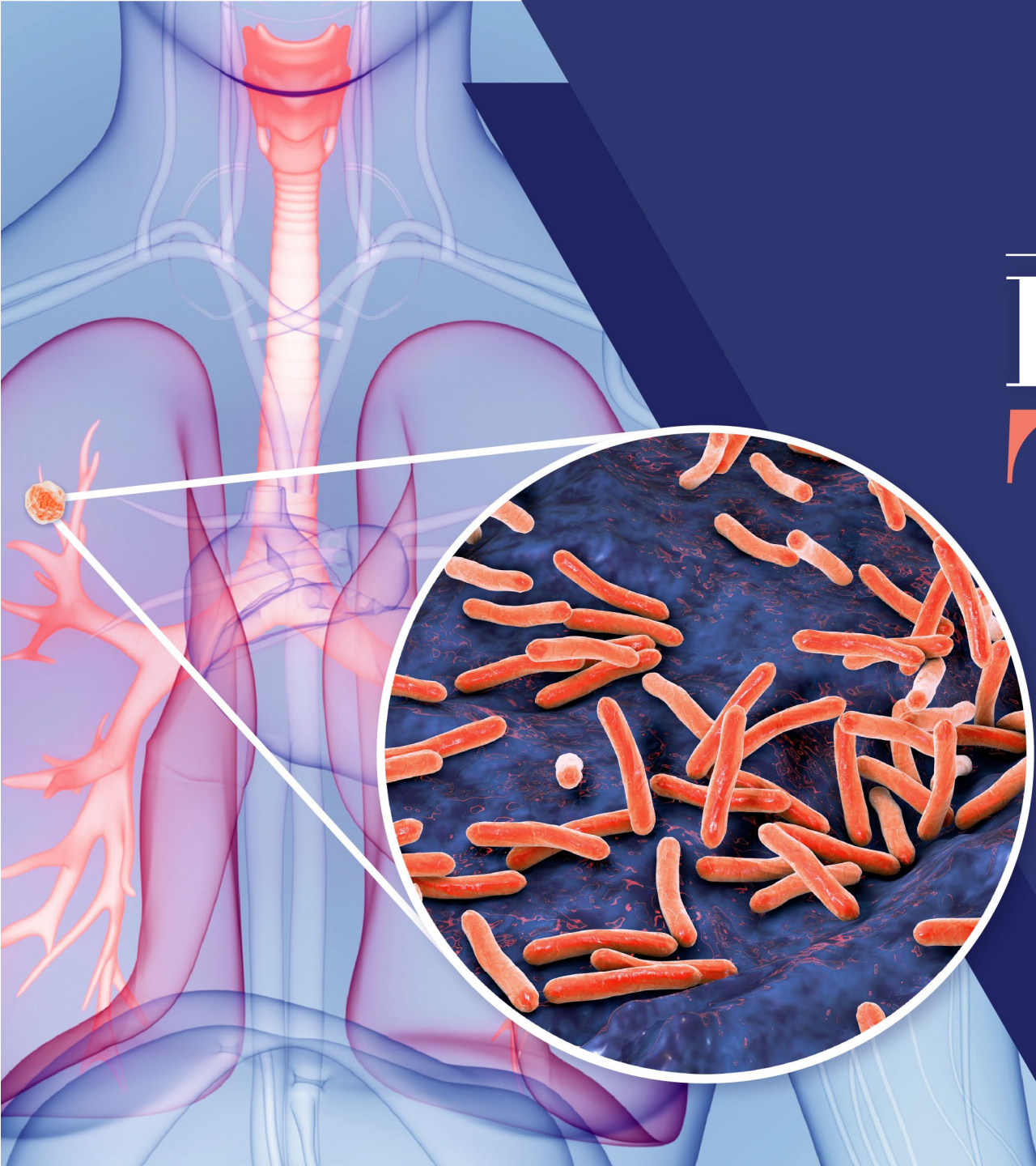


62ND ANNUAL

Denver TB Course

MARCH 25-27, 2026

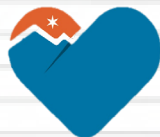
 National Jewish
Health®



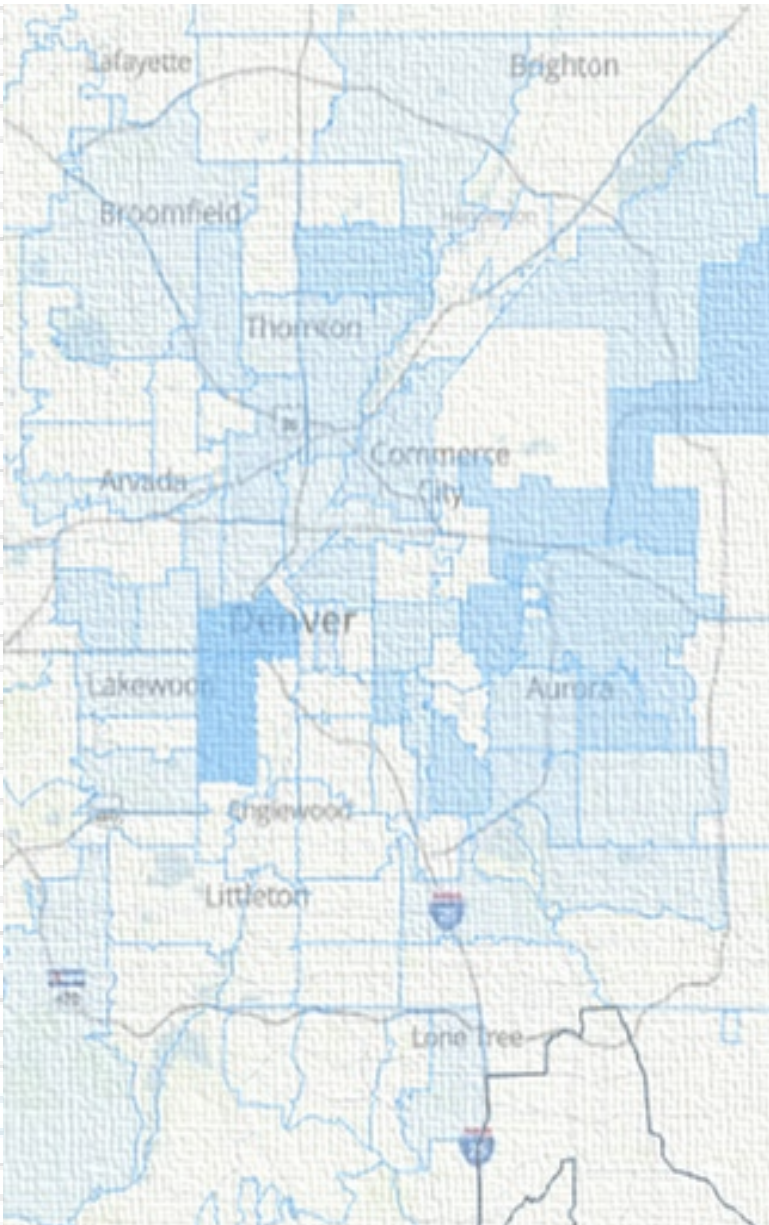
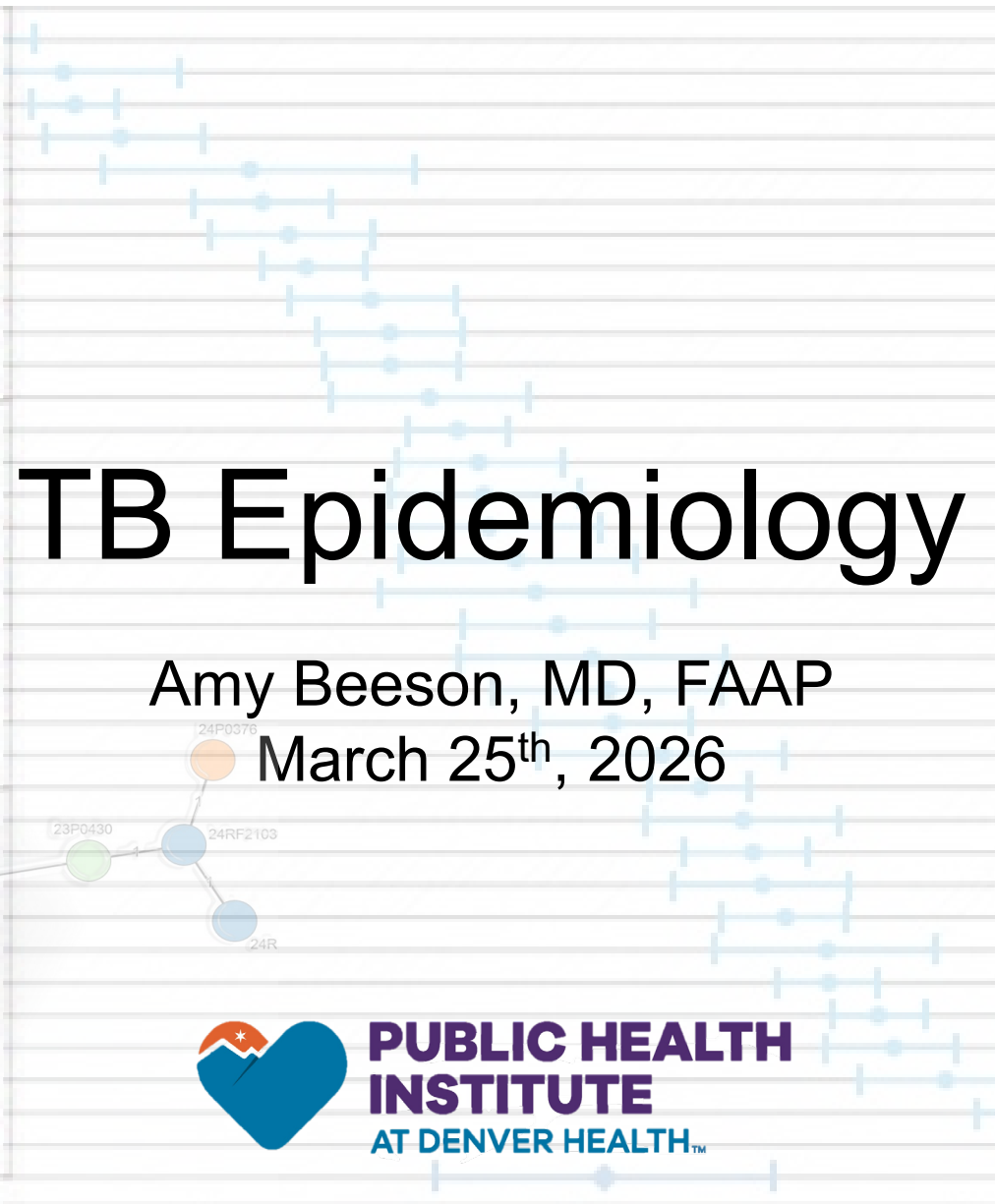
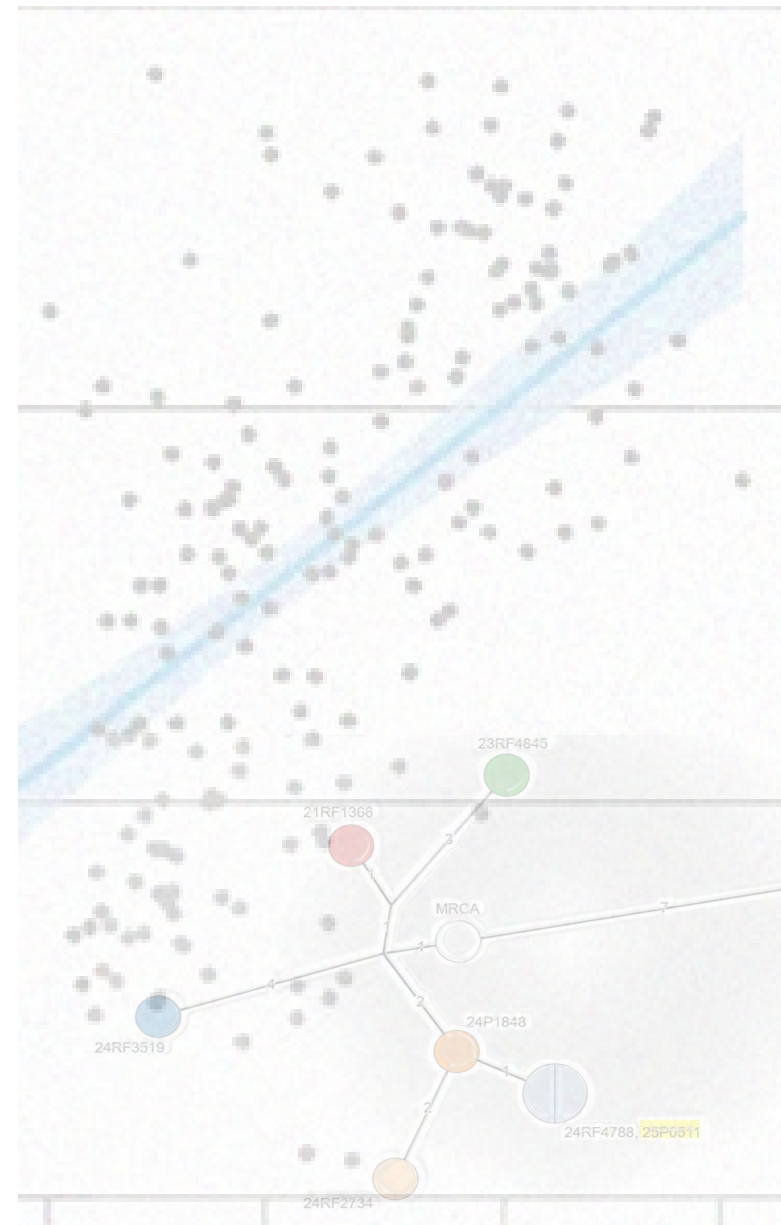
TB Epidemiology

Amy Beeson, MD, FAAP

March 25th, 2026



**PUBLIC HEALTH
INSTITUTE**
AT DENVER HEALTH™



Relevant disclosures

- None

Objectives

- Review global and U.S. estimates and trends in TB infection, TB disease, DR-TB, and death from TB

Objectives

- Review global and U.S. estimates and trends in TB infection, TB disease, DR-TB, and death from TB
- Describe social-structural factors associated with TB infection and outcomes

Why does TB epidemiology matter (to all of us)?

- Imperfect tests
- Limited resources for TB care and prevention
- Necessary for elimination strategy
- Policy/advocacy

TB infection estimates



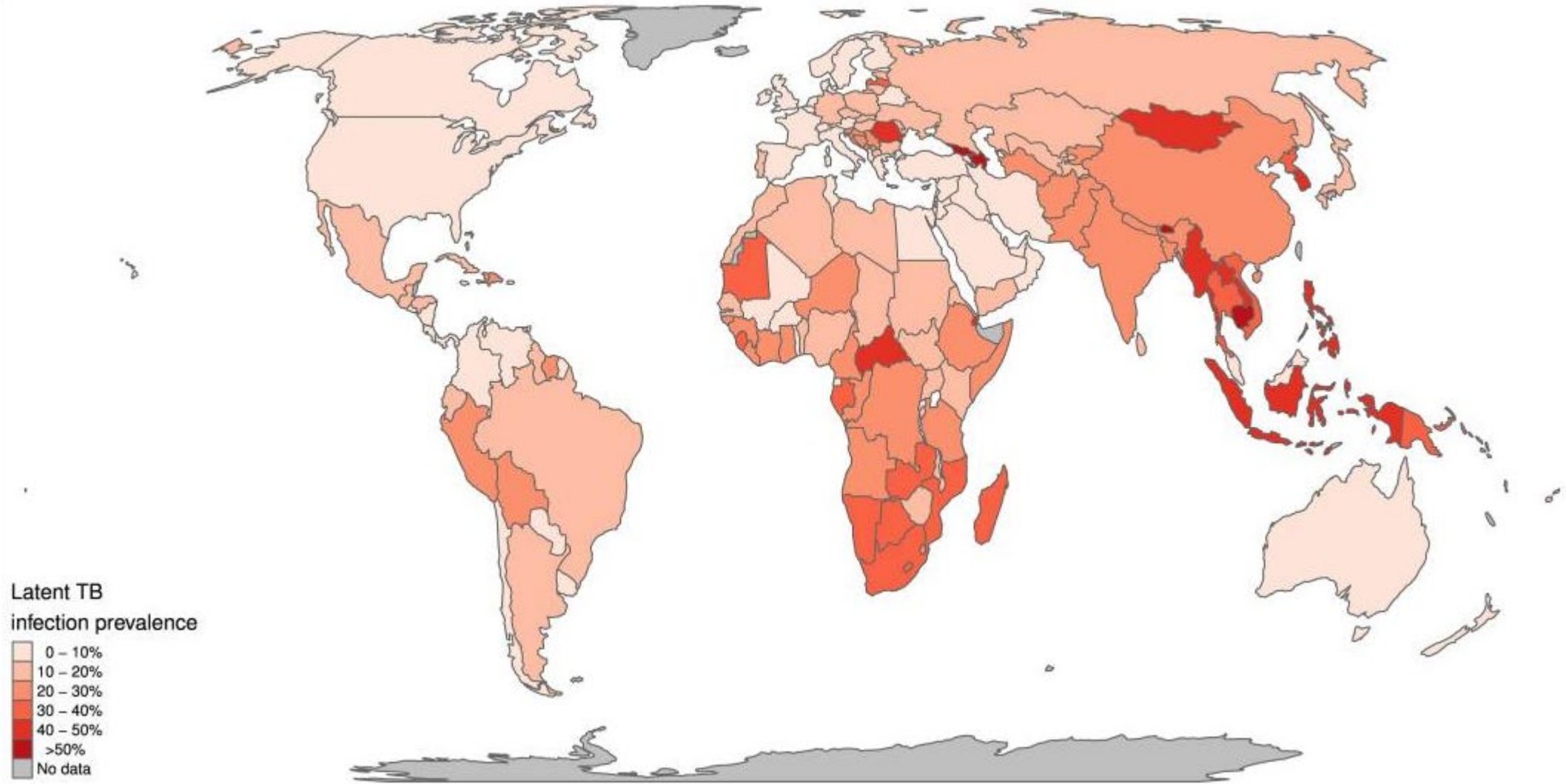
- 25% of the world's population is infected with TB (1.7 billion people)

