Implementing TB diagnostic testing in high burden settings:
Challenges and the role of models

Across the Disease Spectrum: The Future of Modelling TB Diagnostic Testing
Washington DC
Friday 14th September

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IRD Global

Overview

A. TB diagnosis is complex

    1. Demand creation

    2. Enabling access

    3. Screening and diagnosis

    4. Logistics, linkages and data

B. The role of modelling

A. TB DIAGNOSIS IS COMPLEX

Pakistan's Zero TB Initiative

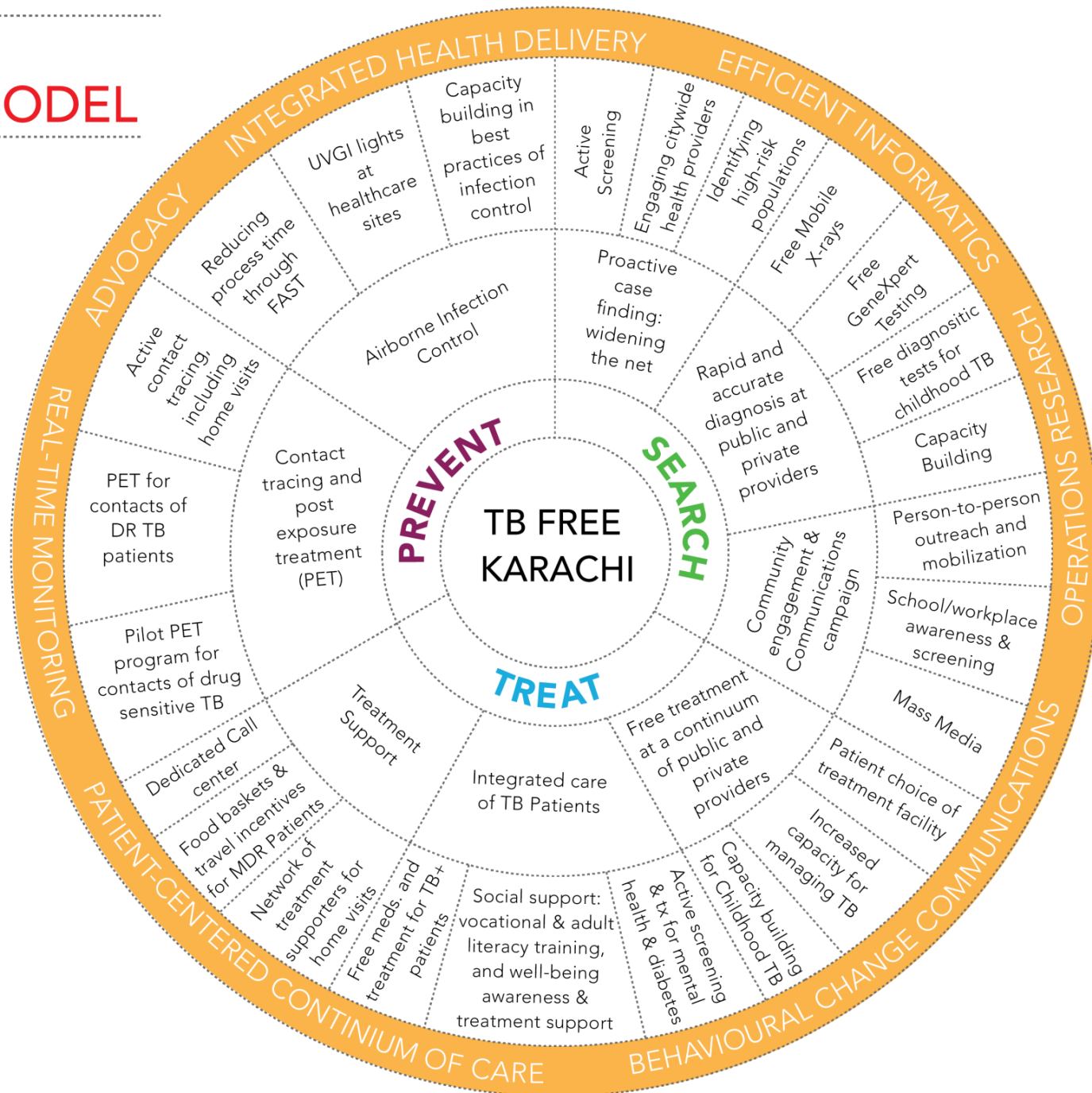Global Fund Support
2016-2017 USD 40m – Zero TB Karachi +32 districts
2018-2020 USD 40m – Zero TB Karachi, Peshawar, Quetta + 32 districts

ZERO TB

ZERO TB CONCEPTUAL MODEL

Outer ring segments: INTEGRATED HEALTH DELIVERY · EFFICIENT INFORMATICS · OPERATIONS RESEARCH · BEHAVIOURAL CHANGE COMMUNICATIONS · PATIENT-CENTERED CONTINIUM OF CARE · REAL-TIME MONITORING · ADVOCACY

Center: TB FREE KARACHI

Core categories: PREVENT · SEARCH · TREAT

PREVENT
- Airborne Infection Control
  - UVGI lights at healthcare sites
  - Capacity building in best practices of infection control
  - Reducing process time through FAST
- Contact tracing and post exposure treatment (PET)
  - Active contact tracing, including home visits
  - PET for contacts of DR TB patients
  - Pilot PET program for contacts of drug sensitive TB

