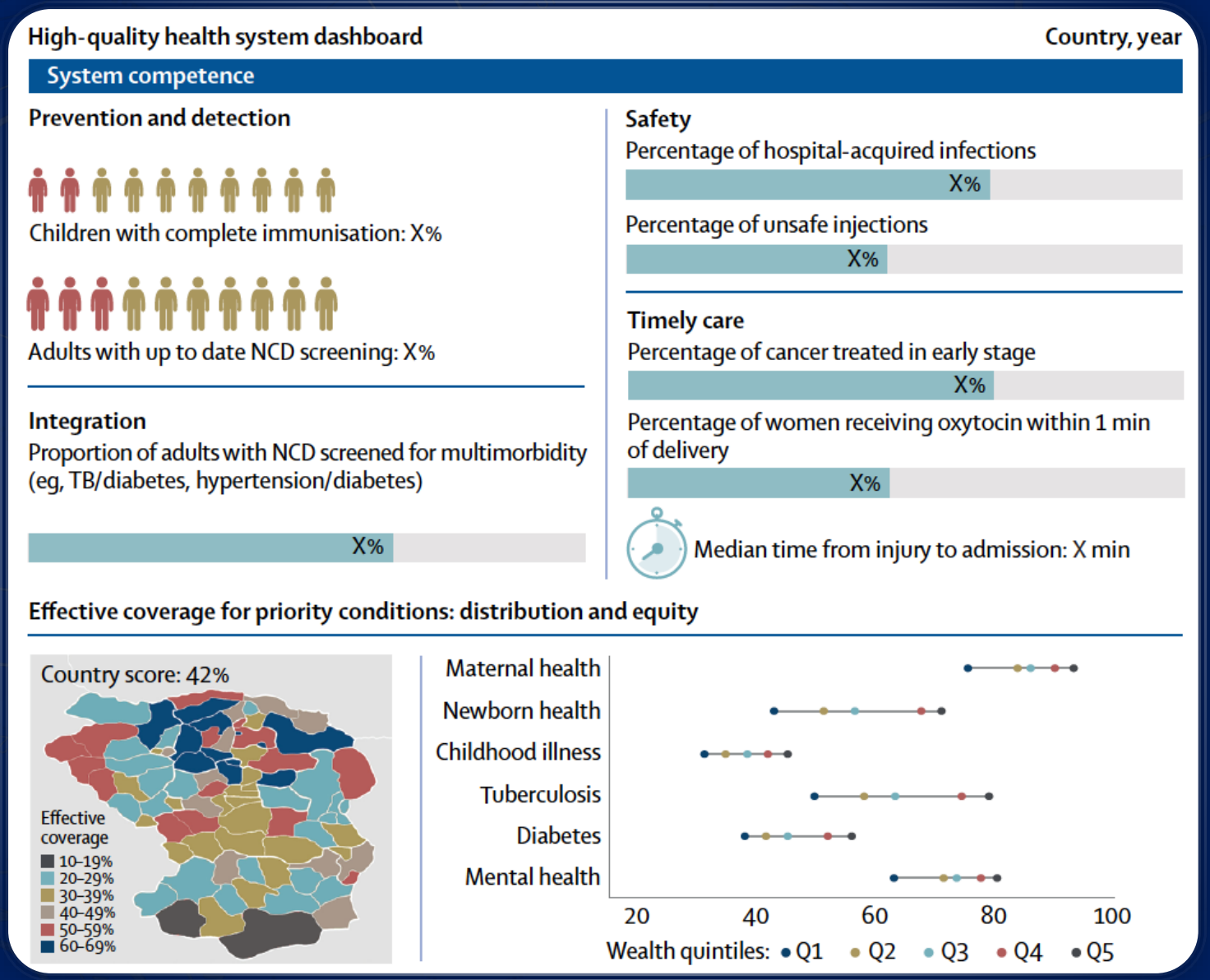




*Source: RNTCP Maharashtra, Gujarat, & Bihar unpublished project data.*

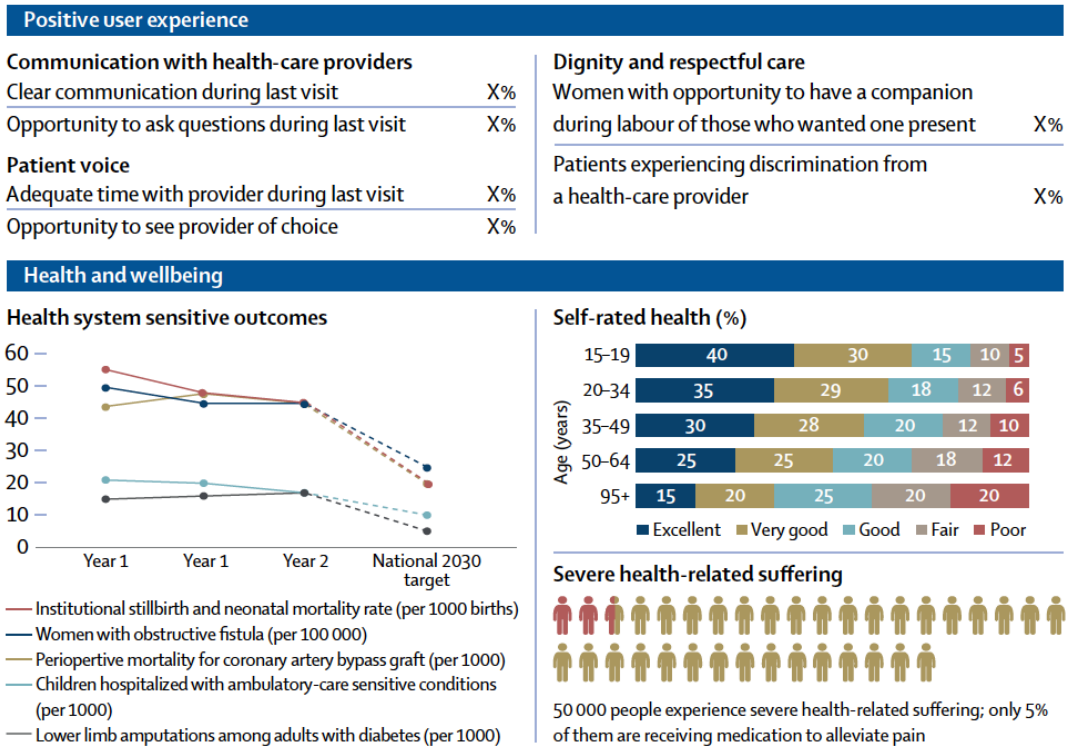


Source: RNTCP, PATH, World Health Partners, BMGF