TB infection estimates

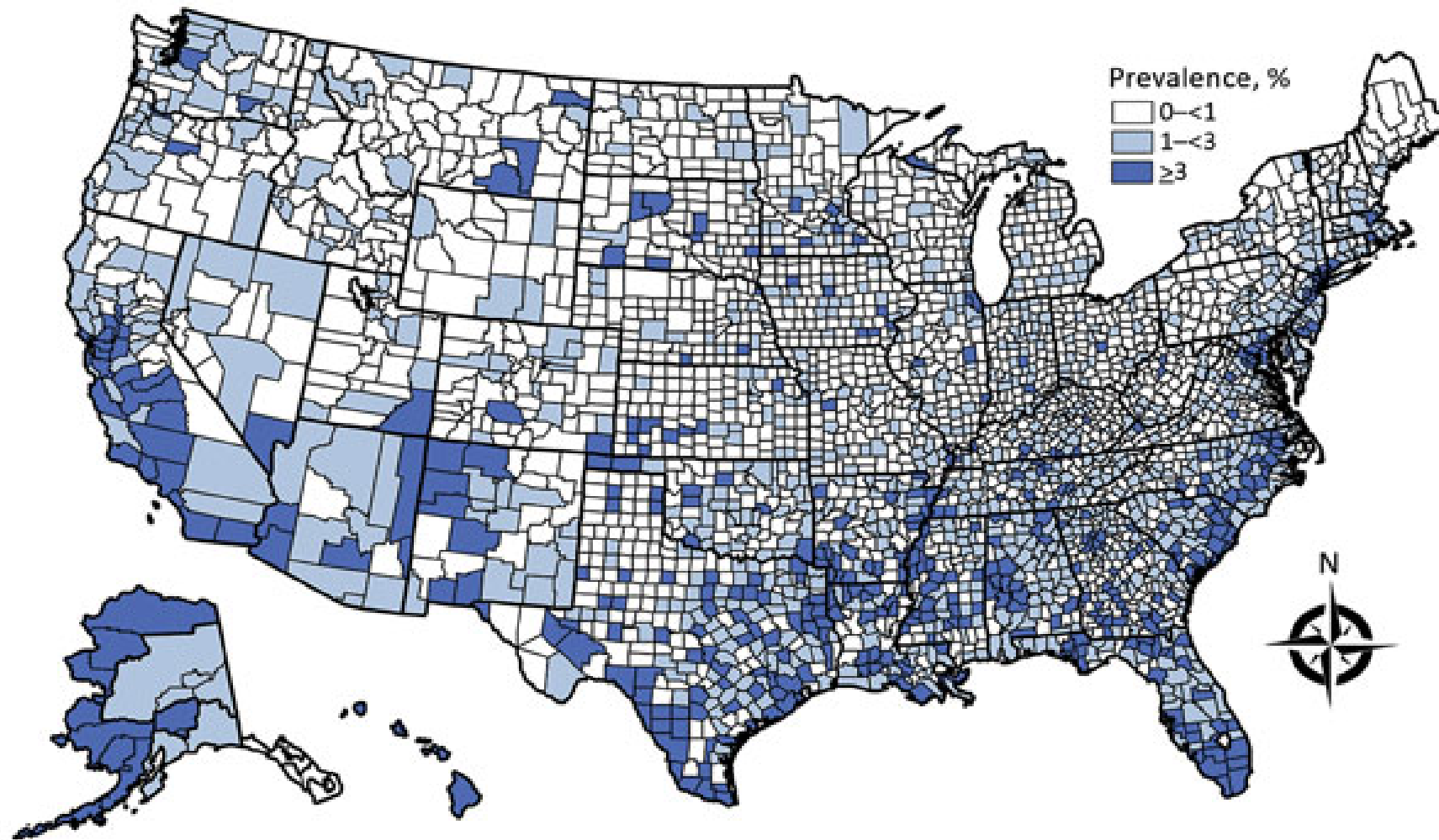


- 25% of the world's population is infected with TB (1.7 billion people)
- 2-3% of the U.S. population is infected with TB (8-10 million people)
 - 14% among people born outside U.S.
 - 1% among people born in U.S.

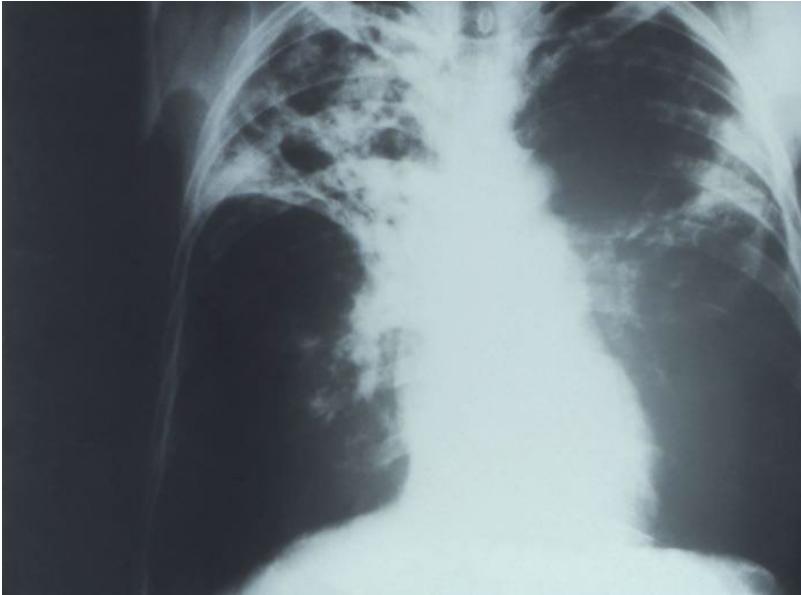
Global map of prevalence of latent TB infection, 2014



Estimated prevalence of latent tuberculosis infection, by county, United States, 2011–2015



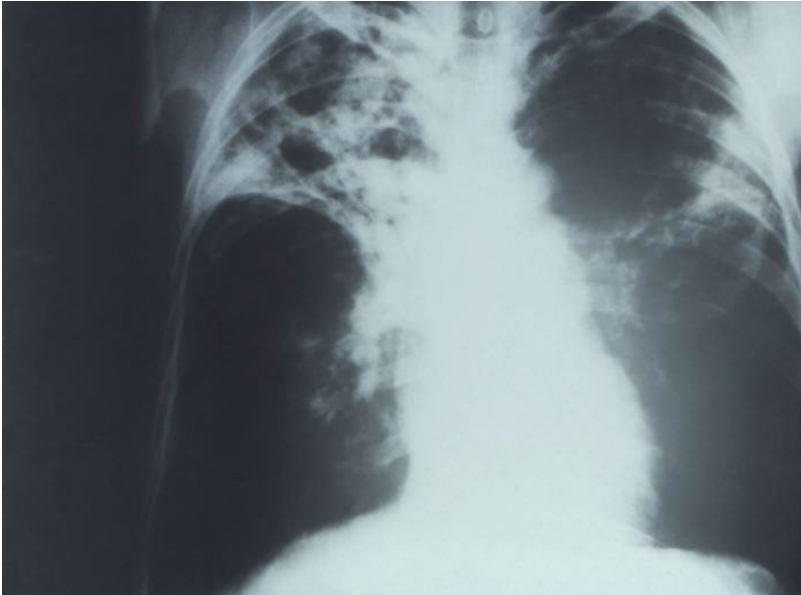
TB disease estimates



- TB has increased globally since 2020
 - Incident cases fell slightly in 2024 for the first time in 4 years, from 10.8 to 10.7 million cases
 - There is significant variability by region

2025 World TB Report, World Health Organization

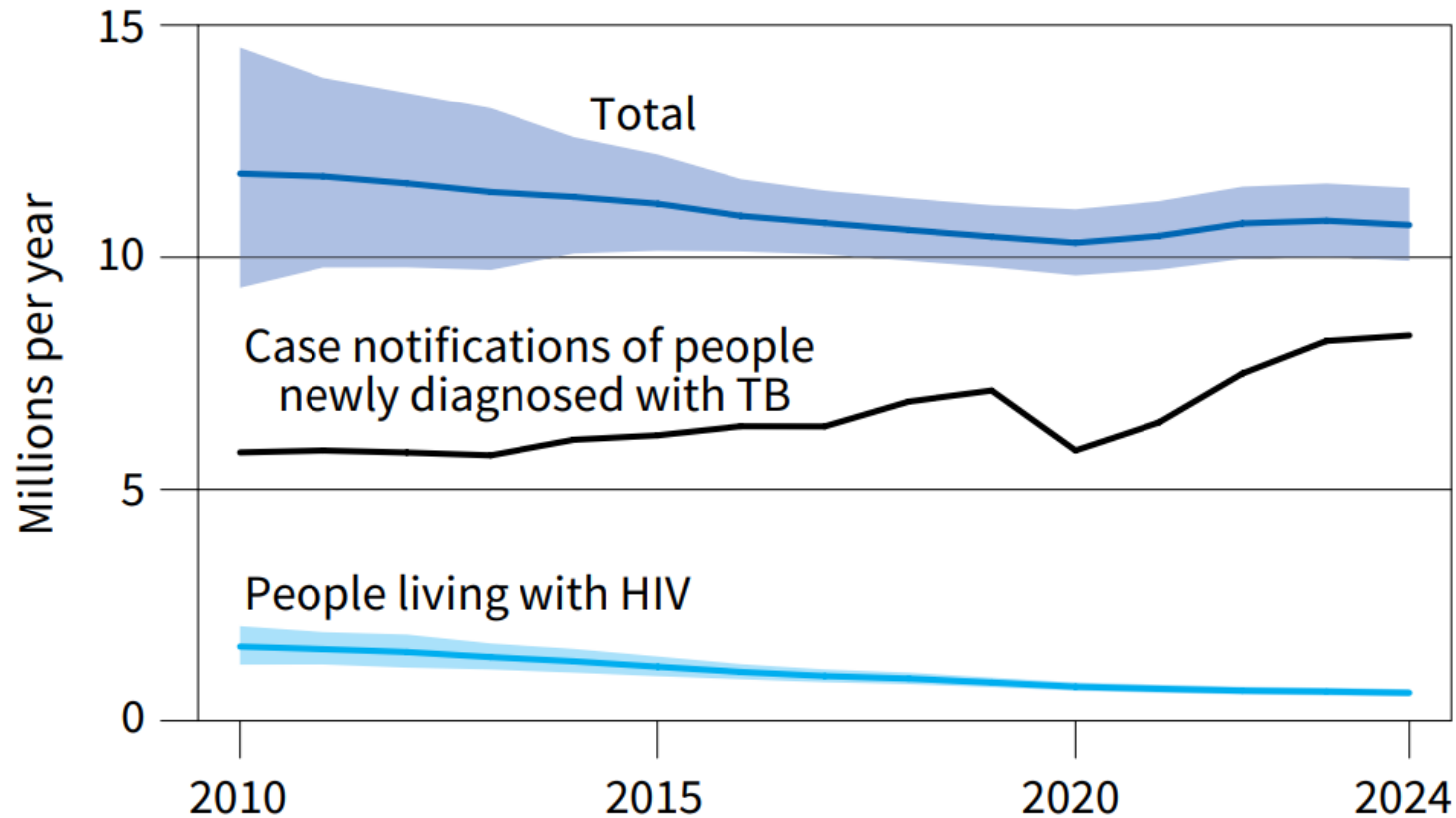
TB disease estimates



- TB has increased globally since 2020
 - Incident cases fell slightly in 2024 for the first time in 4 years, from 10.8 to 10.7 million cases
 - There is significant variability by region
- **TB continues to increase in the United States since 2020**

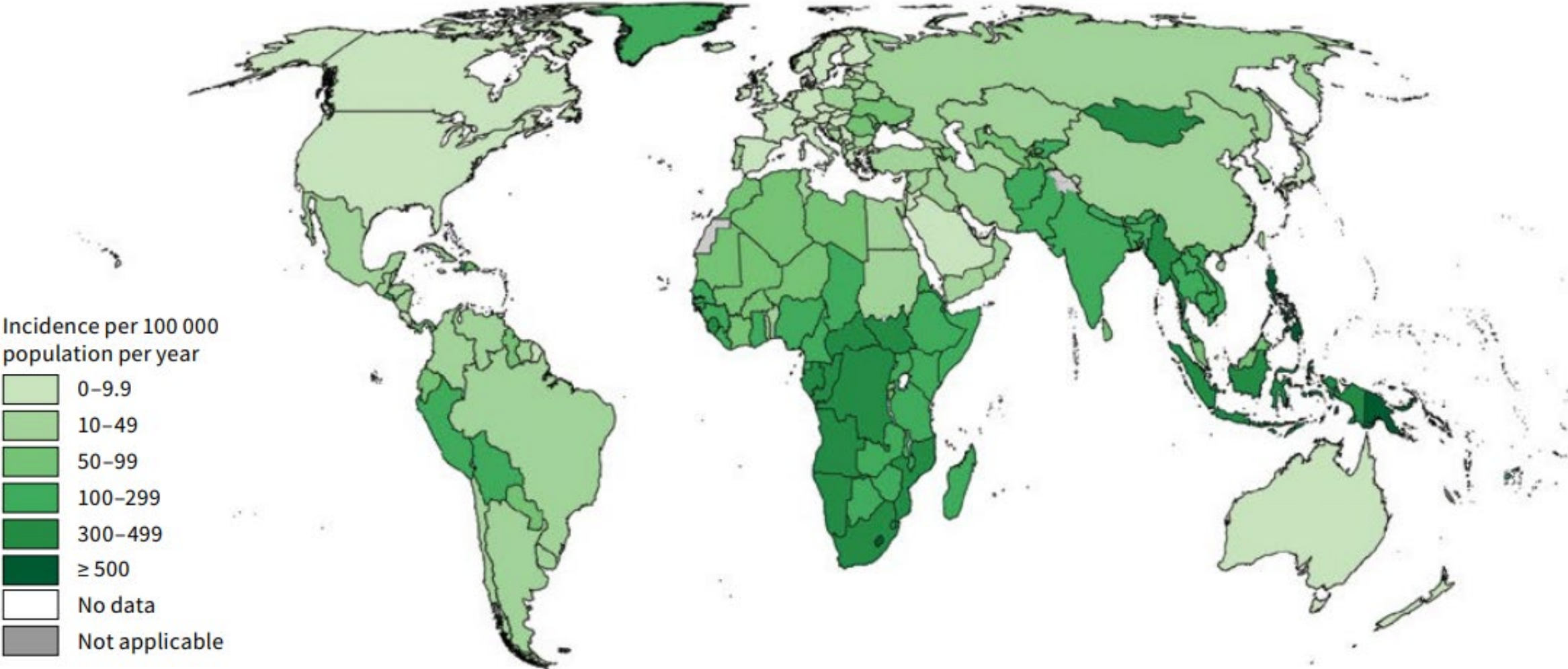
2025 World TB Report, World Health Organization

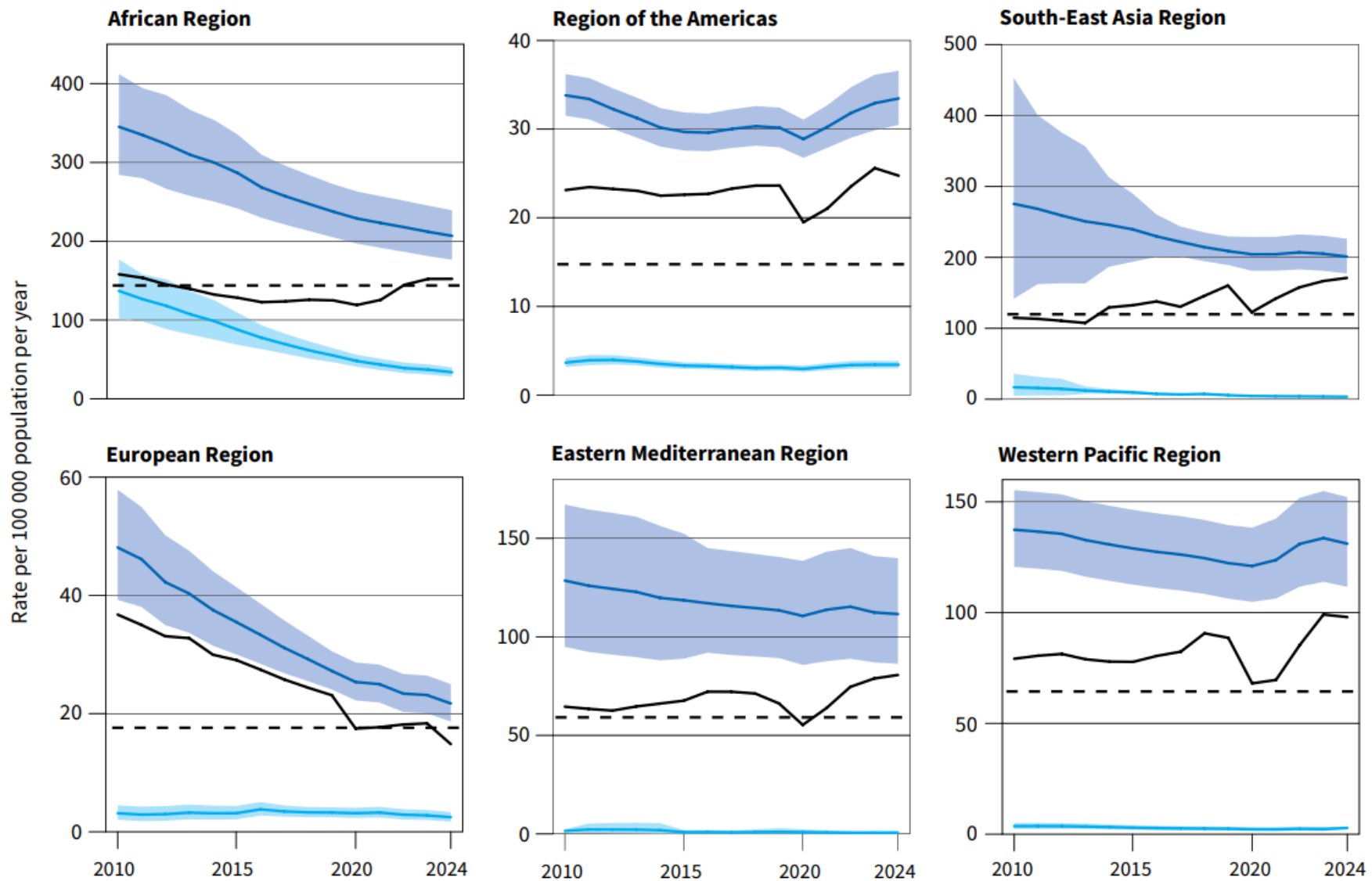
TB is increasing worldwide



10.7 million (131 cases per 100,000 persons)