SEARCH
- Proactive case finding: widening the net
  - Active Screening
  - Engaging citywide health providers
  - Identifying high-risk populations
- Rapid and accurate diagnosis at public and private providers
  - Free Mobile X-rays
  - Free GeneXpert Testing
  - Free diagnositic tests for childhood TB
  - Capacity Building
- Community engagement & Communications campaign
  - Person-to-person outreach and mobilization
  - School/workplace awareness & screening
  - Mass Media

TREAT
- Treatment Support
  - Dedicated Call center
  - Food baskets & travel incentives for MDR Patients
  - Network of treatment supporters for home visits
- Integrated care of TB Patients
  - Free meds. and treatment for TB+ patients
  - Social support: vocational & adult literacy training, and well-being awareness & treatment support
  - Active screening & tx for mental health & diabetes
  - Capacity building for Childhood TB
- Free treatment at a continuum of public and private providers
  - Increased capacity for managing TB
  - Patient choice of treatment facility

ZERO TB

1. Demand creation

- Challenges
  - An afterthought
  - Under or unfunded
  - Inappropriate
    - Content
    - Methods

# 2. Enabling access

- Patient-related factors
  - Stigma – in South Africa: Greater for TB than HIV
  - Provider trust
  - Costs, multiple visits
  - Gender issues
    - Pakistan: Reduced for females
    - South Africa: Reduced for males
- Definition of vulnerable populations by setting
- Geographic
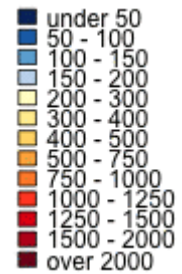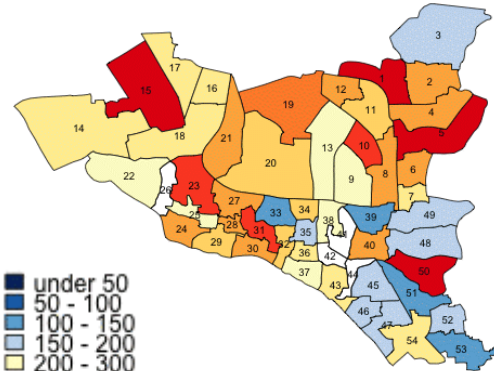 - Taking services people/ missing patients in facilities
  - Role of mapping
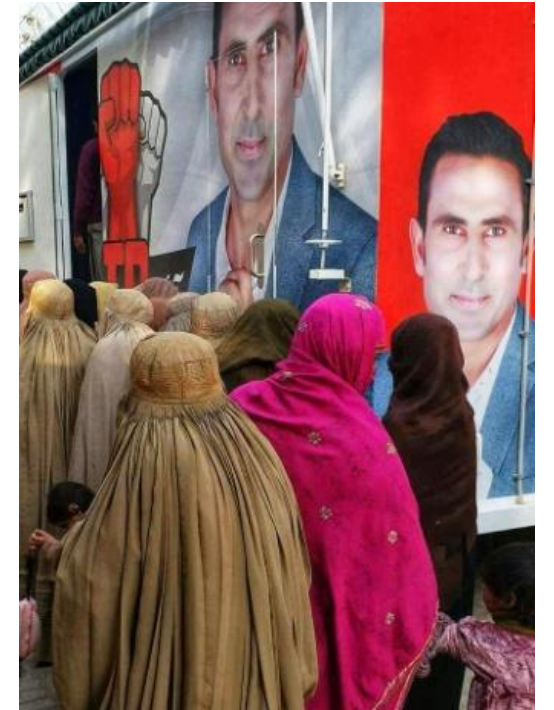
Bangladesh: Map of 423 facilities
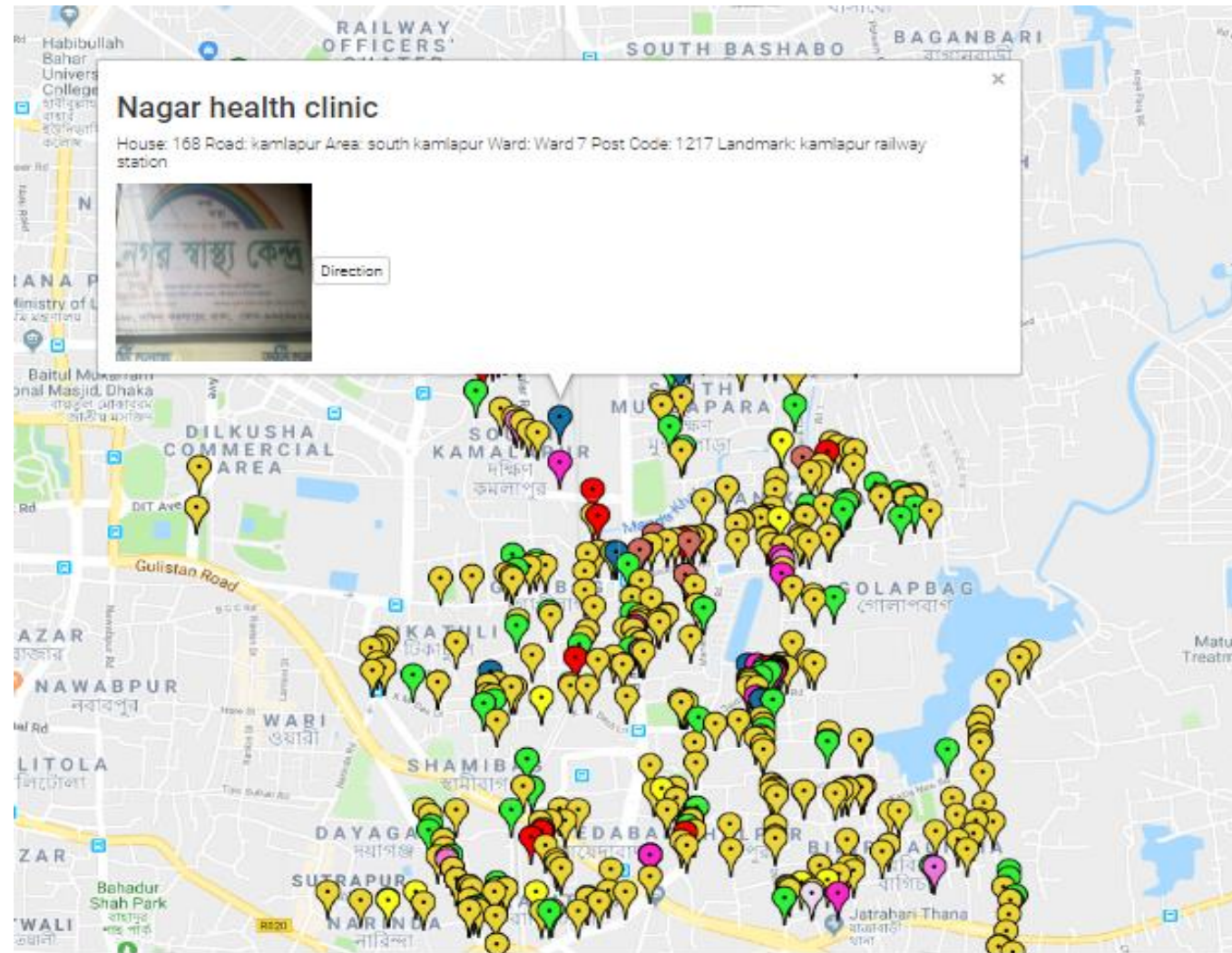
Pharmacy -330