# ALL TB PROGRAMS NEED A QUALITY DASHBOARD



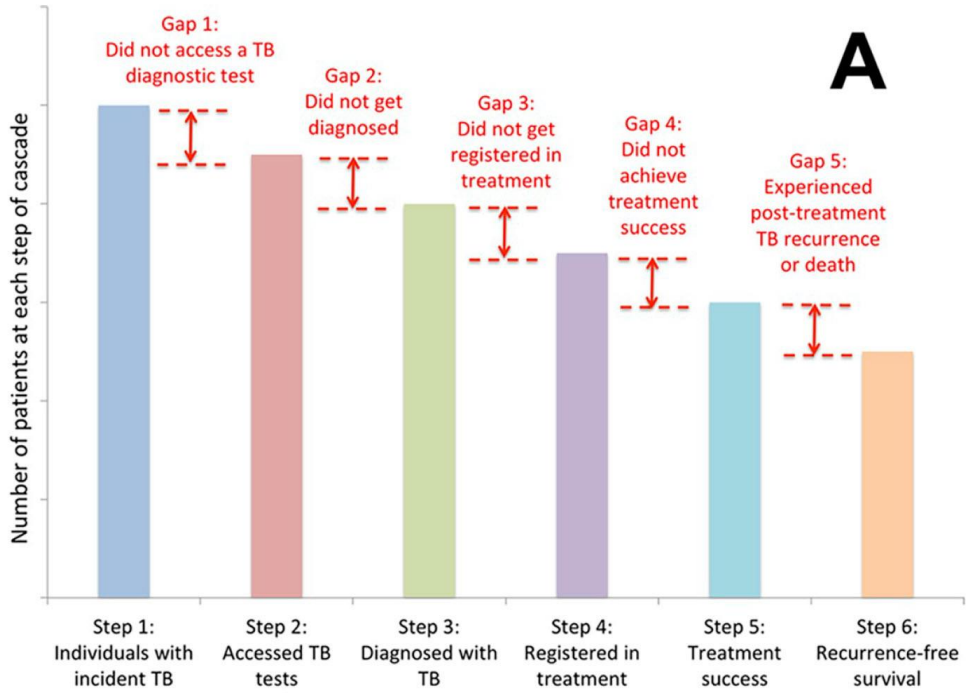

HQSS
The Lancet Global Health Commission on High Quality Health Systems in the SDG Era