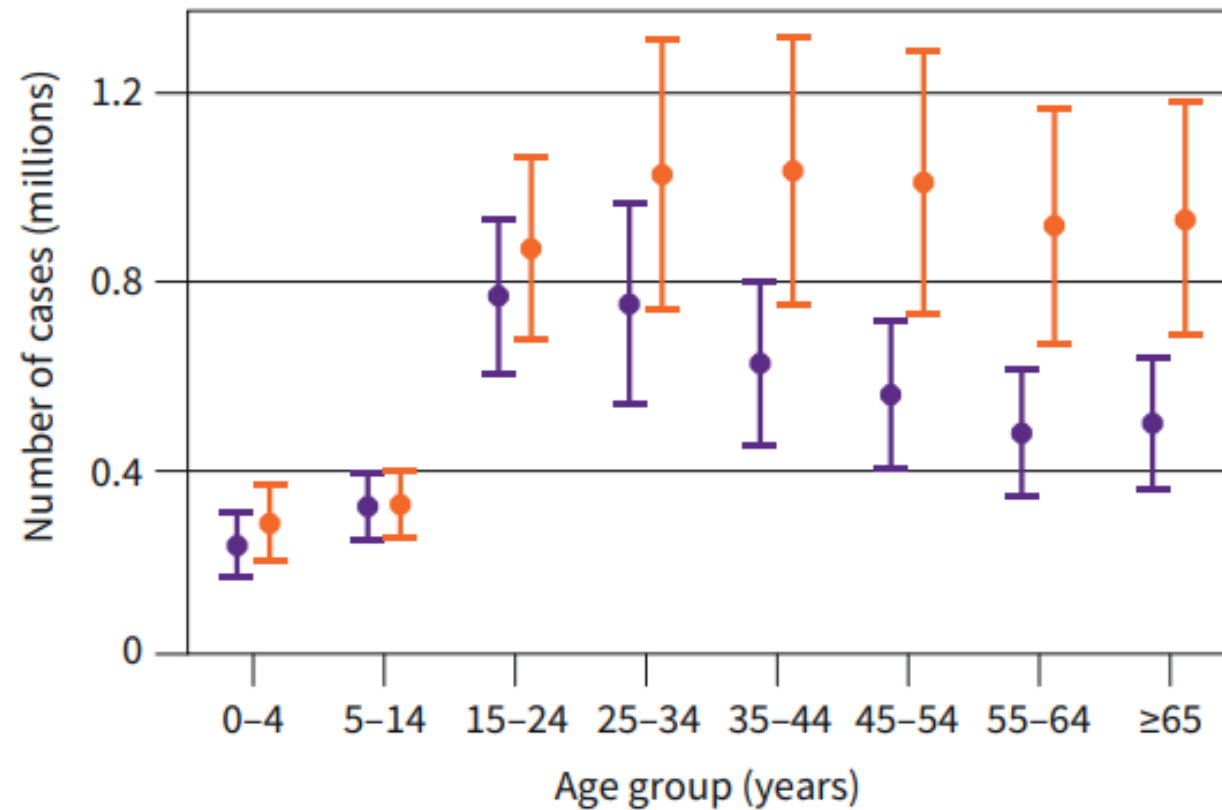
Estimated TB incidence rates at country level, 2024



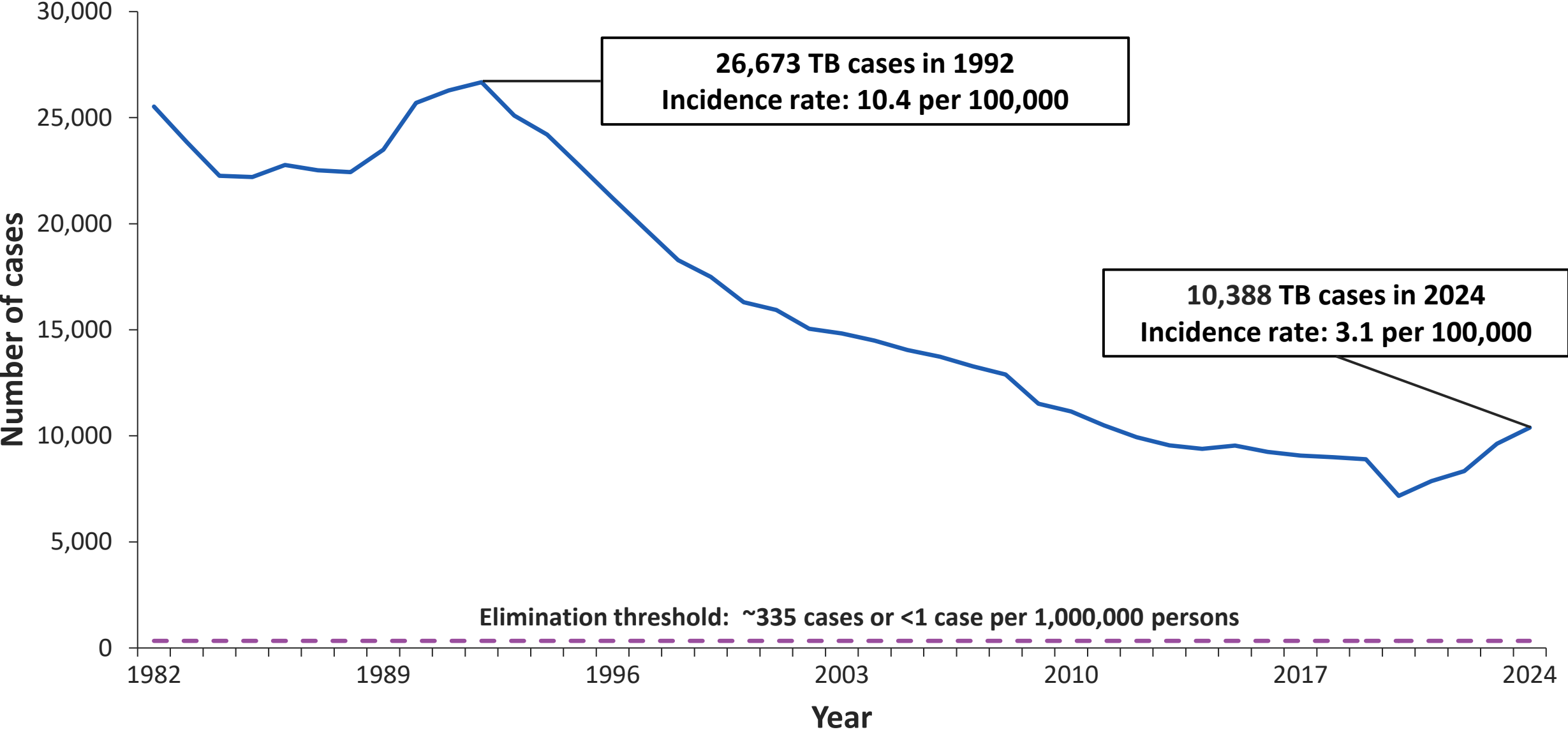


Global estimates of TB incidence (absolute numbers) disaggregated by age group and sex (female in purple; male in orange), 2024

Dots and error bars show best estimates and 95% uncertainty intervals, respectively.

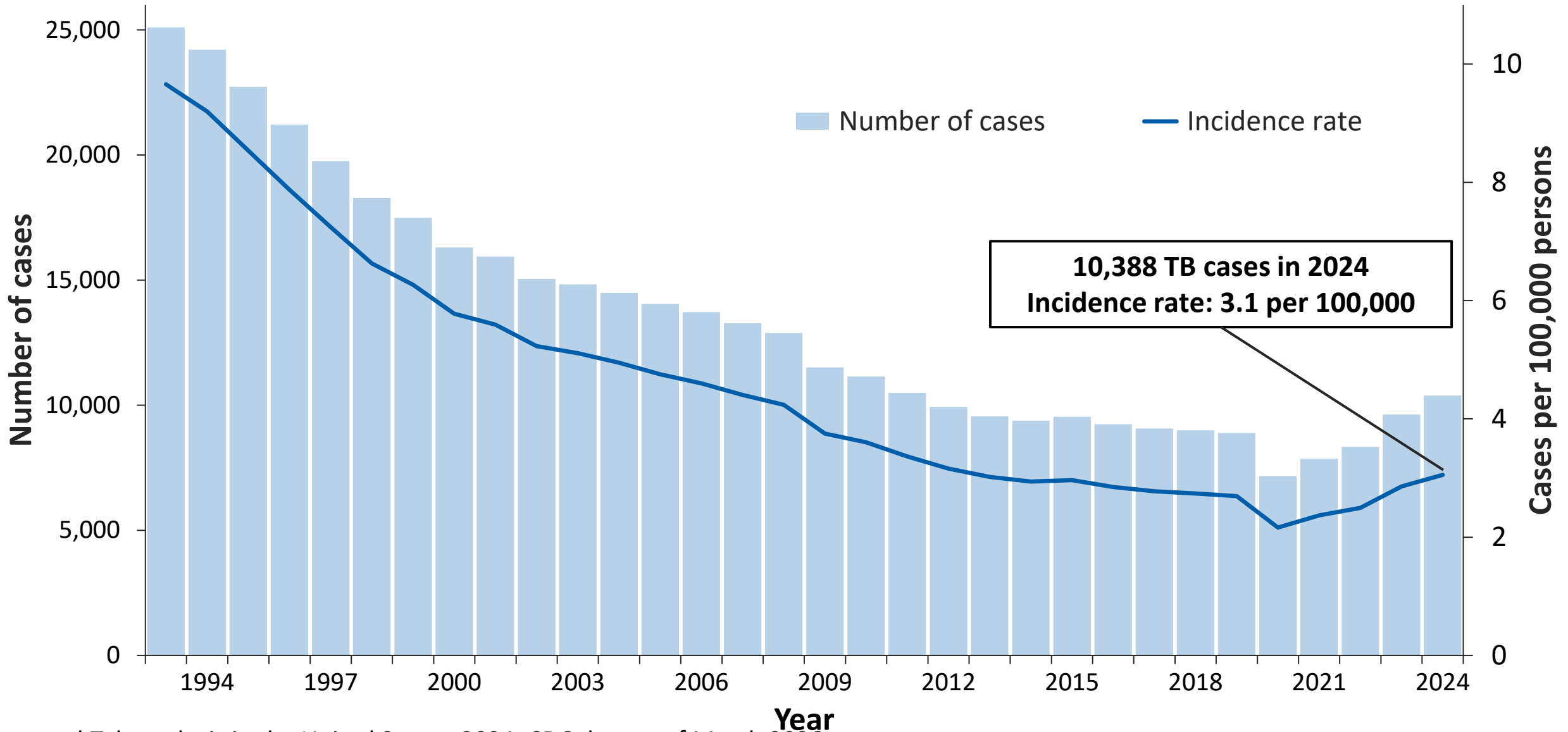


Progress Towards TB Elimination, United States, 1982–2024



Reported Tuberculosis in the United States, 2024, CDC data as of March 2026

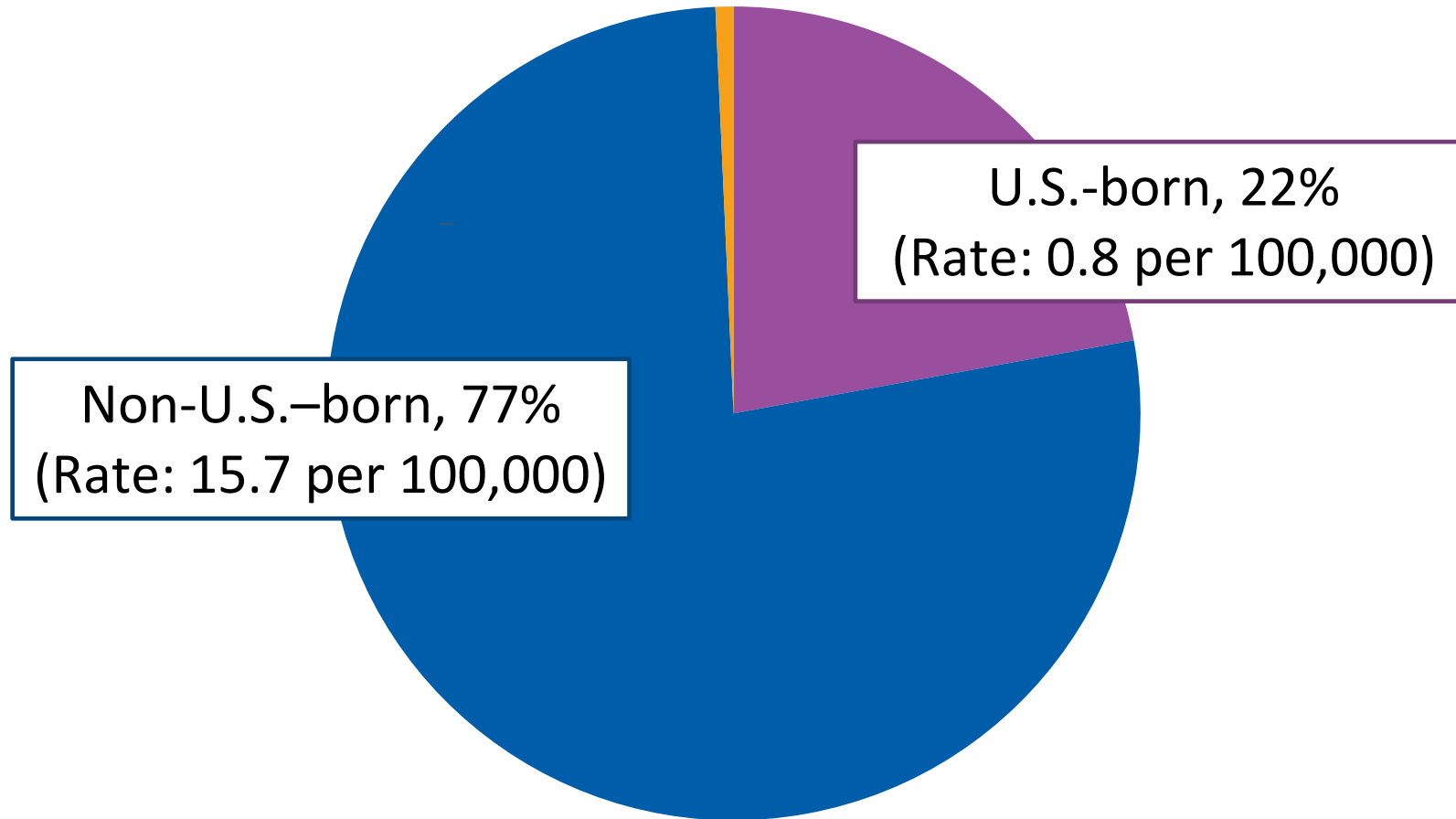
TB Cases and Incidence Rates, United States, 1993–2024



Reported Tuberculosis in the United States, 2024, CDC data as of March 2026

TB Incidence Rates and Percentages by Origin of Birth,* United States, 2024 (N=10,388)