PP Clinic-12

Consultation center- 48

Diagnostic center-12

DOT center-12

Specialised hospital -9
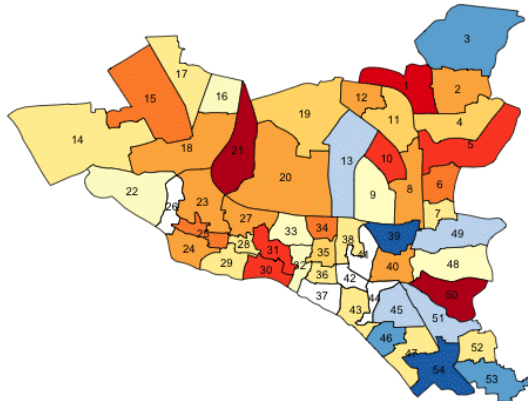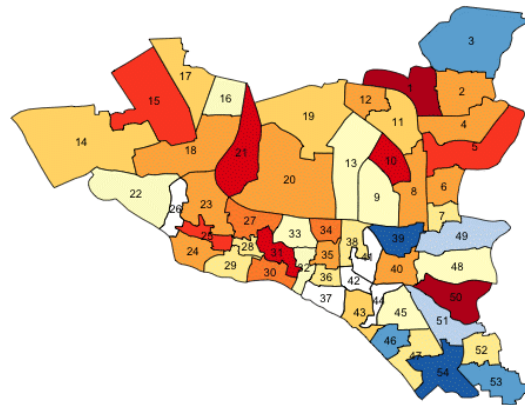
Bangladesh: TB incidence by reporting unit
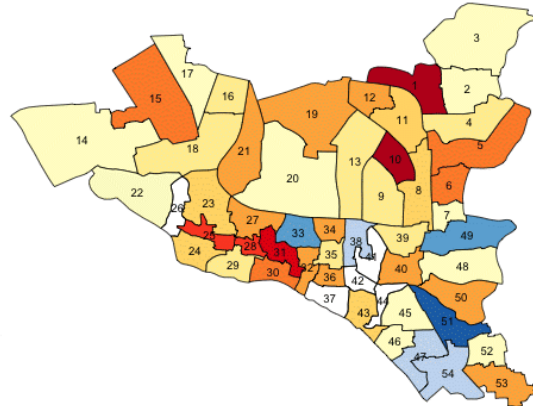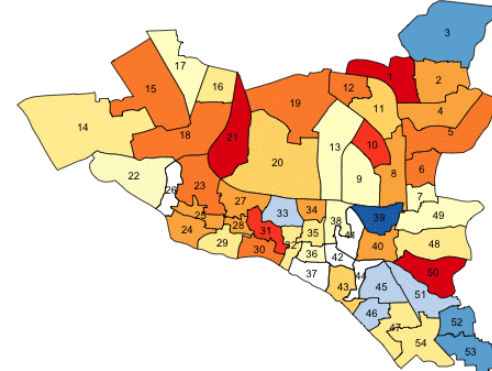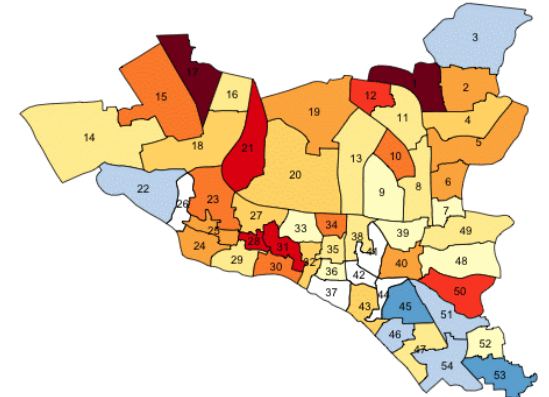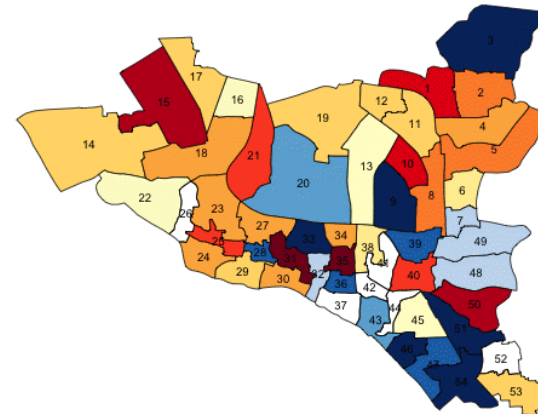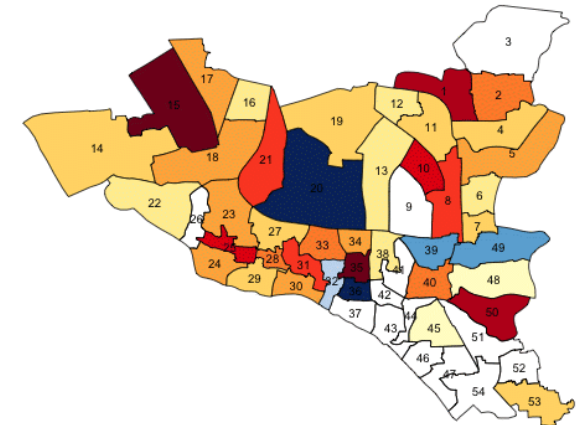