# ALL TB PROGRAMS MUST LISTEN TO PATIENTS

HQSS

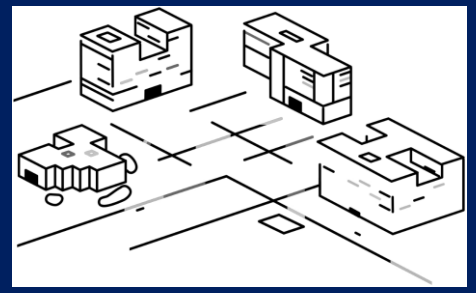
*The Lancet Global Health* Commission on **High Quality Health Systems** in the **SDG Era**




# ALL TB PROGRAMS MUST ANALYZE CARE CASCADES

# BEYOND QI: ADDRESSING SYSTEM-WIDE ISSUES

# We need to expand solution space for improvement



Local (micro)

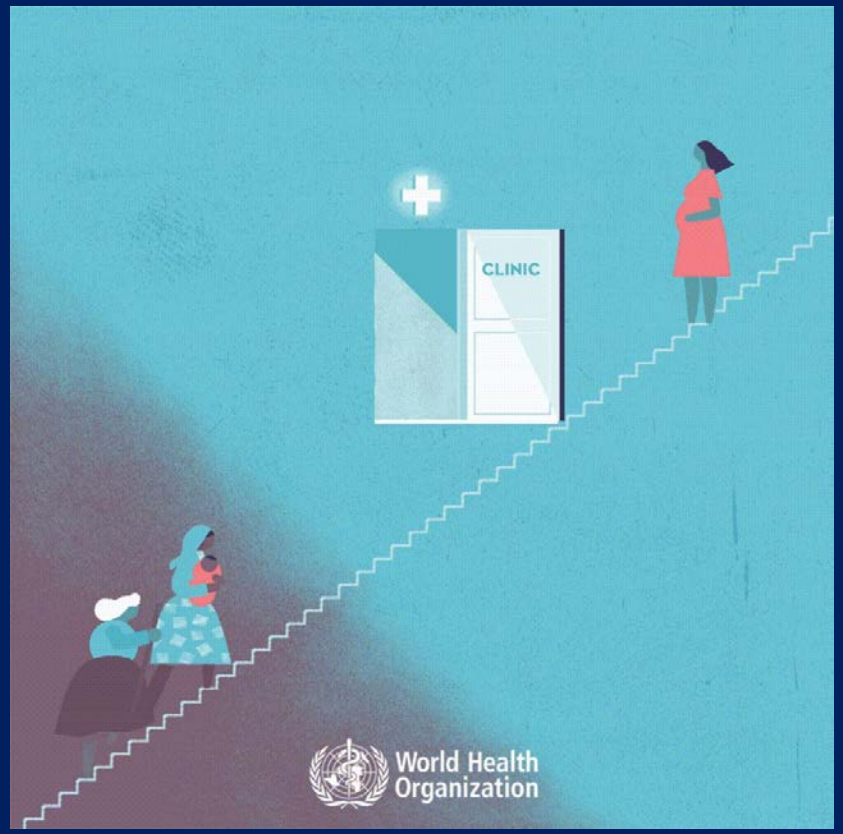
Facility level QI
Behavior change
Local scale

Structural (macro)