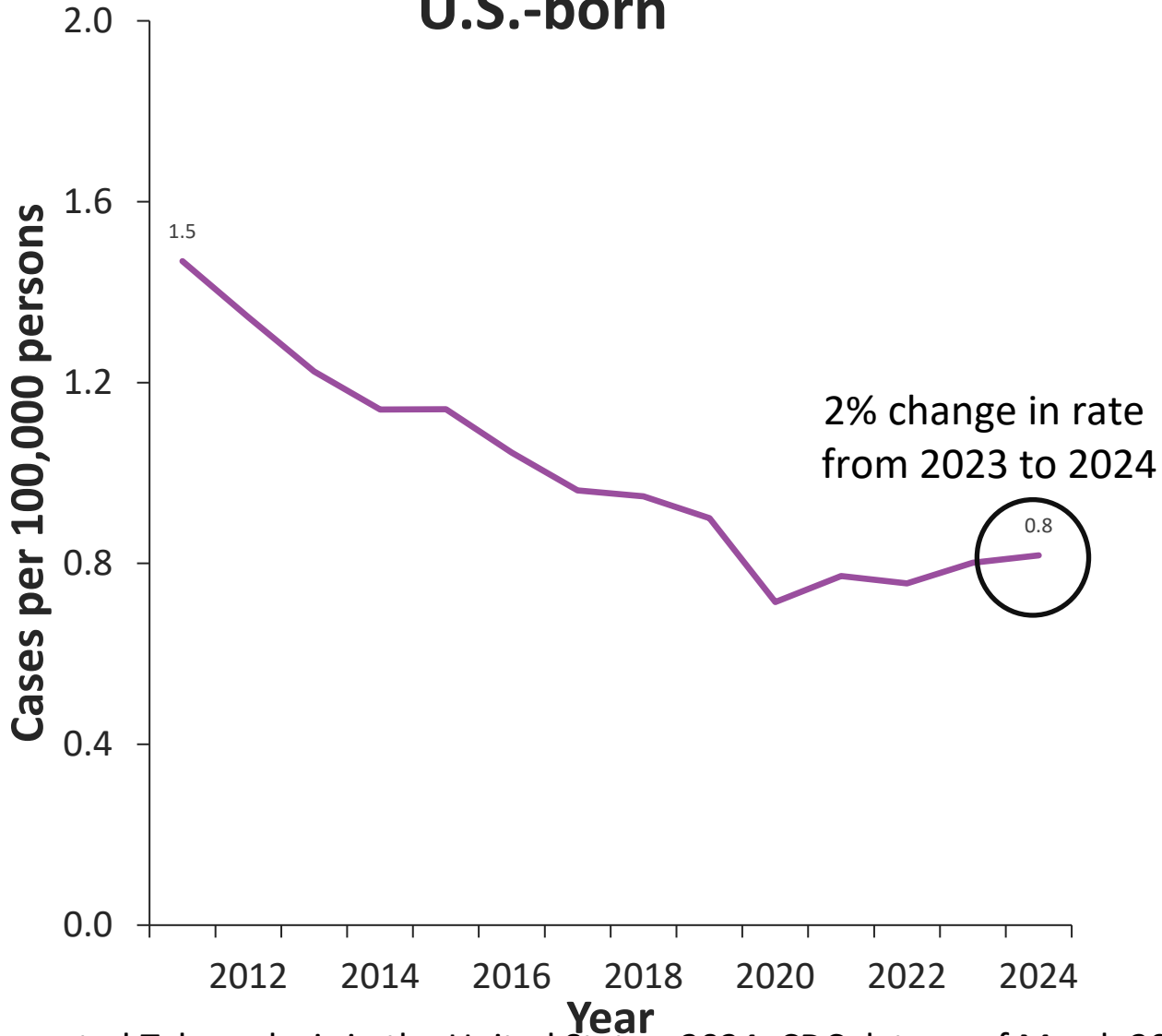
Origin of birth unknown, <1%



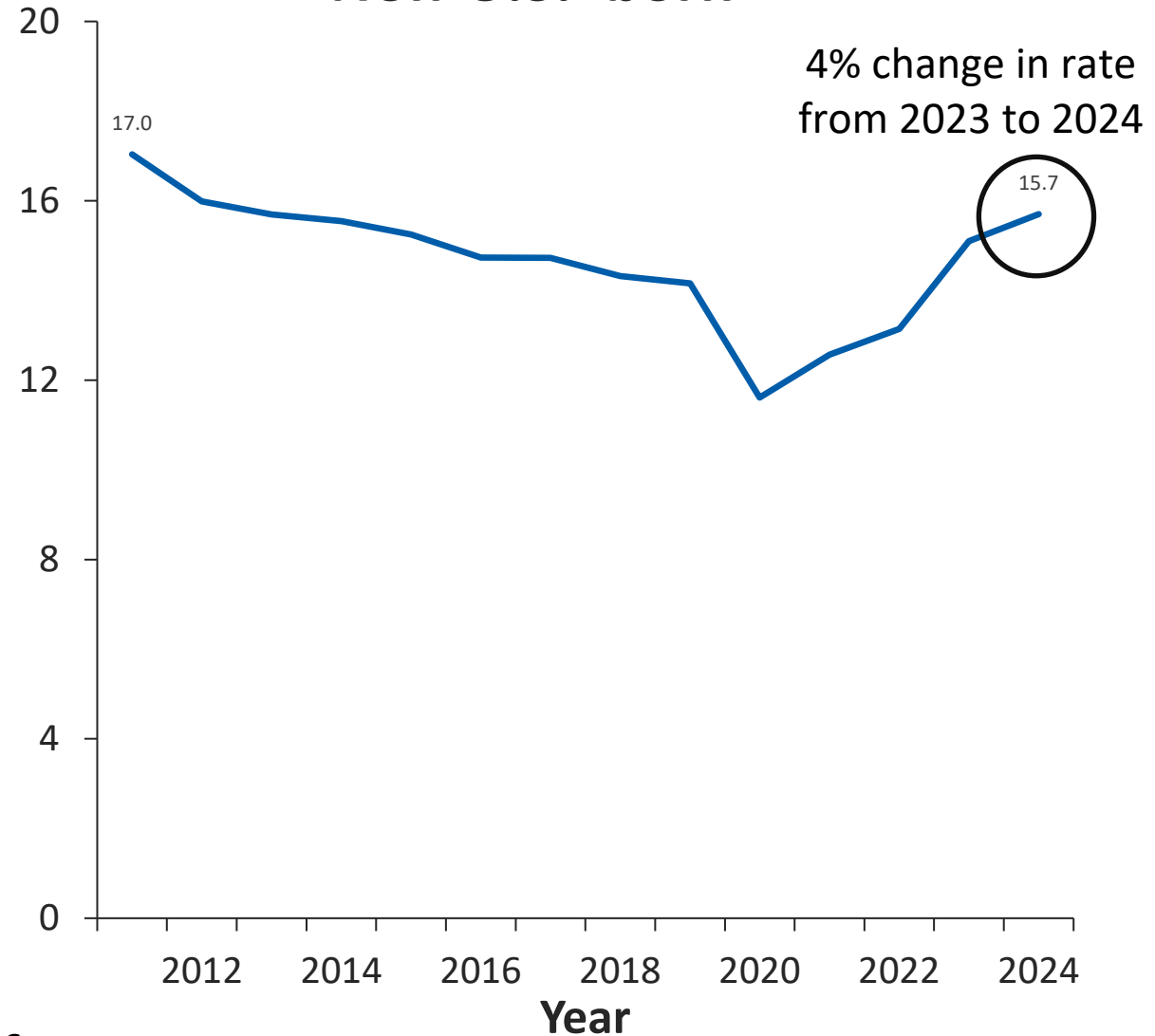
*Persons born in the United States, certain U.S. territories, or elsewhere to at least one U.S. citizen parent are categorized as U.S.-born. All other persons are categorized as non-U.S.-born.
Reported Tuberculosis in the United States, 2024, CDC data as of March 2026

TB Incidence Rates by Origin of Birth, United States, 2011–2024

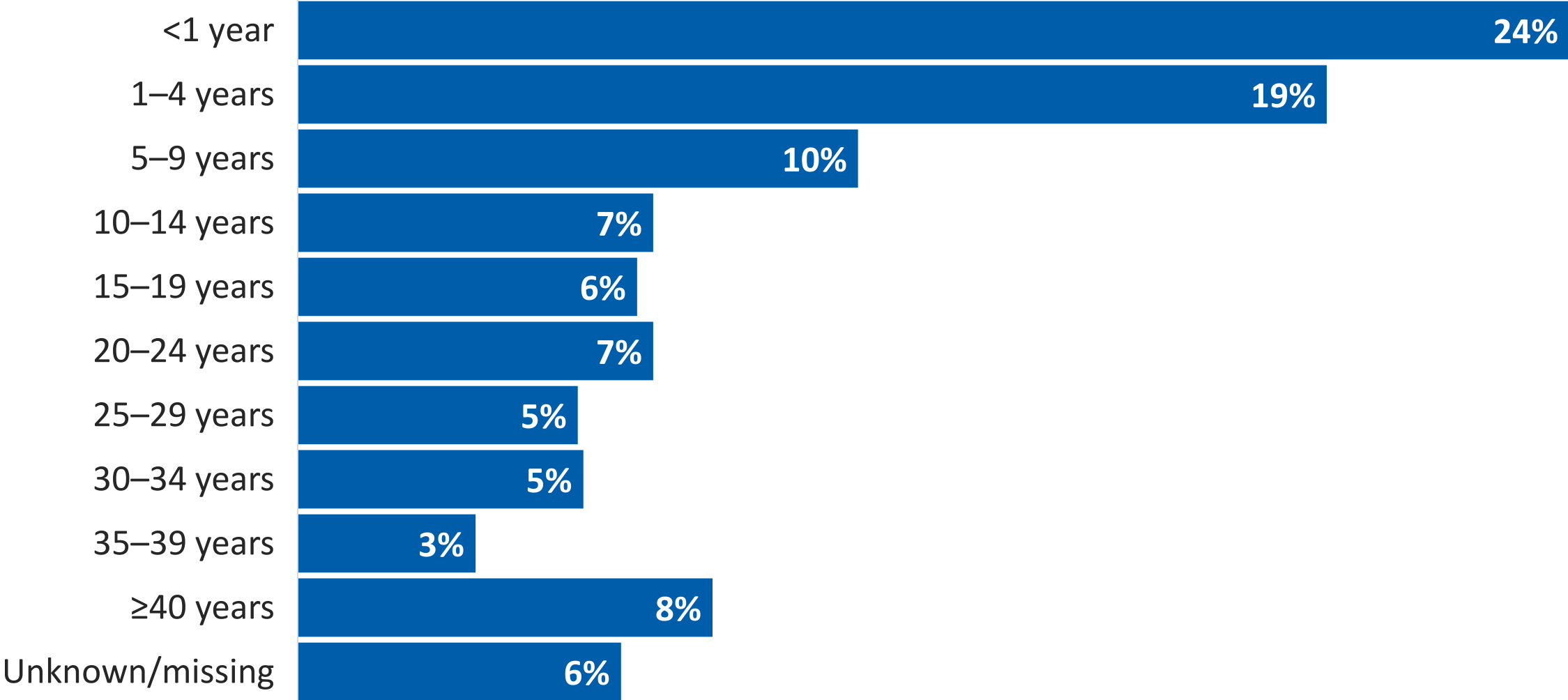
U.S.-born



Non-U.S.-born

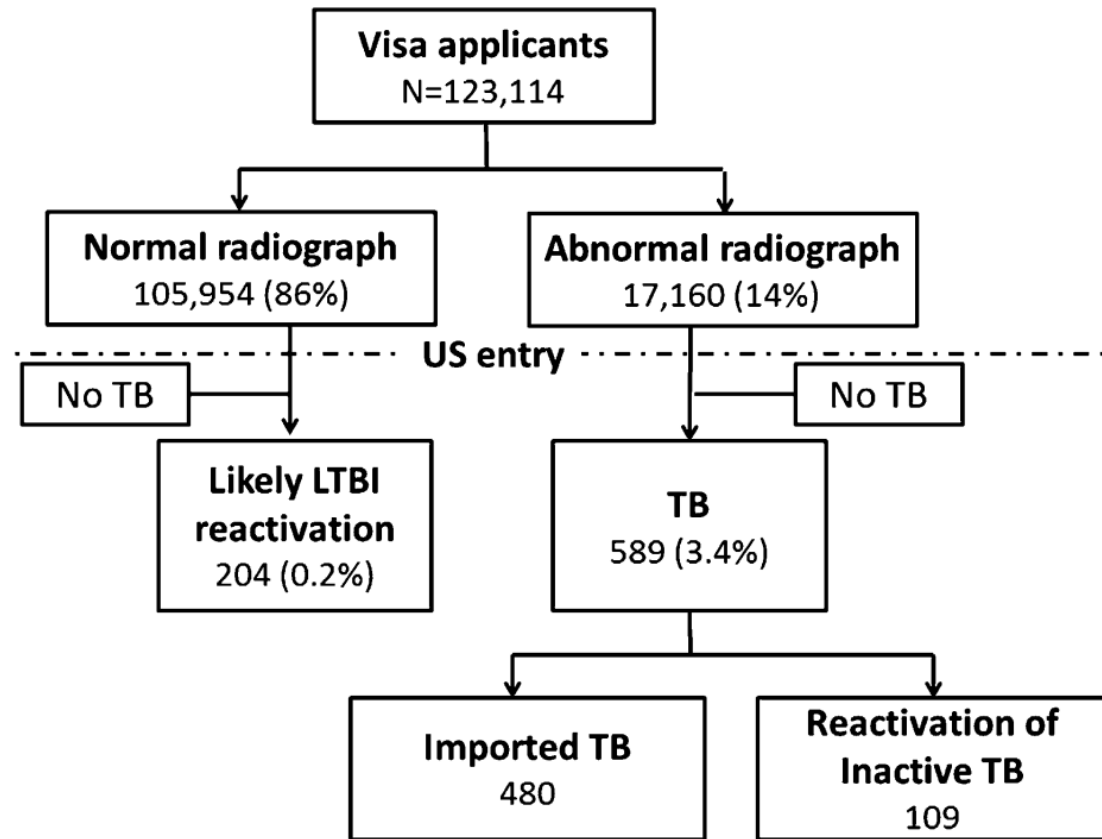


Percentage of TB Cases Among Non-U.S.–Born Persons by Years Since Arrival in the United States Prior to Diagnosis, 2024 (N=8,016)



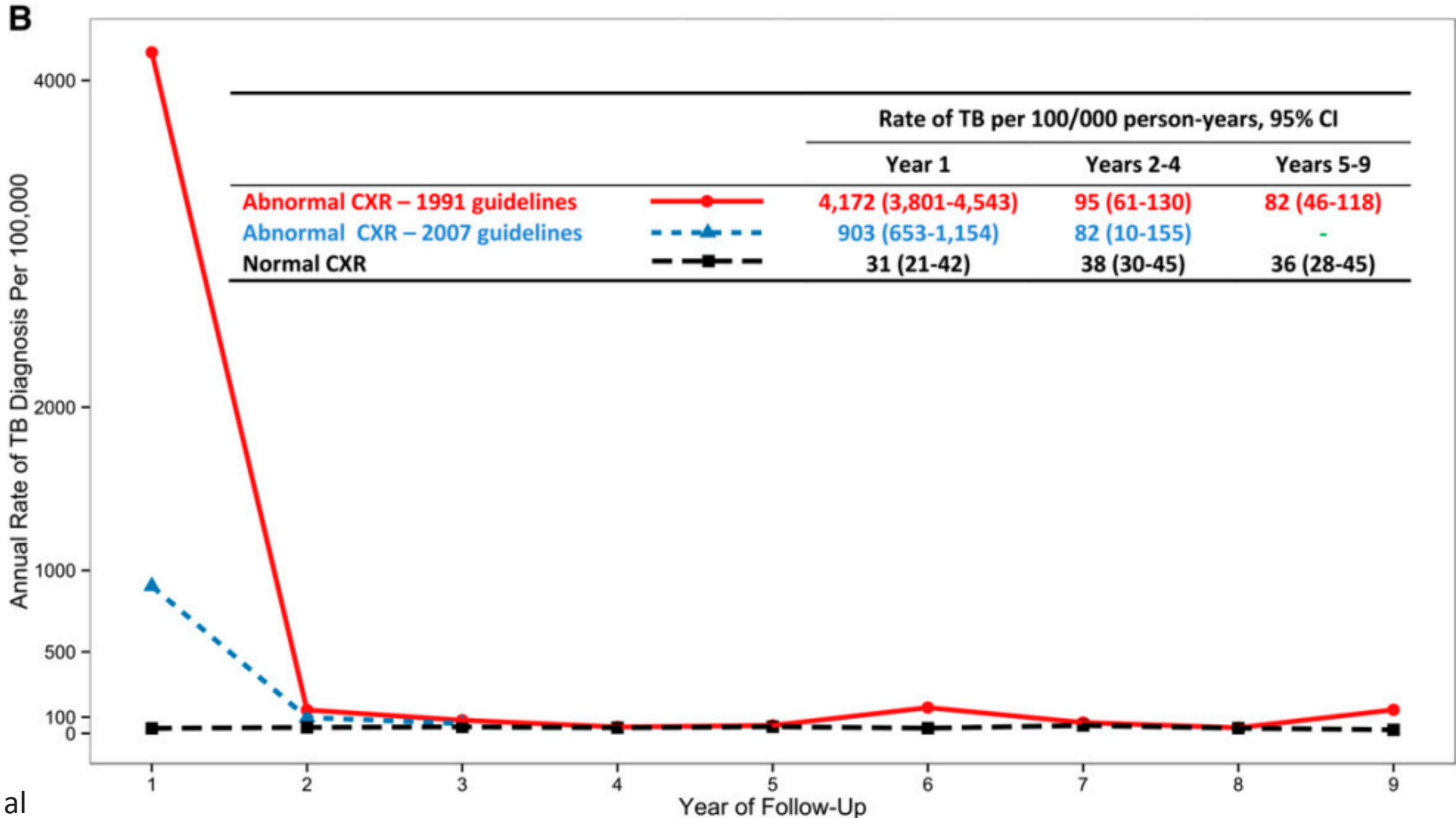
Reported Tuberculosis in the United States, 2024, CDC data as of March 2026