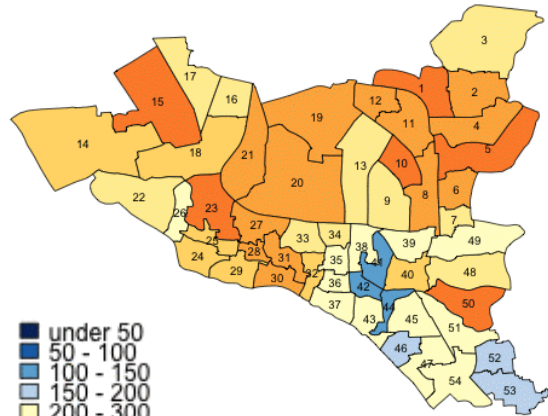# Bangladesh: TB incidence by residence
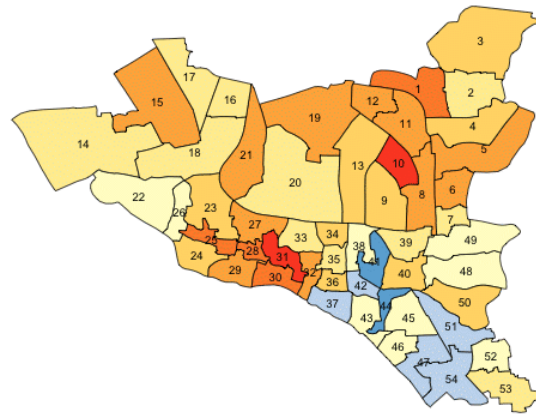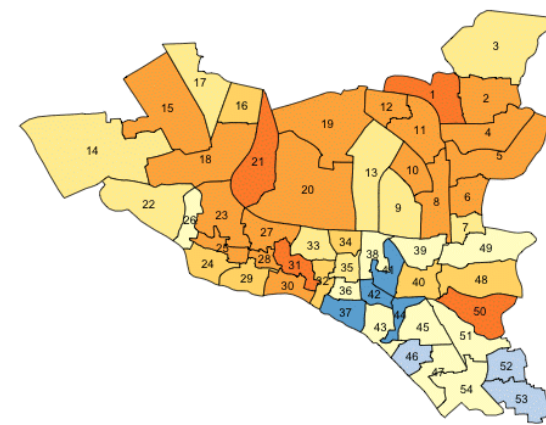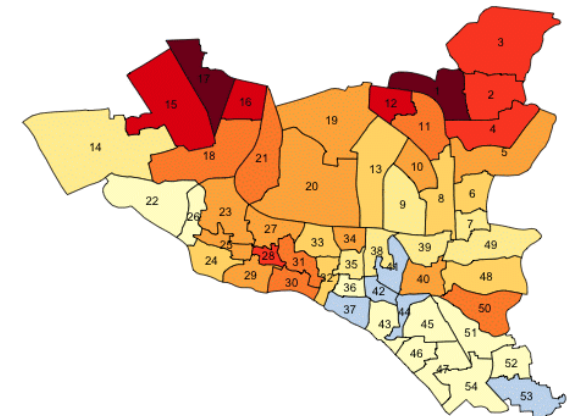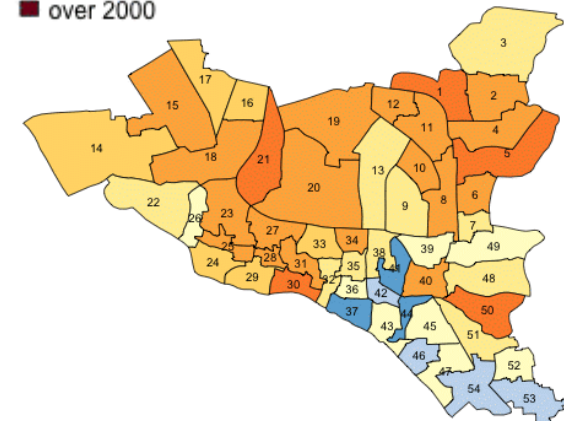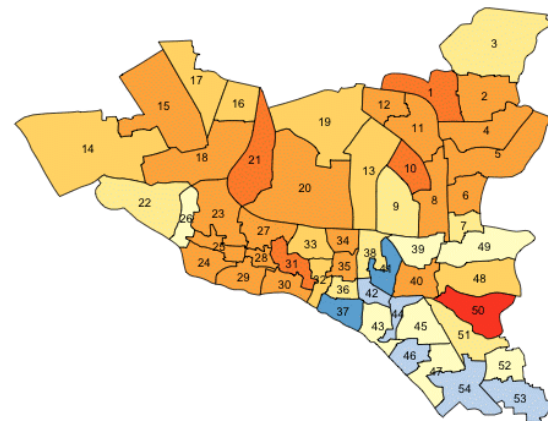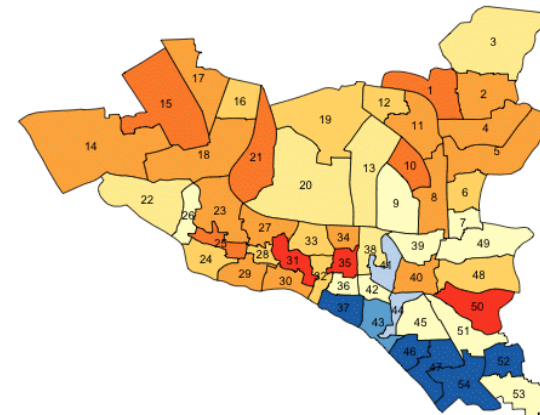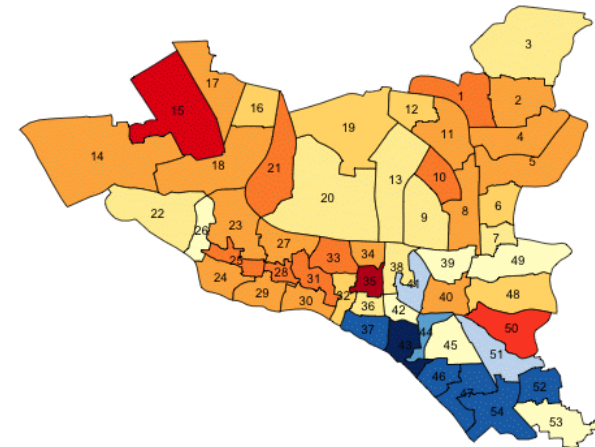
3. SCREENING AND DIAGNOSIS