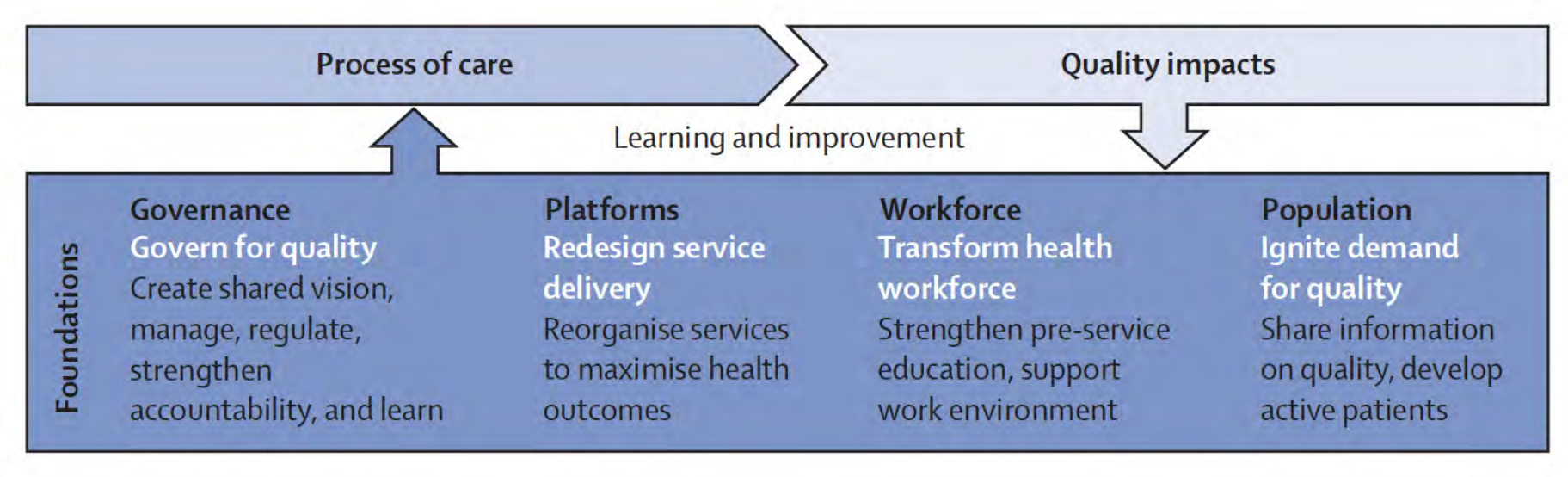
System level
Slower to implement
Large scale

HQSS
The Lancet Global Health Commission on High Quality Health Systems in the SDG Era

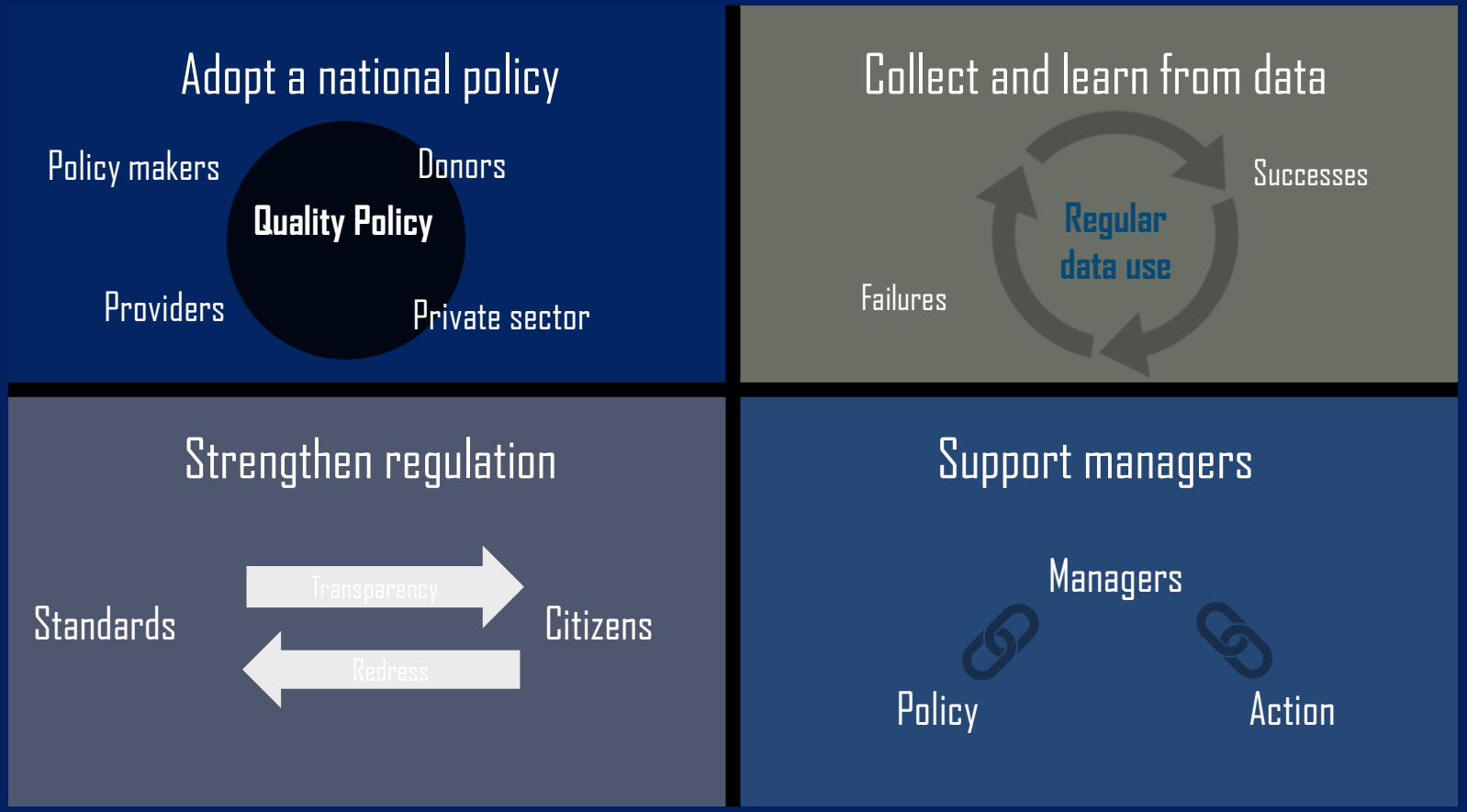
# EVERYONE WORKING IN TB MUST ADVOCATE FOR UHC



