# THE FUTURE OF TB IN THE UNITED STATES

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### Policy and epidemiological context

- The number of TB cases reported in the United States has followed a prolonged exponential decline since the mid 1950s, only interrupted by an HIV-fueled increase in TB cases in the 1990s.
- If annual declines in TB case rates match the trend observed over the past 20 years, it will take more than 60 years to achieve TB elimination, defined as <1 case per million per year.



- · Foreign-born individuals represent an increasing share of reported TB cases, with 66% of all TB cases reported for 2014 among foreign-born individuals.
- Historical reductions in TB case rates reflect improvements in case finding and treatment, but further improvements in these areas may be difficult. New intervention approaches may be needed to maintain and accelerate declines in TB cases.

#### Research guestions and approach

- It is important to understand the long-term trends in TB epidemiology in the US, and the impact of policy options that might be employed to decrease TB burden and shorten the time to TB elimination.
- · We developed a detailed mathematical model of TB epidemiology and the mechanisms determining long-term outcomes, and used that model to simulate the future course of TB epidemiology under several policy scenarios.

## Model structure and parameterization

Core TB Subdivision

Fit to historical data

Total TB Cases Identified (000s), 1953-2014

rcent of TB Cases by Risk Group, 2000-201

2006 2008 2010

Data all Model all Data US-torn Model US-to Data Soviet-born Model toreign

· Model constructed as deterministic state-transition model, with subdivisions for relevant features of TB epi and control.

Basic state transition

Model entry US born

Model entry foreign born

1) Exits due to

Age Distribution of TB Cases (%), 2000-2014

2006

DR-TR in T

mortality not shown.

Foreign born er distributed acre

· Published evidence used to create prior distributions for model parameters, then Bayesian calibration to program data.

Basic state transition

Drug Resistance Subdivision

ment History Subdivisio

for US born

1) Exits due to mortality not shown

 Foreign born enter dist treatment history and ent history and age states, not

#### **Scenarios**

- 1. Base case: TB care held at current levels
- 2. LTBI screening & treatment for all immigrants
- 3. INH-RPT LTBI regimen, intensified screening of risk-groups
- 4. Intensified case detection, halve time to treatment initiation

TB Mortality, 2015-2035

- 5. Reduce treatment default/failure, DR-TB misdiag. by 50%
- 6. All improvements (scenarios 2-5) together



# Conclusions

- Projections suggest an ongoing, approx. log-linear decline in TB cases among the US-born population. TB incidence increasingly dominated by imported infection, and longerterm projections are sensitive to uncertainty in immigration patterns and trends.
- Future trends in TB in the US depend on TB control success among foreign-born and high-risk groups. Accelerating declines in TB cases will require substantially expanded LTBI treatment, strategies targetting imported infection, or novel approaches for addressing LTBI burden.

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45-54 55-64

Age Group

 Data
Model Data, ICD 0-4 5-14 15-24 25-34 25-44 45-54 55-64 65-74 75-84 85-Age Group nt Naive Caree (%) 2000-201 ITRIP Total TB Deaths (HIV-neg) by Age Grou e in 2011 by Age and Nativity (% Data, ICD-Model Data: US born Model: US
Data: foreign born Model: foreign born

Model entry for

HIV Subdivision

US Born

0-4 Years

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Age Group