TB diagnostic pathway

NNS: 95
Overall yield: 0.4%

Screened	Presumptive	Sputum collected	TB positive	Treatment
2 368	1 439	638	25	9

61%   44%   4%   36%
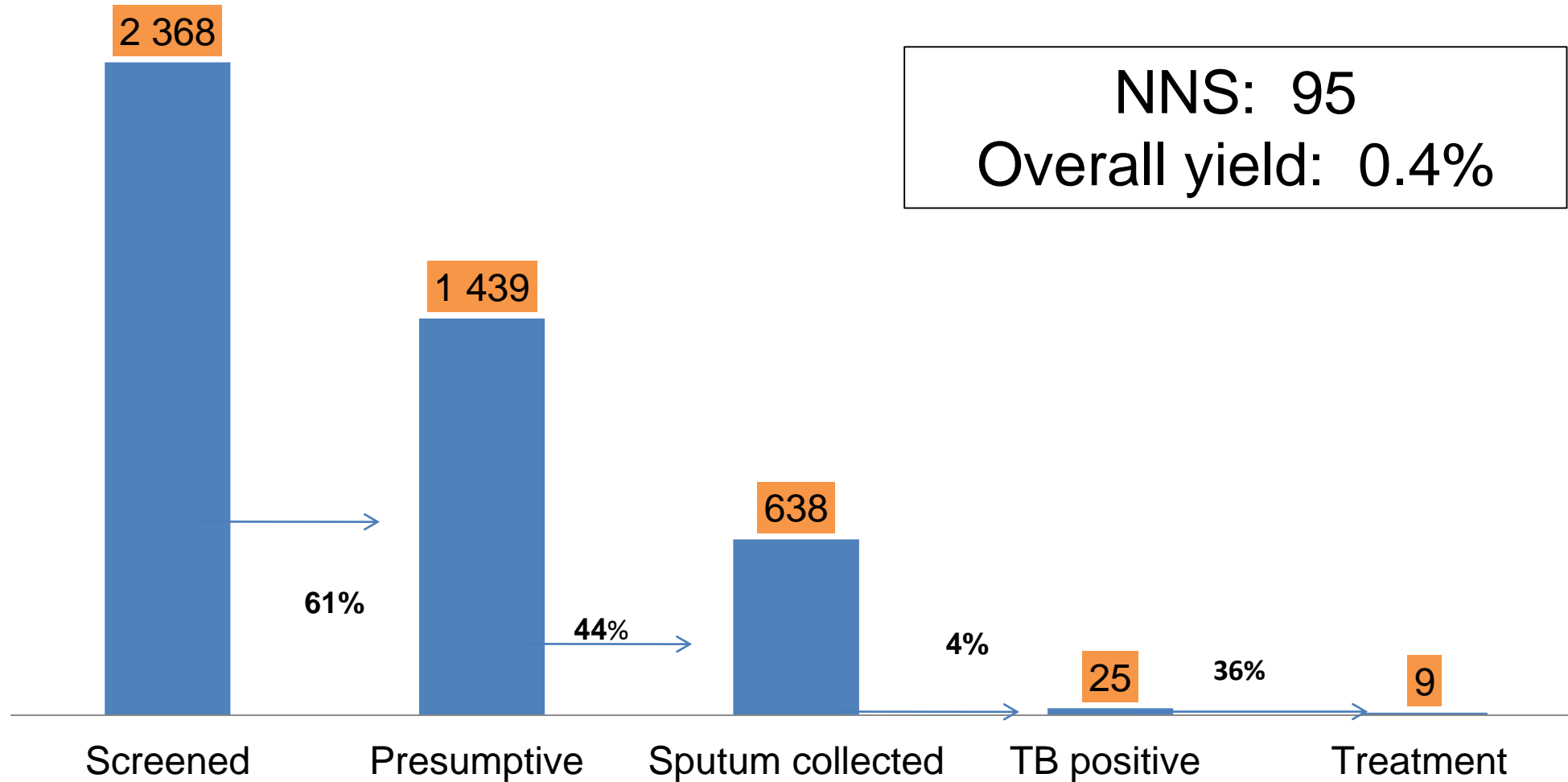
TB diagnosis may be "subjective"

- **Depends on staff motivation and mentoring**
- Symptom screen as initial tool
  - User dependent/symptom choice
- CXR with CAD as initial screen
  - Arguably more objective as a screen
- **Dependent on good quality sputum**
  - Sputum positive (smear/ Xpert/ Culture)- objective measure
  - Sputum negative
    - Very poor adherence to algorithms