# FOUR UNIVERSAL ACTIONS



# 1. GOVERN FOR QUALITY



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# 2. REDESIGN SERVICE DELIVERY

Reorganize services to maximize health outcomes

Conditions that demand advanced clinical expertise

Tertiary

Secondary

Primary

Low-acuity conditions requiring coordinated, continuous care



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The Lancet Global Health Commission on High Quality Health Systems in the SDG Era

# 3. TRANSFORM HEALTH WORKFORCE

Strengthen health professional education

Build an enabling work environment beyond graduation

# 4. IGNITE DEMAND FOR QUALITY

Support patients to become active participants

## Quality reporting

Share data on quality with communities through report cards

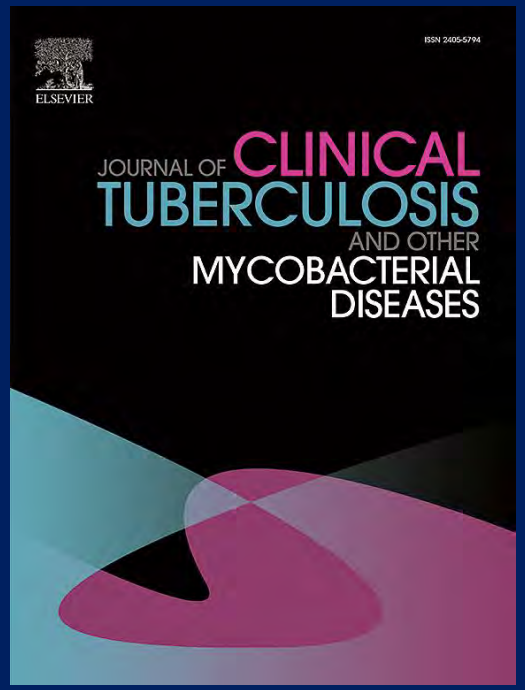
## Community monitoring

Establish community boards to assess performance and provide feedback

## Participatory women's groups

Learning and action cycles in facilities with community engagement

# SERIES ON QUALITY OF TB CARE: J CLINICAL TB




Quality: The missing ingredient in TB care and control

Quality of drug-resistant tuberculosis care: Gaps and solutions

Lessons on the quality of tuberculosis diagnosis from standardized patients in China, India, Kenya, and South Africa

+ more than 10 papers in the next 3-4 months


WORLD
TB DAY
March 24
It's
TIME
To End TB
#WorldTBDay2019
Stop TB Partnership