Pre- and post-arrival screening detects imported TB

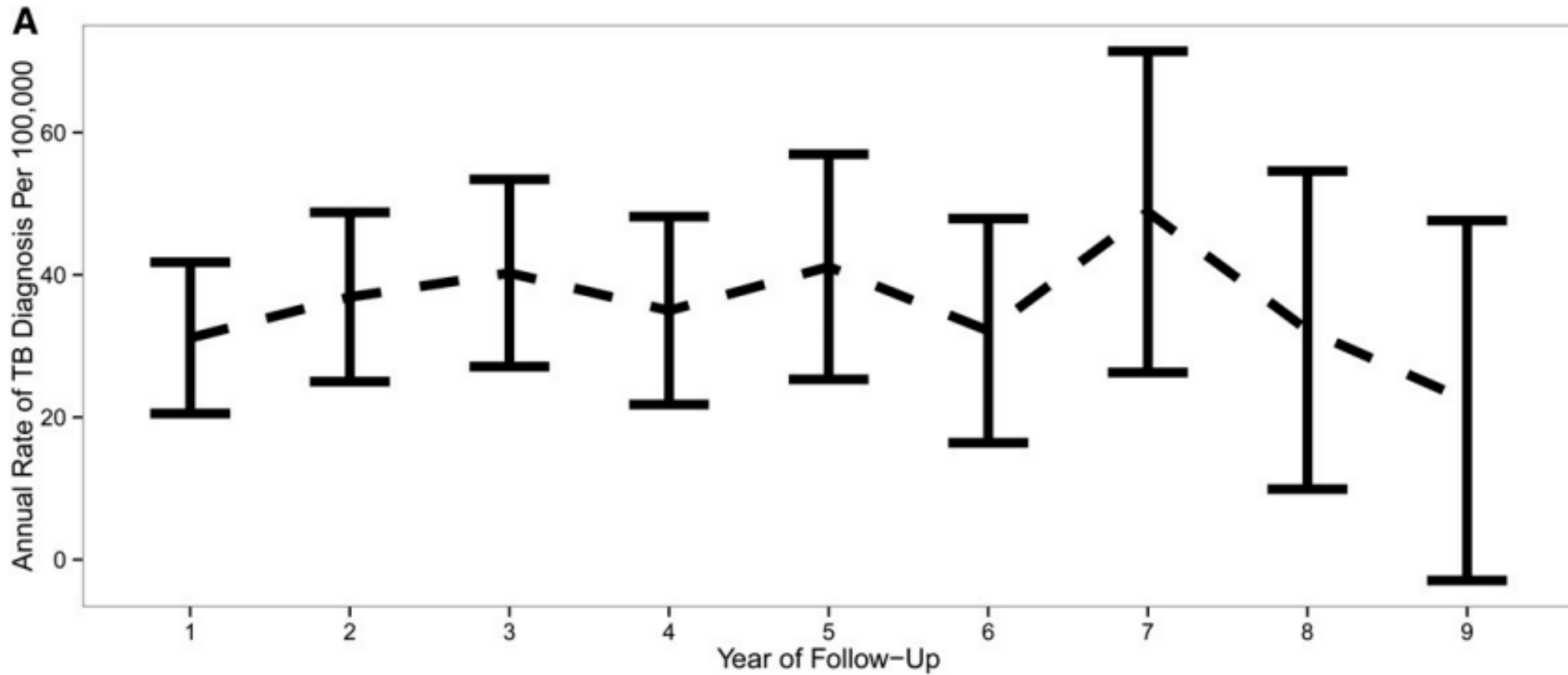


Walter ND, Painter J, Parker M, Lowenthal P, Flood J, Fu Y, Asis R, Reves R; Tuberculosis Epidemiologic Studies Consortium. Persistent latent tuberculosis reactivation risk in United States immigrants. *Am J Respir Crit Care Med*. 2014 Jan 1;189(1):88-95. doi: 10.1164/rccm.201308-1480OC. PMID: 24308495; PMCID: PMC3919127.

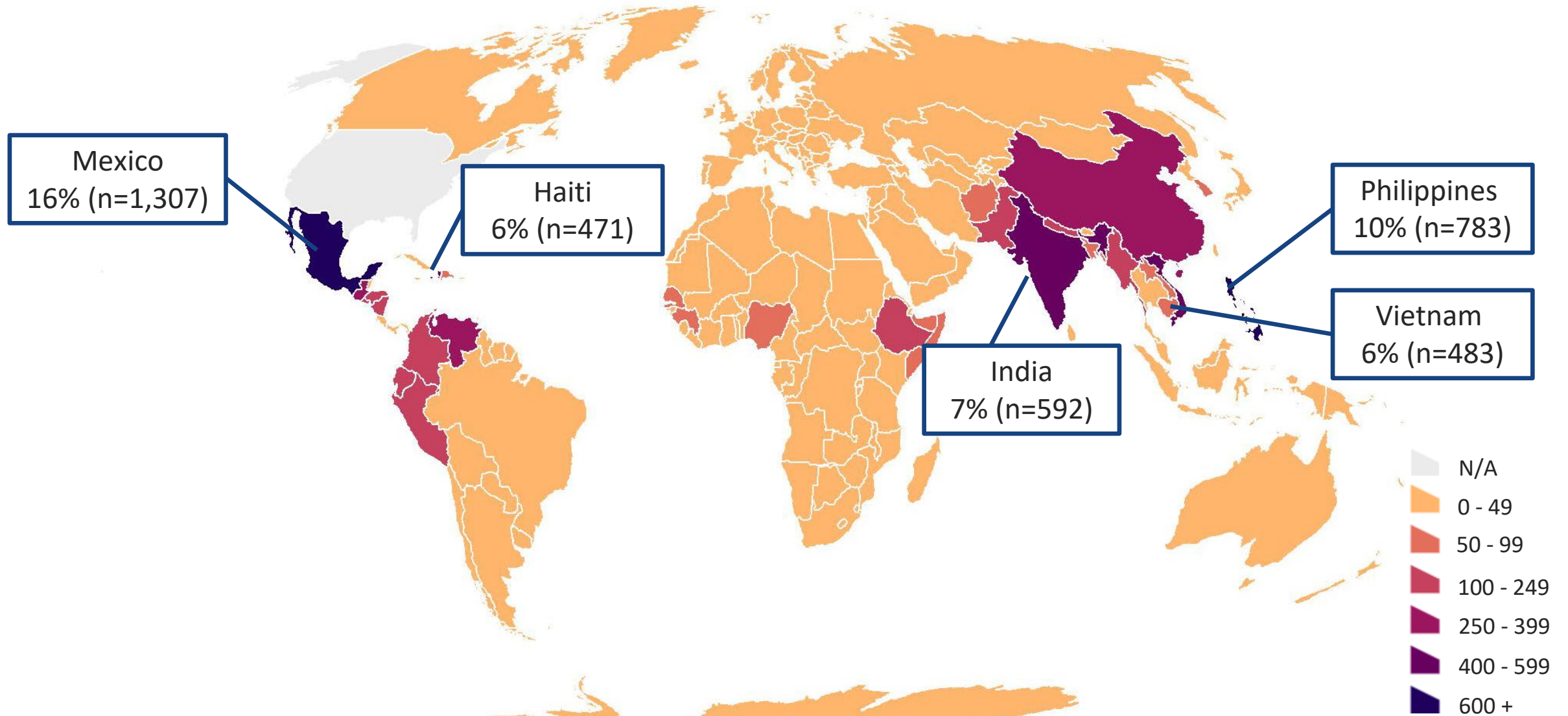
Pre- and post-arrival screening detects imported TB



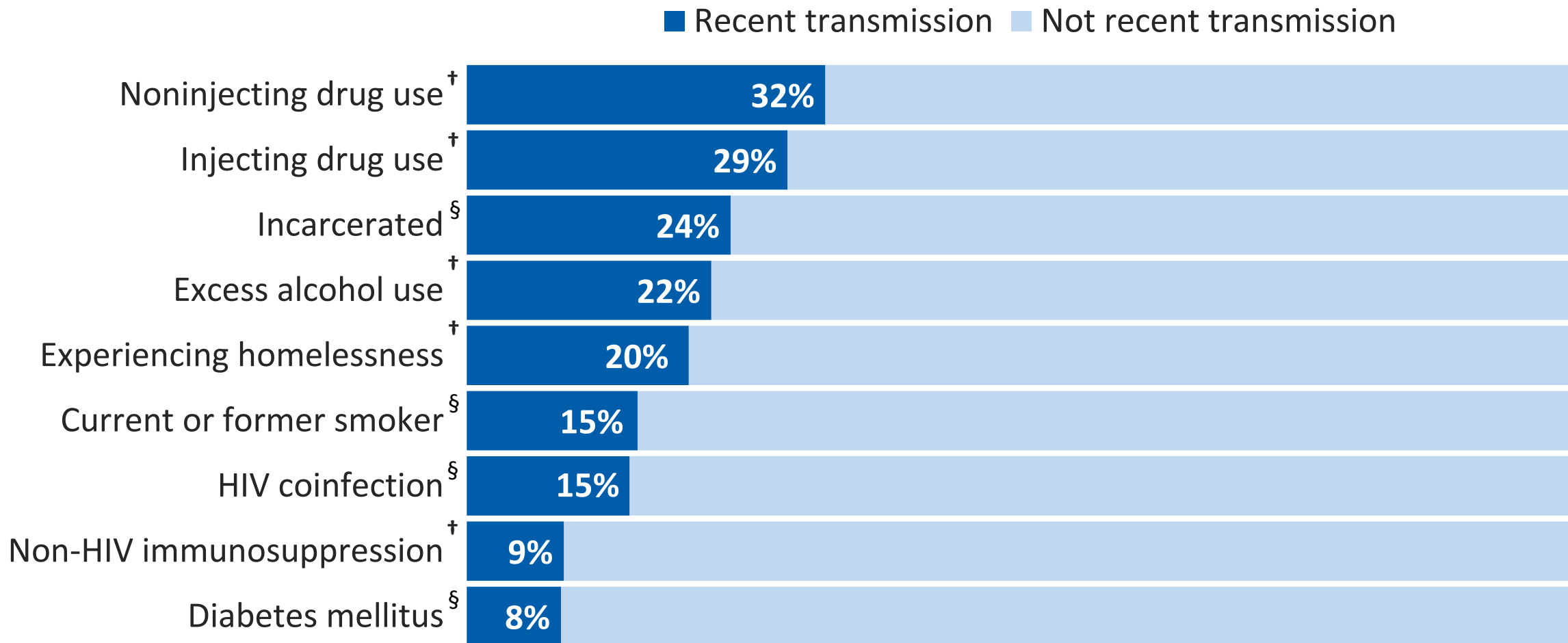
Among immigrants, reactivation risk persists



TB Cases by Countries of Birth Among Non-U.S.–Born Persons, United States, 2024 (N=8,016)



Percentage of TB Cases Attributed to Recent Transmission* by Selected Risk Factors, United States, 2023–2024



* A case is attributed to recent transmission if a plausible source case can be identified in a person who had an *M. tuberculosis* isolate with the same wgMLSType that differed by ≤ 5 single nucleotide polymorphisms, had an infectious form of TB, was 10 years of age or older, resided within 100 miles of the case, and was diagnosed within 2 years before the case.

[†] Within past 12 months prior to TB diagnosis.

[§] At the time of TB diagnosis.

Reported Tuberculosis in the United States, 2024, CDC data as of March 2026

DR-TB



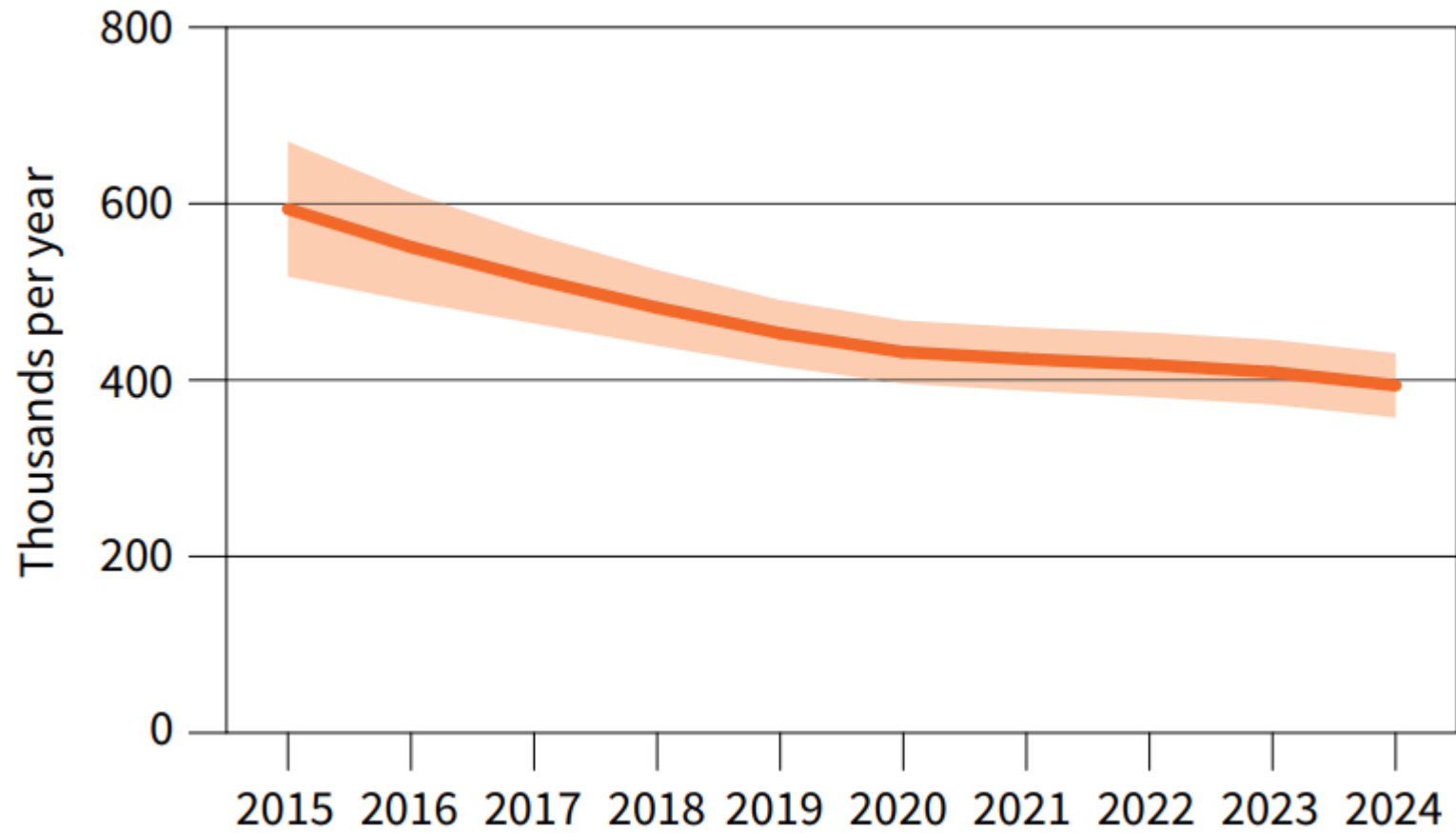
- Globally, MDR-TB (total cases and proportion of all new cases) is estimated to be slowly decreasing

DR-TB

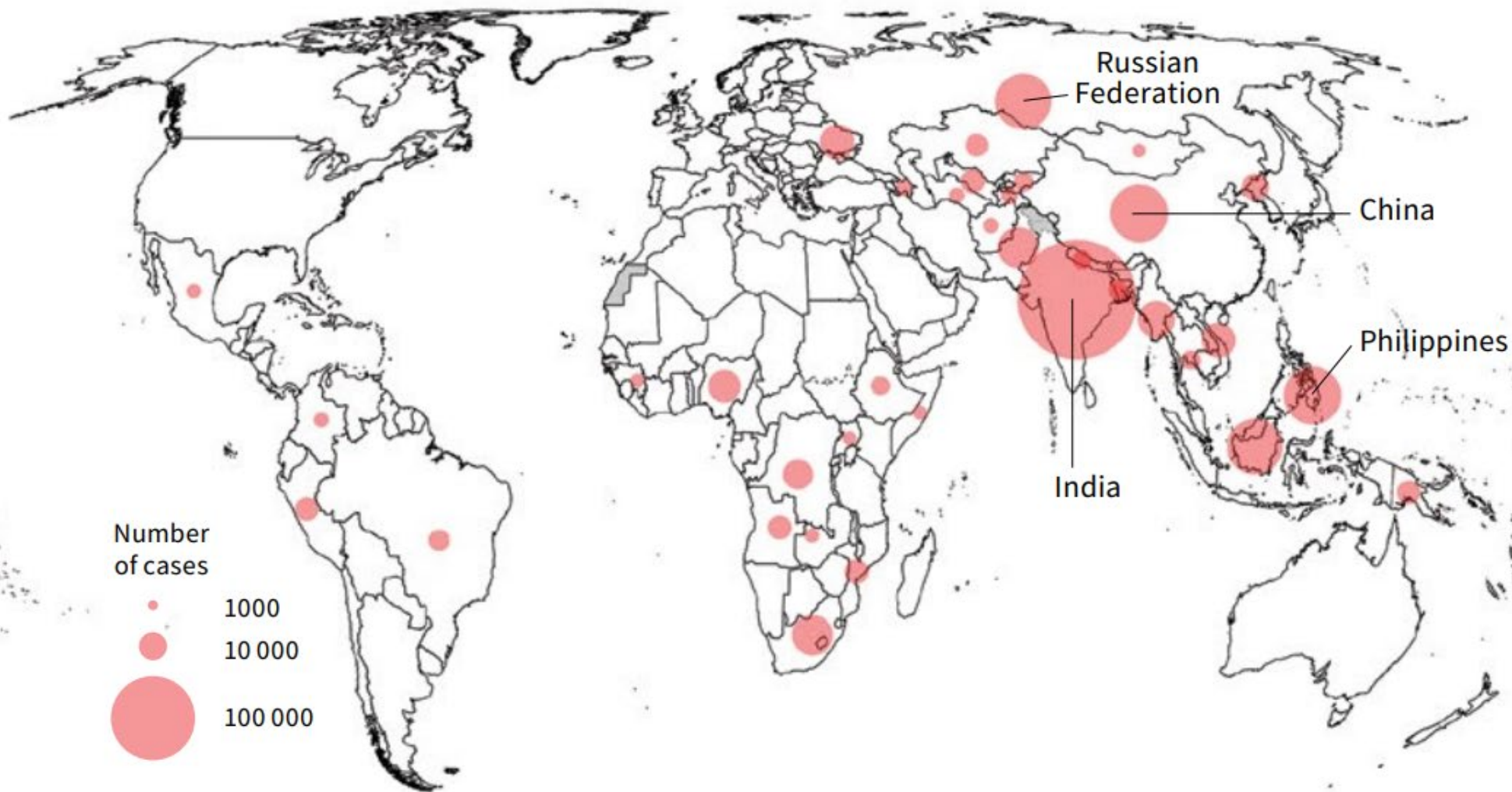


- Globally, MDR-TB (total cases and proportion of all new cases) is estimated to be slowly decreasing
- In the U.S., MDR-TB is relatively stable (100 cases/year)