    - Ultimately a clinical diagnosis is may be dependent on a medical officer, here DCXR can be valuable for diagnosis

Adherence Support

4. LOGISTICS, LINKAGES AND DATA

Laboratory

- Capacity
  - Staff
  - Working hours
  - Commodities
- Linkages
  - Transport
  - Results
- Quality Control

Increase in Xpert tesing: Karachi

Year	Quarter	Value
2014	Q1	3162
2014	Q2	3863
2014	Q3	3889
2014	Q4	5868
2015	Q1	7326
2015	Q2	8235
2015	Q3	7856
2015	Q4	9106
2016	Q1	9811
2016	Q2	8242
2016	Q3	9044
2016	Q4	18292
2017	Q1	20909
2017	Q2	27302
2017	Q3	35233
2017	Q4	36463
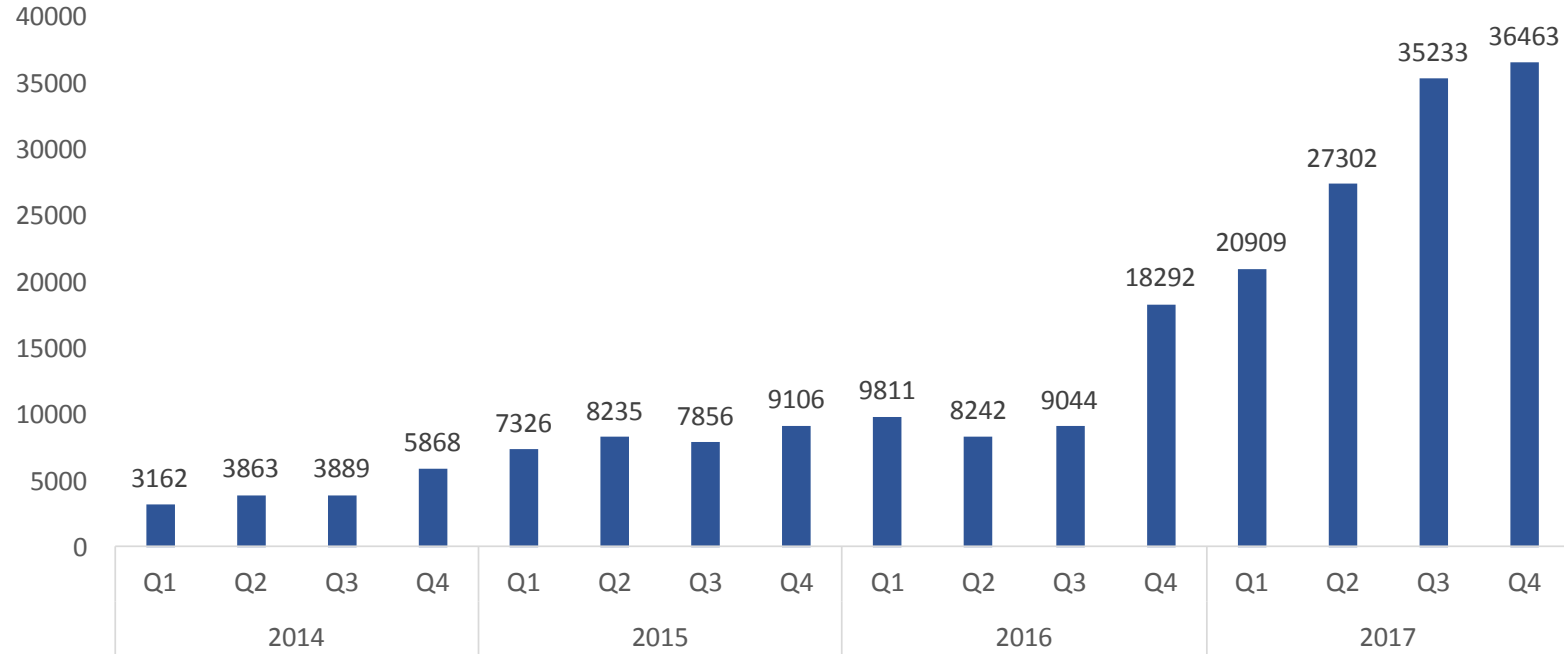
Data collection and linkages