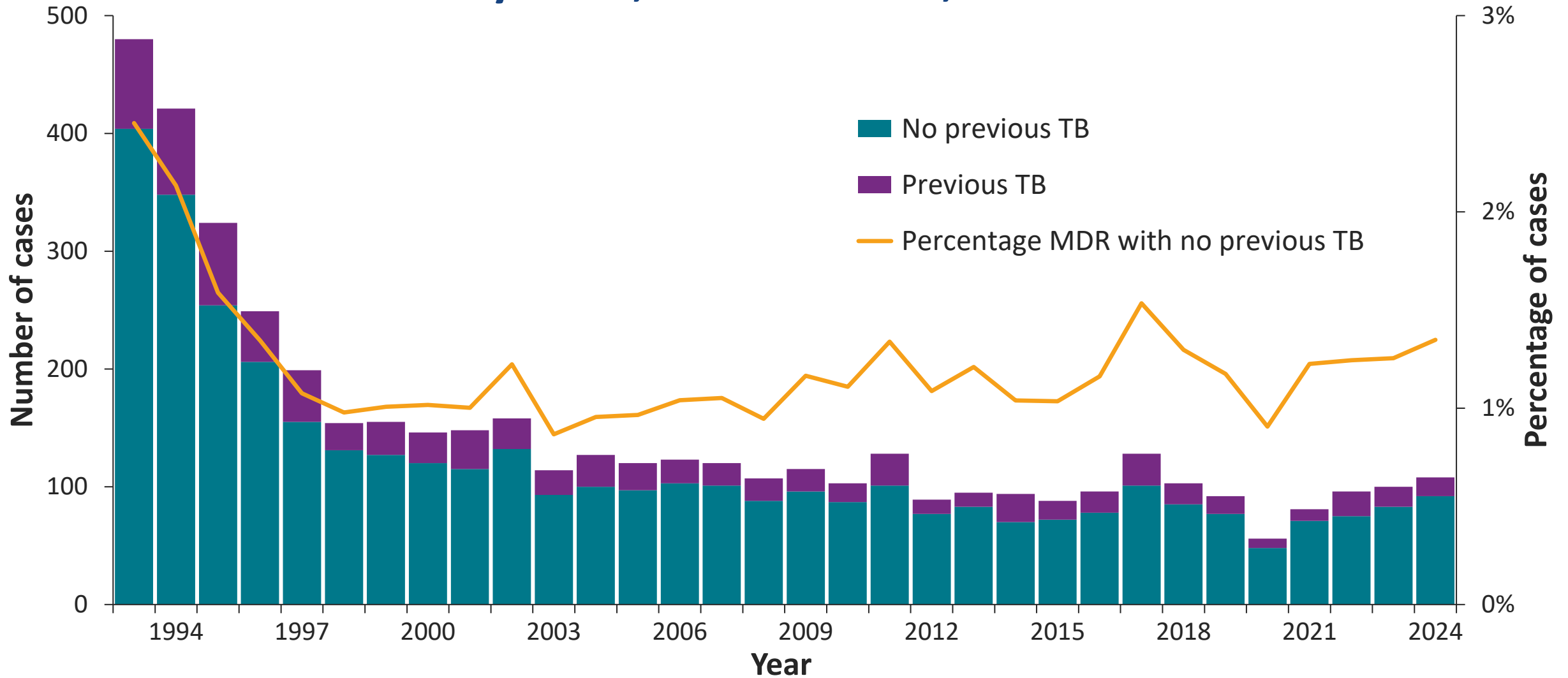
Global DR-TB



Estimated number of people who developed MDR/RR-TB (incident cases) for countries with at least 1000 incident cases, 2024^a



Number and Percentage of Multidrug-Resistant (MDR) TB Cases by History of TB, United States, 1993–2024



Deaths from TB



Image: James Nachtwey (Tugela Ferry, KwaZulu-Natal, South Africa)

Deaths from TB



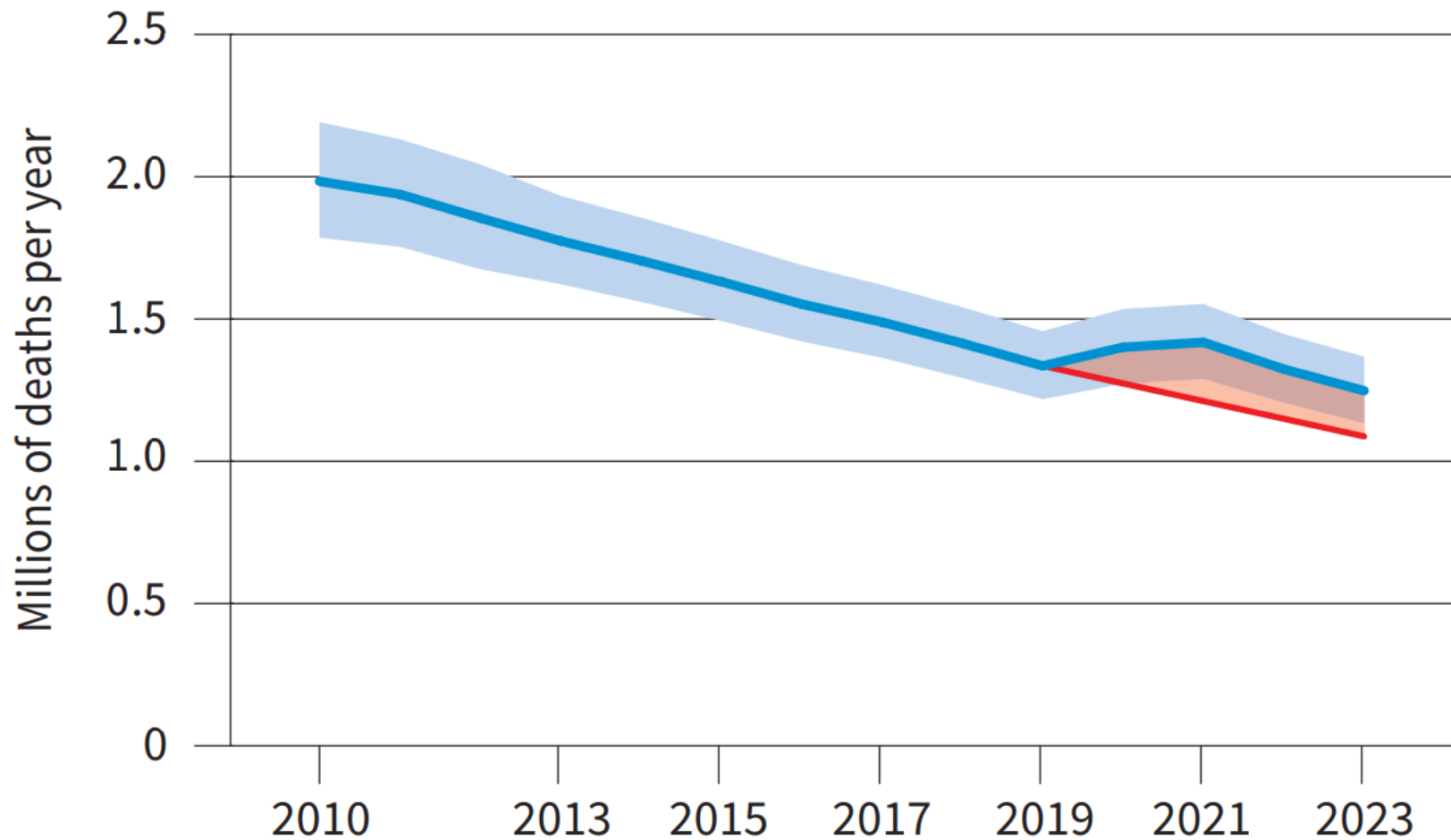
- In 2024, TB was the most common infectious cause of death globally, and caused nearly twice as many deaths as HIV/AIDS
- 1.23 million deaths (1.08 million among HIV-negative people)

Deaths from TB

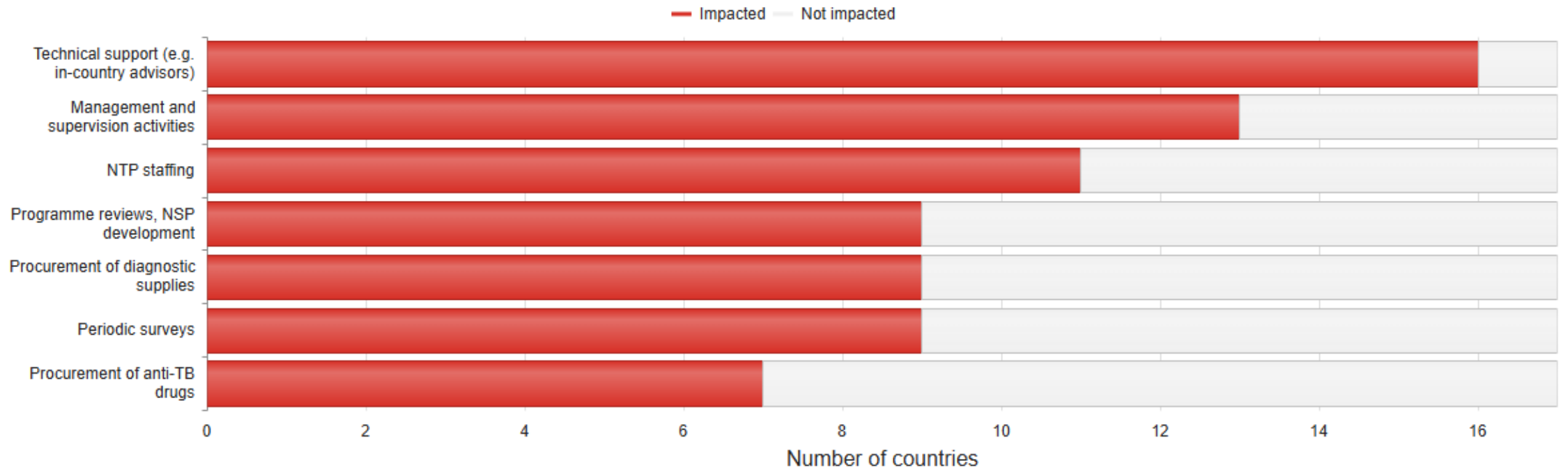


- In 2024, TB was the most common infectious cause of death globally, and caused nearly twice as many deaths as HIV/AIDS
 - 1.23 million deaths (1.08 million among HIV-negative people)
- **565 people in the U.S. died from TB in 2022**

COVID-19 disruptions drove excess TB mortality



Funding disruptions *will drive* excess TB mortality



Funding disruptions *will drive* excess TB mortality

- USG contributed about 50% of international donor funding for TB in 2015–2024
- International donor funding = 18% of global funding for TB, disproportionately lower income countries
- Modelling predicts 5 million additional cases, two million additional deaths over 10 years if funding not restored

Objectives

- Review global and U.S. estimates and trends in TB infection, TB disease, DR-TB, and death from TB
- Describe social-structural factors associated with TB infection and outcomes

Biopsychosocial model and TB



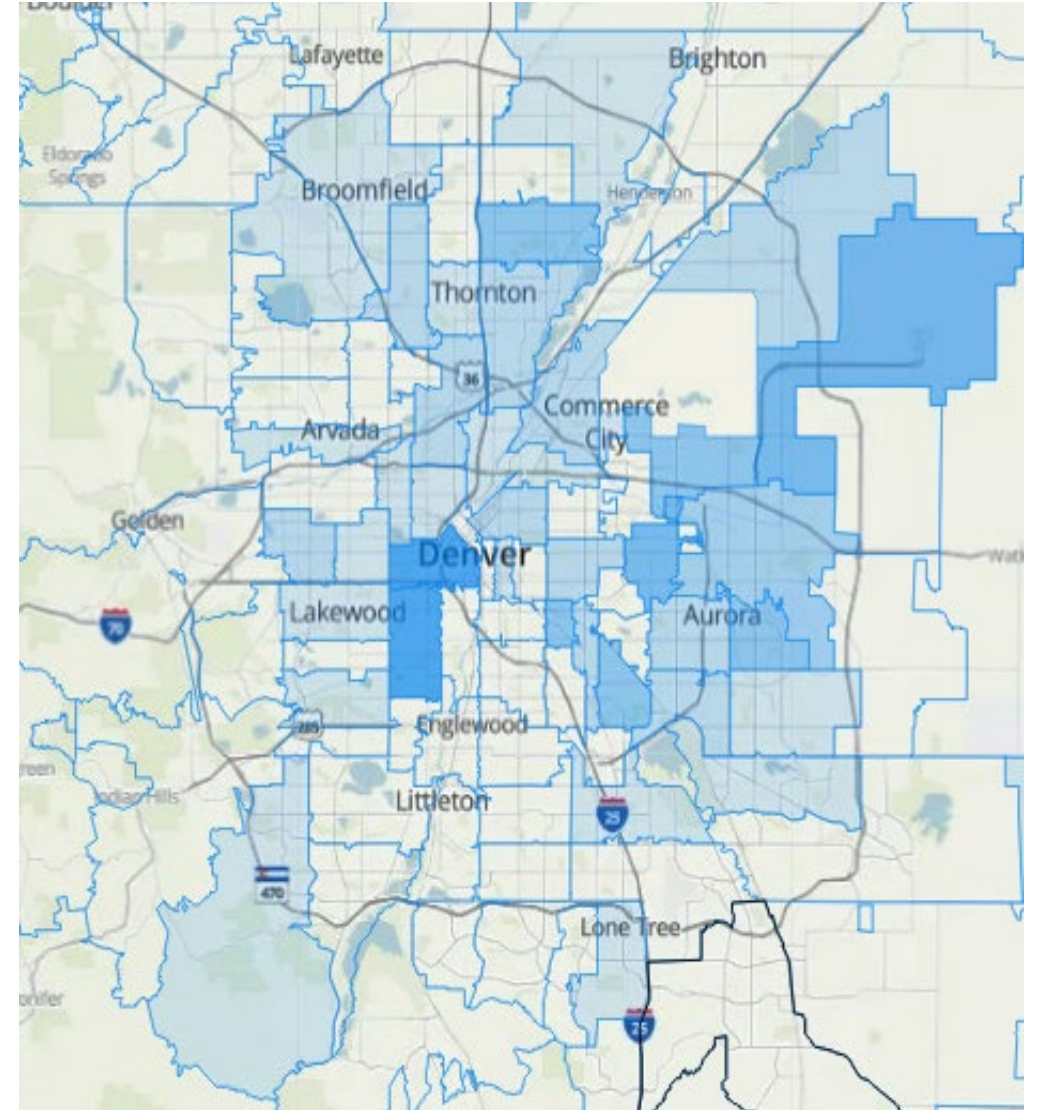
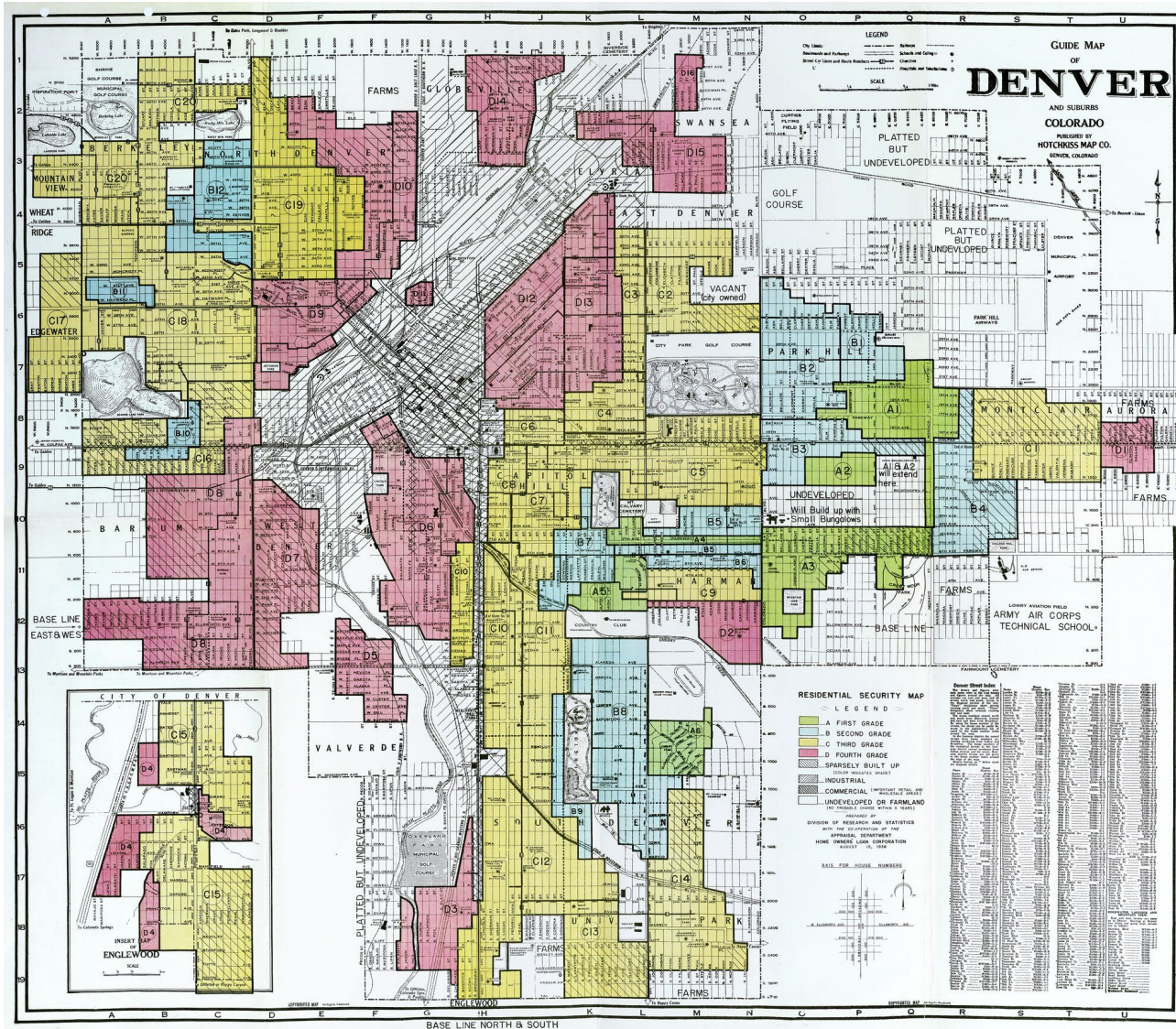
Image: Lewis Hine, taken January 1912 (Library of Congress)