- M-Health
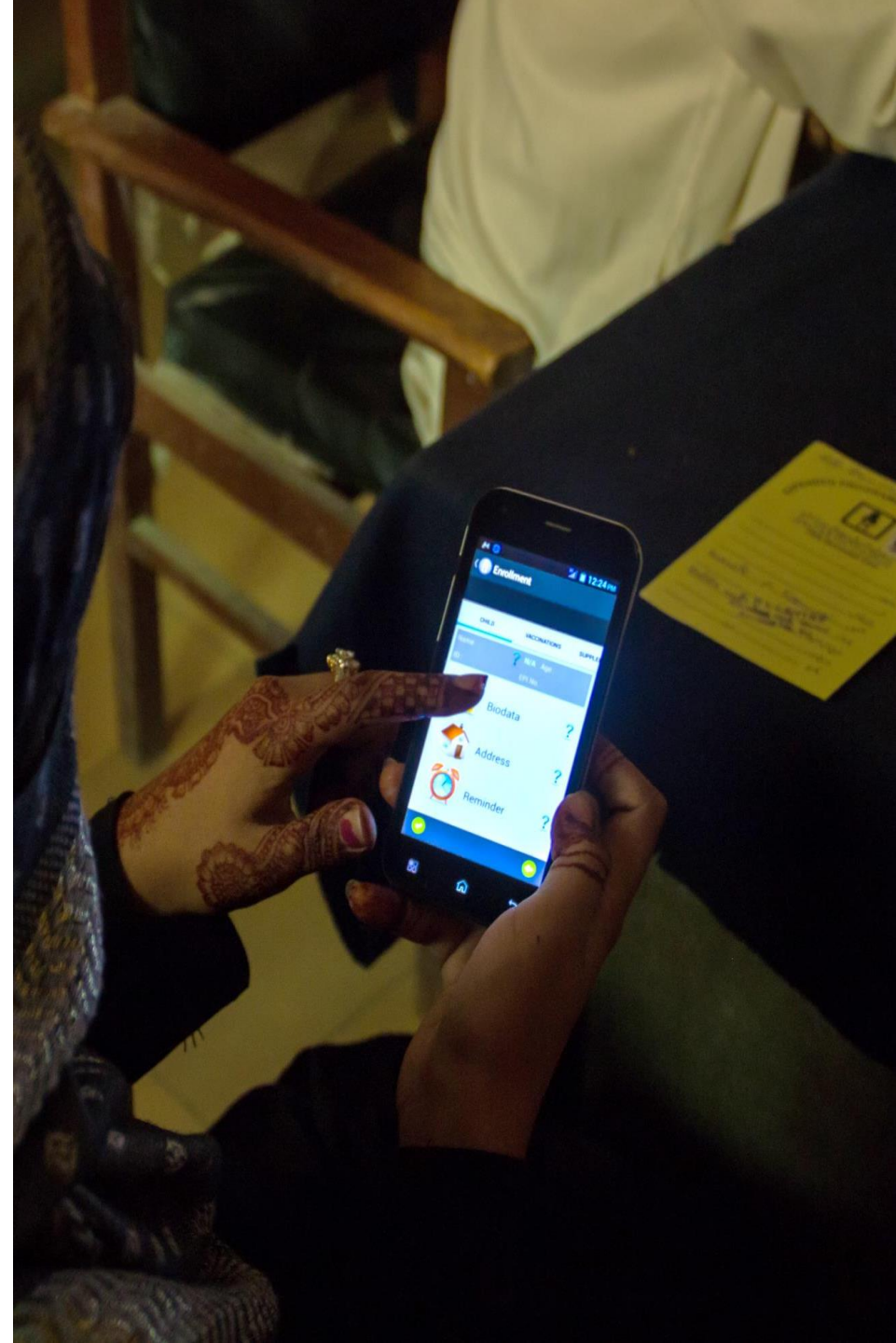 - Data collection
  - Lab linkage
 - Patient reminders
  - Real time monitoring

B. THE ROLE OF MODELLING

Advocacy

Population-Level Impact of Active Tuberculosis Case Finding in an Asian Megacity

David W. Dowdy[1,2*], Ismat Lotia[3], Andrew S. Azman[1], Jacob Creswell[4], Suvanand Sahu[4], Aamir J. Khan[3,5]

1 Department of Epidemiology, Johns Hopkins Bloomberg School of Public Health, Baltimore, Maryland, United States of America, 2 Center for Tuberculosis Research, Johns Hopkins University, Baltimore, Maryland, United States of America, 3 Interactive Research and Development, Karachi, Sindh, Pakistan, 4 Stop TB Partnership, Geneva, Switzerland, 5 Department of International Health, Johns Hopkins Bloomberg School of Public Health, Baltimore, Maryland, United States of America
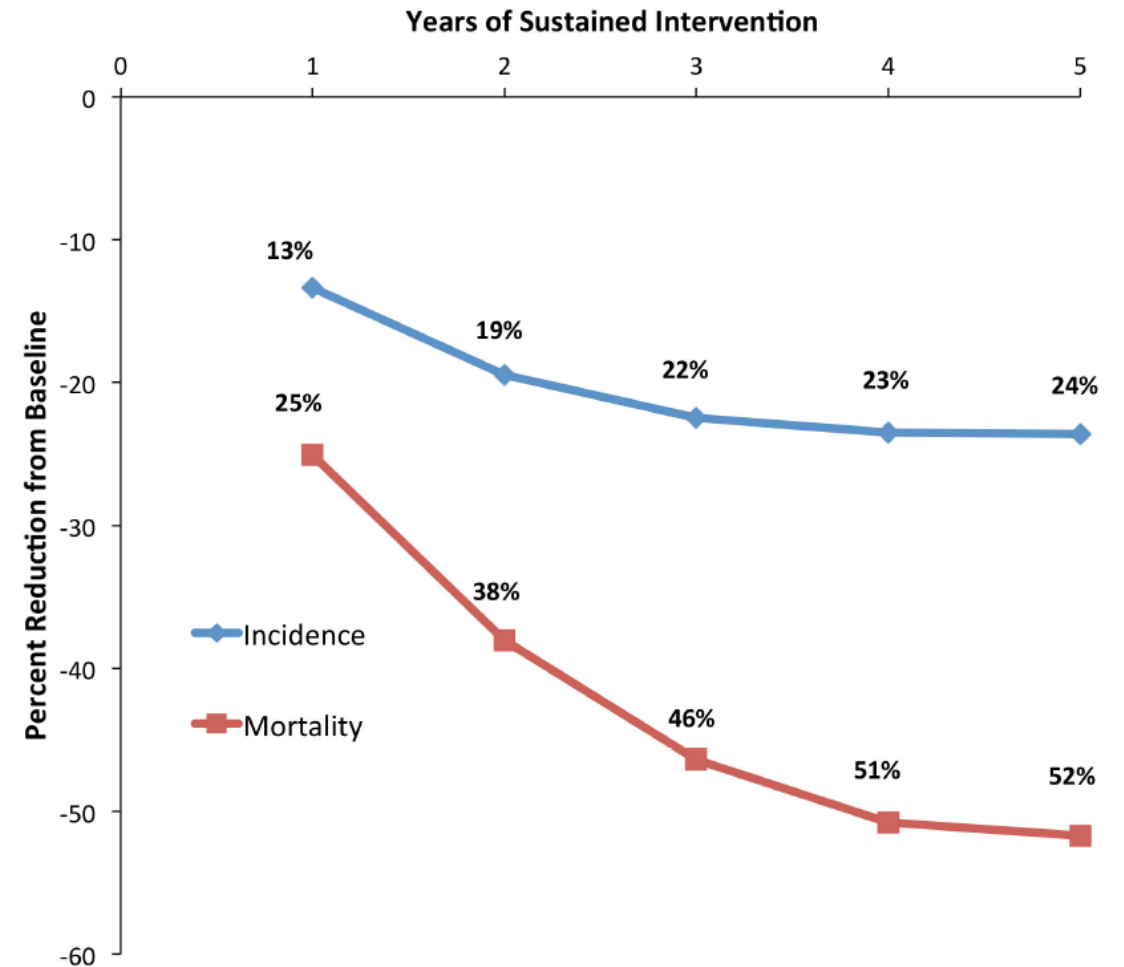
"Modelling suggests that a "best available evidence" approach might place **TB screening programs** costing $ 1,000 per patient detected in the same basket of essential services **as ART** "

Azman, Golub, Dowdy. BMC Medicine 2014, **12**:216

Conclusion: Changing the paradigm

- It is not simply about cost. To "turn off the tap", save lives and reduce TB incidence, we need to move
    - Quickly
    - At multiple levels
    - Include the opportunity provided for preventive treatment
- Large amount of data available
    - Routine implementation data is critical for meaningful modelling
- Modelling can contribute to critical decisions
    - Tailoring
    - Optimising
    - ADVOCATING

Acknowledgements

Participants and patients

Thank you

Photo:Shehzad Noorani