Biopsychosocial model and TB



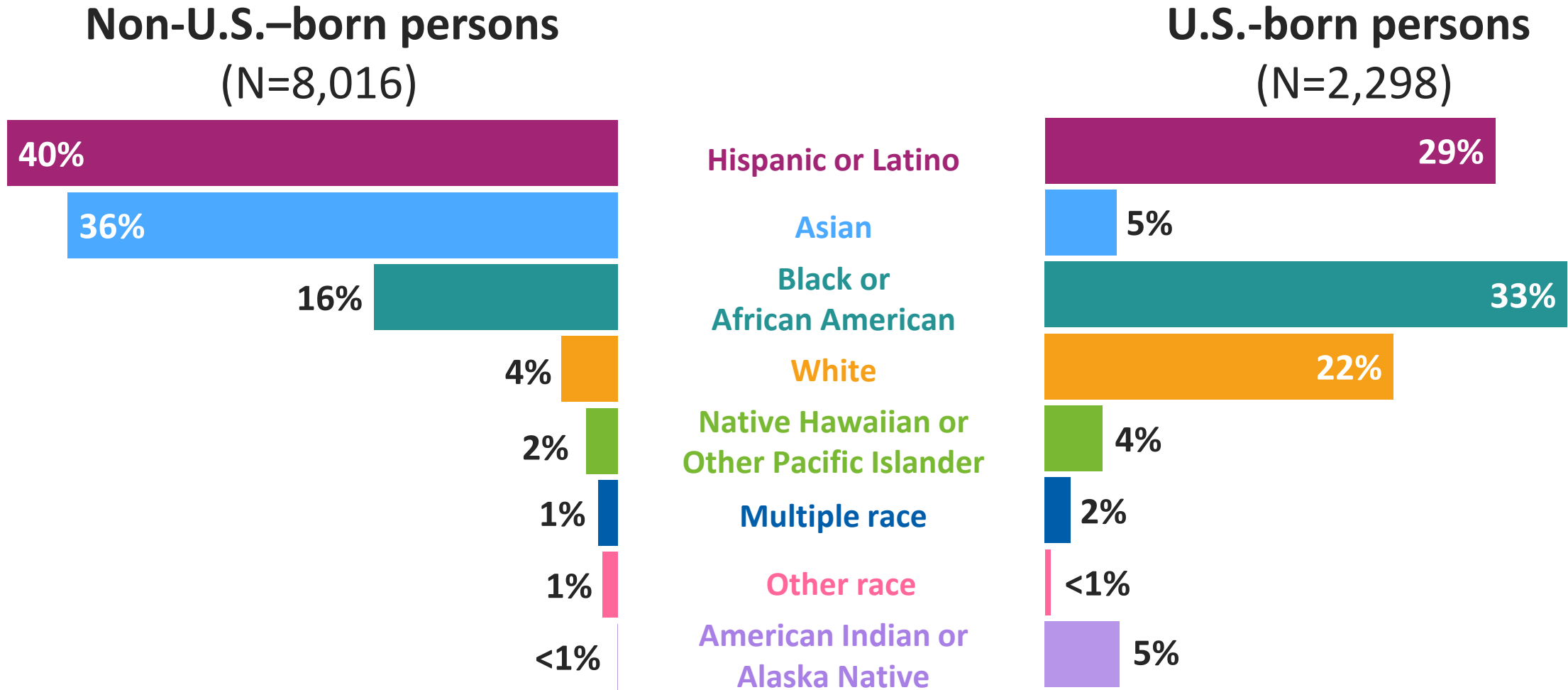
Image: Carabayllo, Lima, Peru (Socios En Salud)

Socio-structural disease determinants in the U.S



Images: L - Denver Public Library; R – Denver TB Program

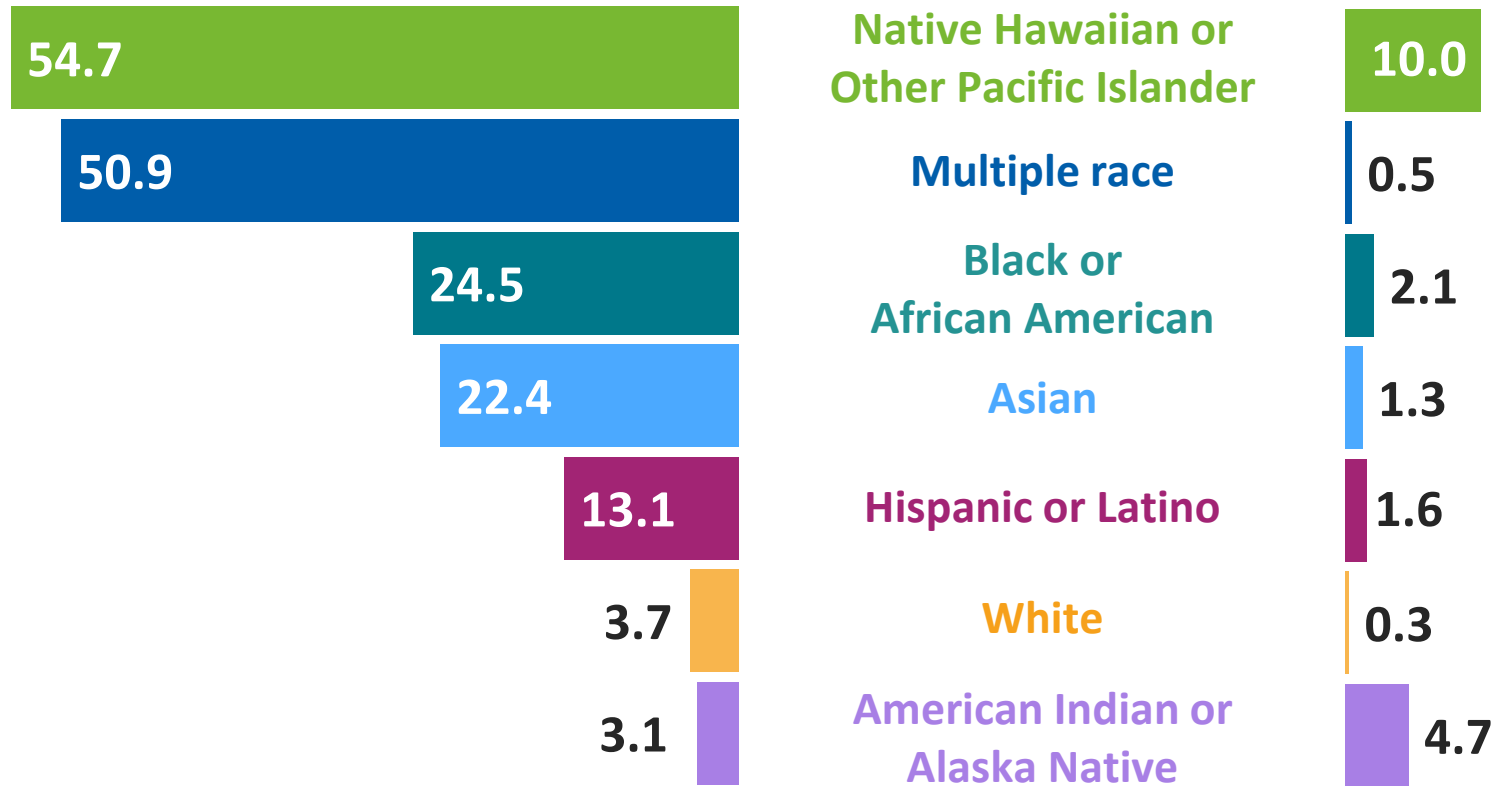
Percentage of TB Cases by Origin and Race/Ethnicity, United States, 2024



TB Incidence Rates* by Origin and Race/Ethnicity, United States, 2024

Non-U.S.–born persons
(N=8,016)

U.S.-born persons
(N=2,298)

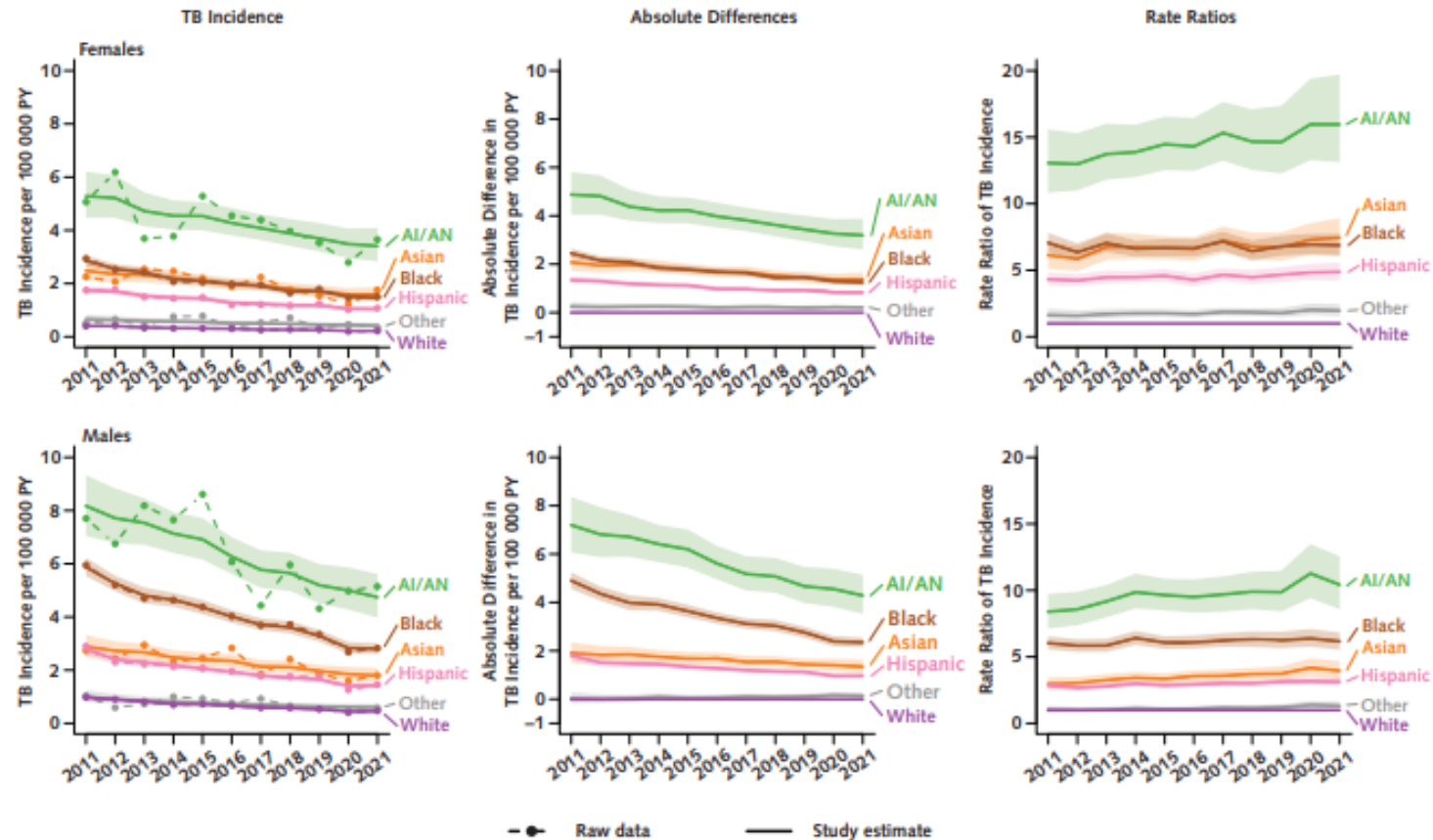


*Cases per 100,000 persons

†

TB disparities are moving in the wrong direction

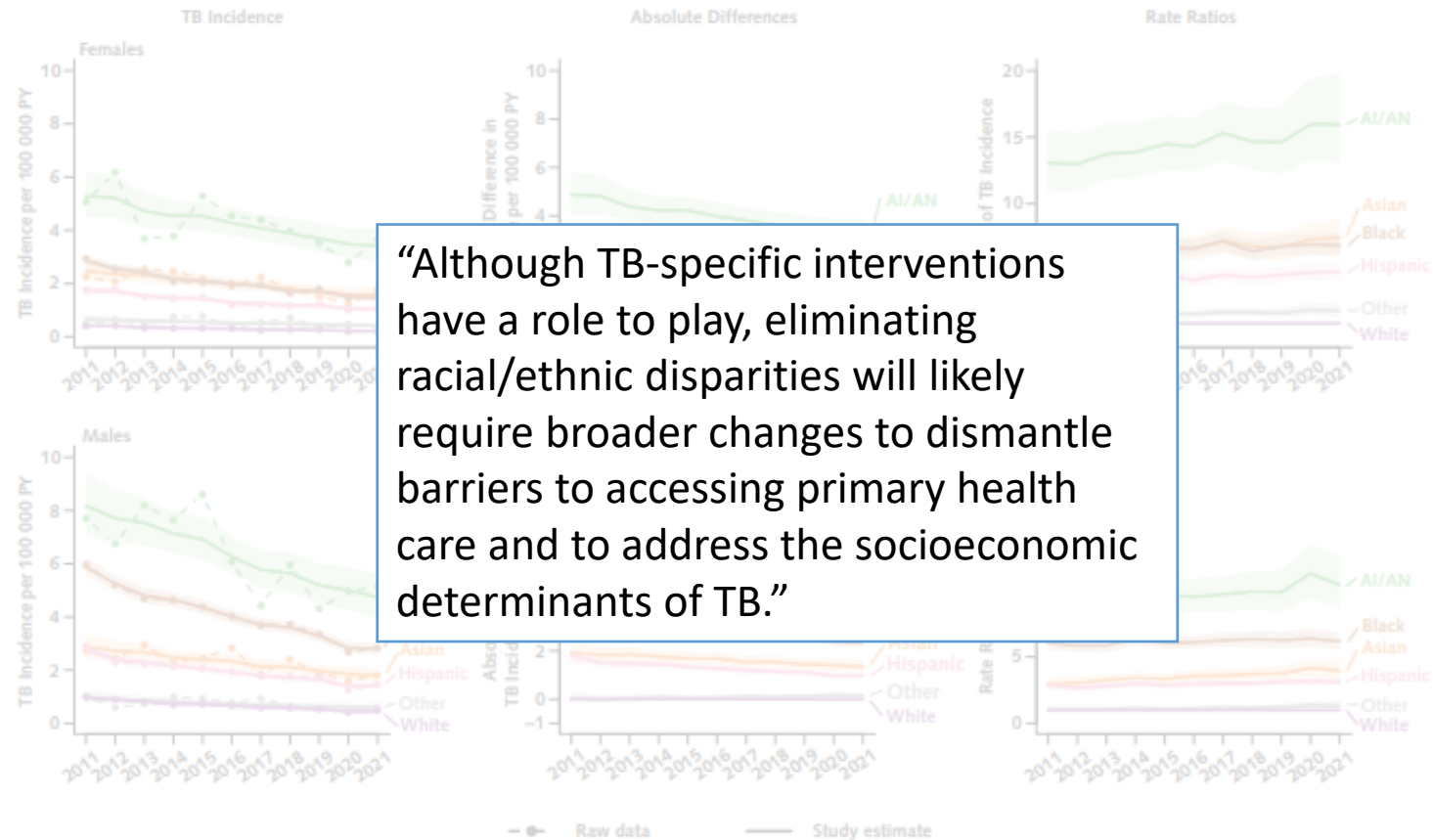
Figure 1. Estimated TB incidence rates, absolute differences in incidence rates, and incidence rate ratios among U.S.-born persons, by sex and race/ethnicity, United States, 2011-2021.



The reference group is White persons. Rate ratios and absolute differences increased as the incidence rate in the comparator group (non-Hispanic White persons) decreased over time. Estimates were adjusted for year, age, and state of residence. Shaded areas represent 95% CIs. AI/AN = American Indian/Alaska Native; PY = person-years; TB = tuberculosis.

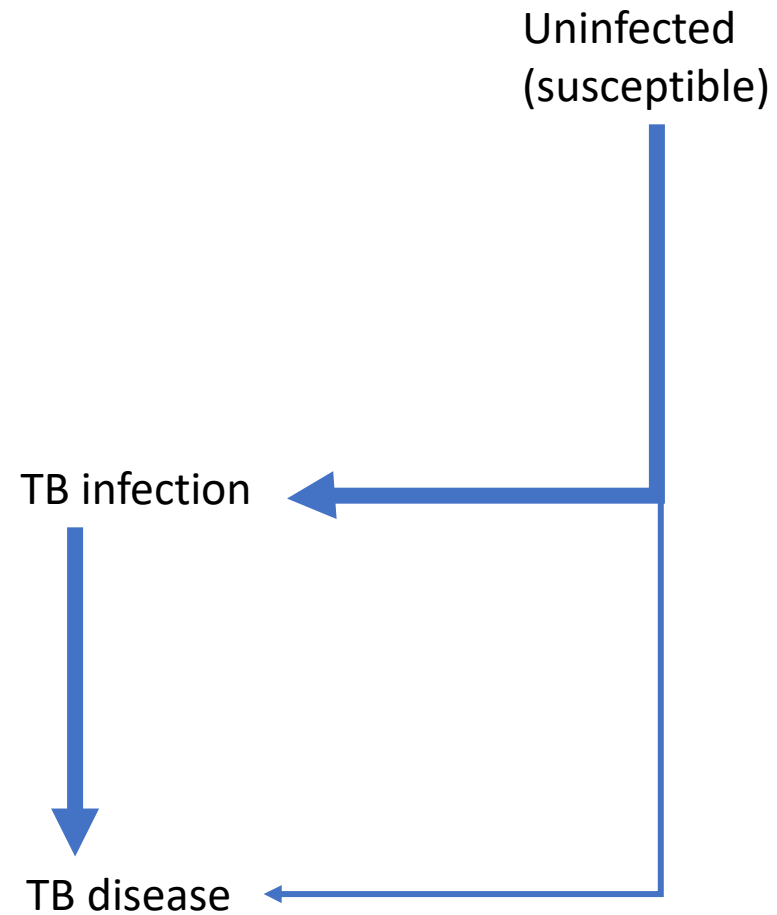
TB disparities are moving in the wrong direction

Figure 1. Estimated TB incidence rates, absolute differences in incidence rates, and incidence rate ratios among U.S.-born persons, by sex and race/ethnicity, United States, 2011-2021.



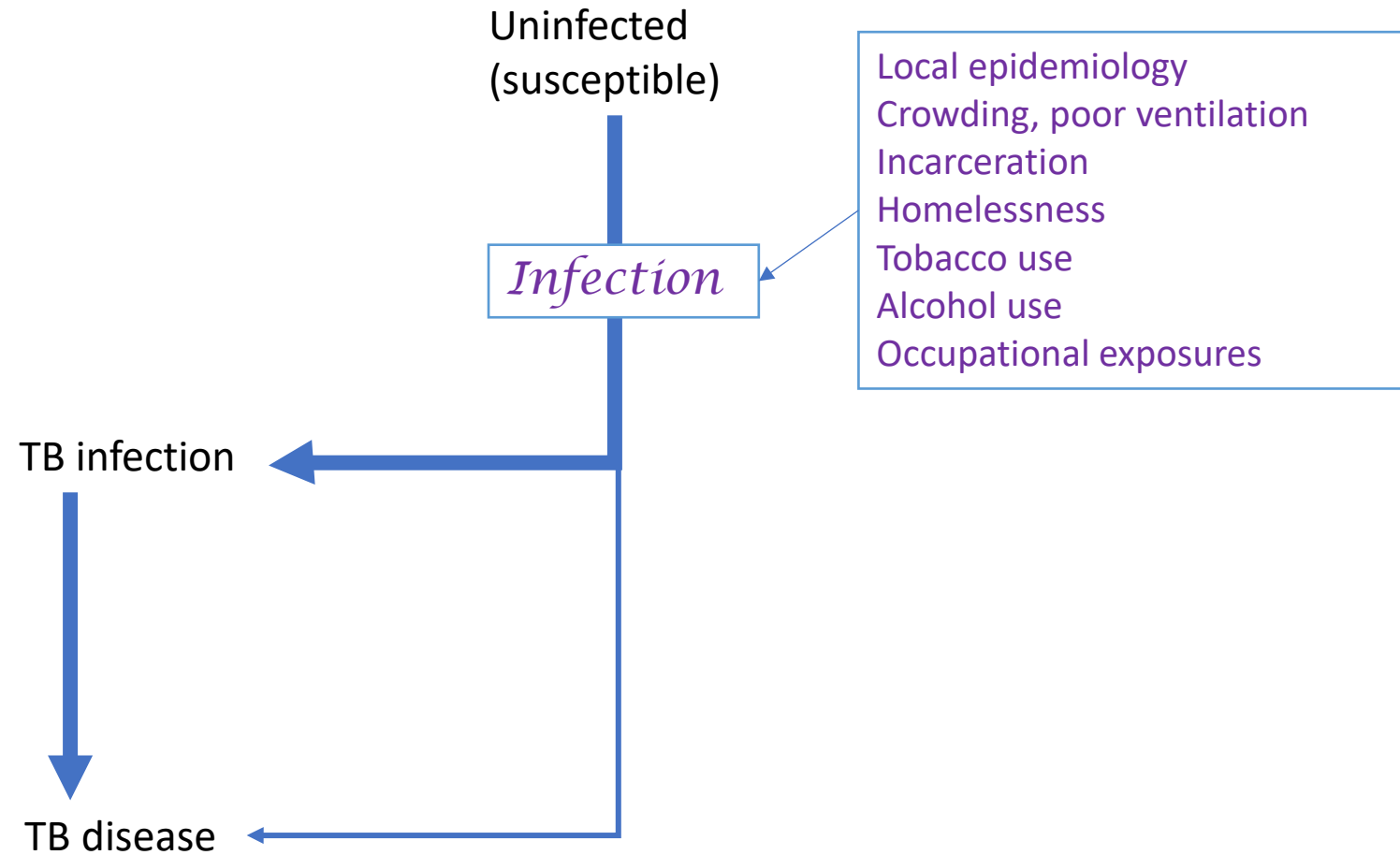
The reference group is White persons. Rate ratios and absolute differences increased as the incidence rate in the comparator group (non-Hispanic White persons) decreased over time. Estimates were adjusted for year, age, and state of residence. Shaded areas represent 95% CIs. AI/AN = American Indian/Alaska Native; PY = person-years; TB = tuberculosis.

Model of TB



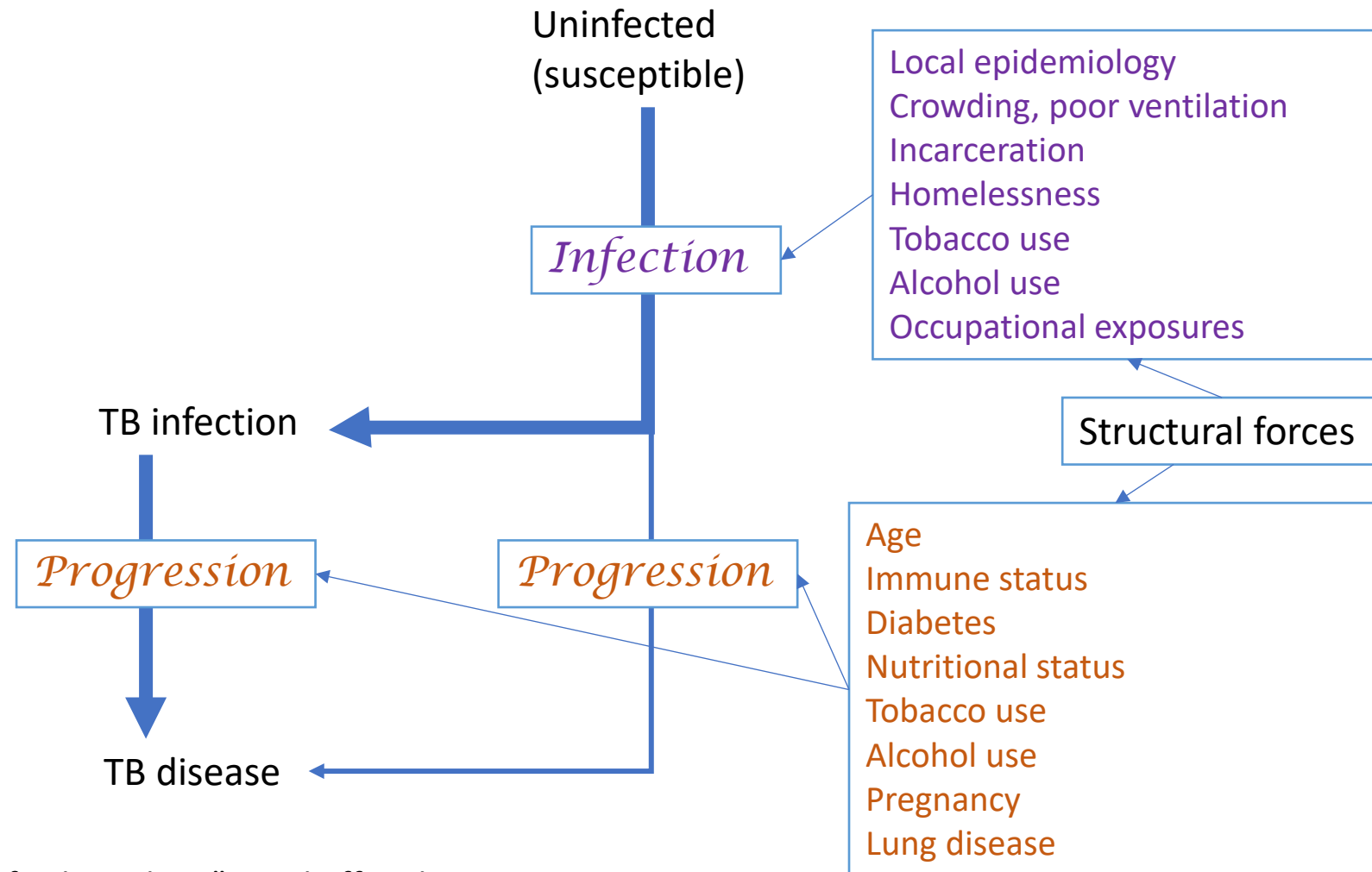
Adapted from Watt et al, "the Global Epidemiology of Tuberculosis" in Schaff and Zumla, eds., *Tuberculosis: A Comprehensive Clinical Reference*.

Model of TB



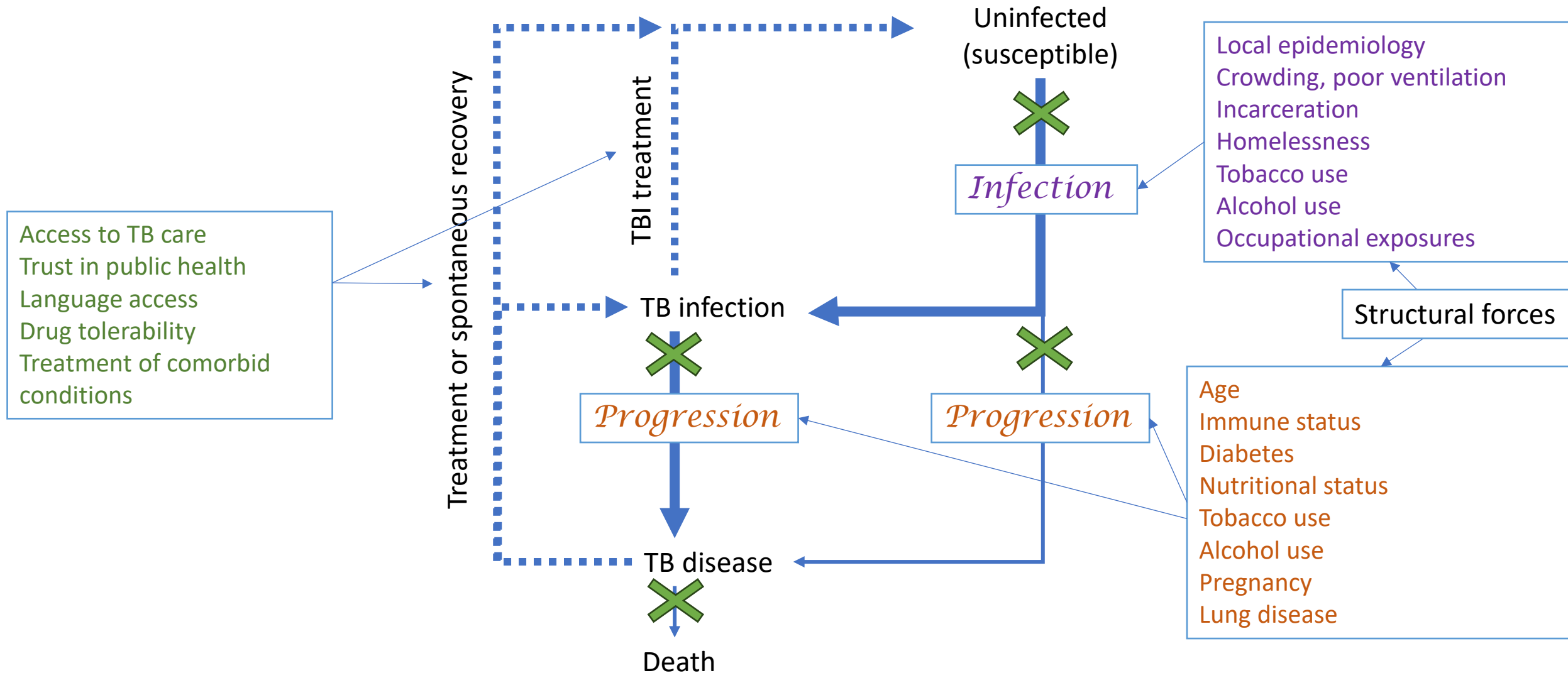
Local epidemiology
Crowding, poor ventilation
Incarceration
Homelessness
Tobacco use
Alcohol use
Occupational exposures

Model of TB

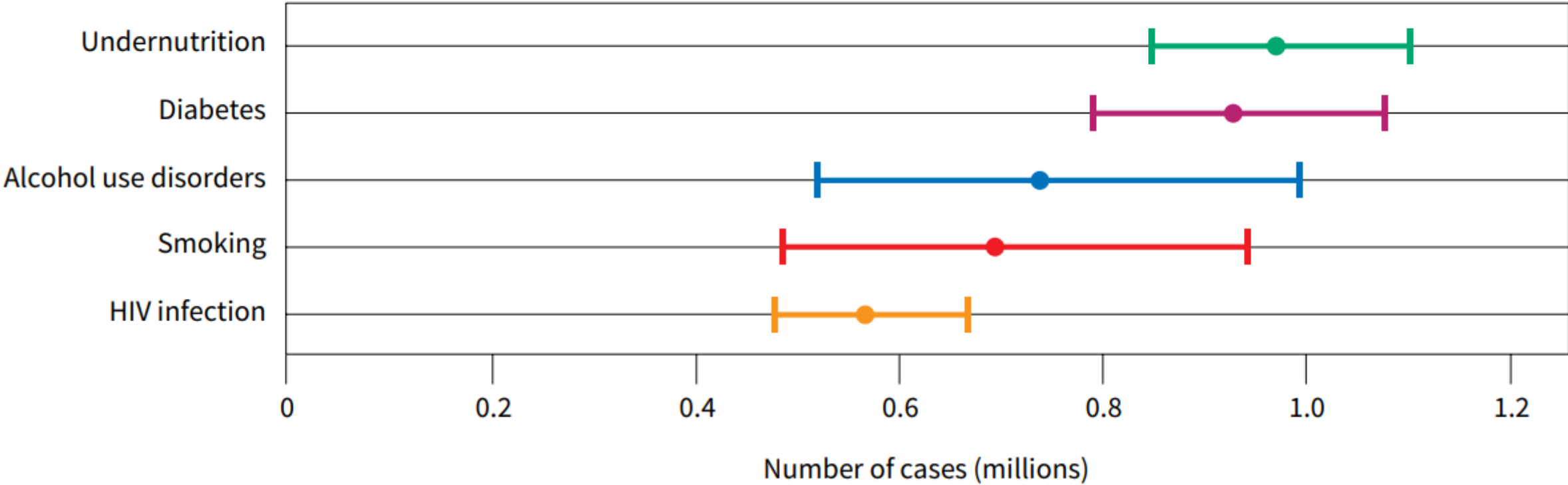


Adapted from Watt et al, "the Global Epidemiology of Tuberculosis" in Schaff and Zumla, eds., *Tuberculosis: A Comprehensive Clinical Reference*.

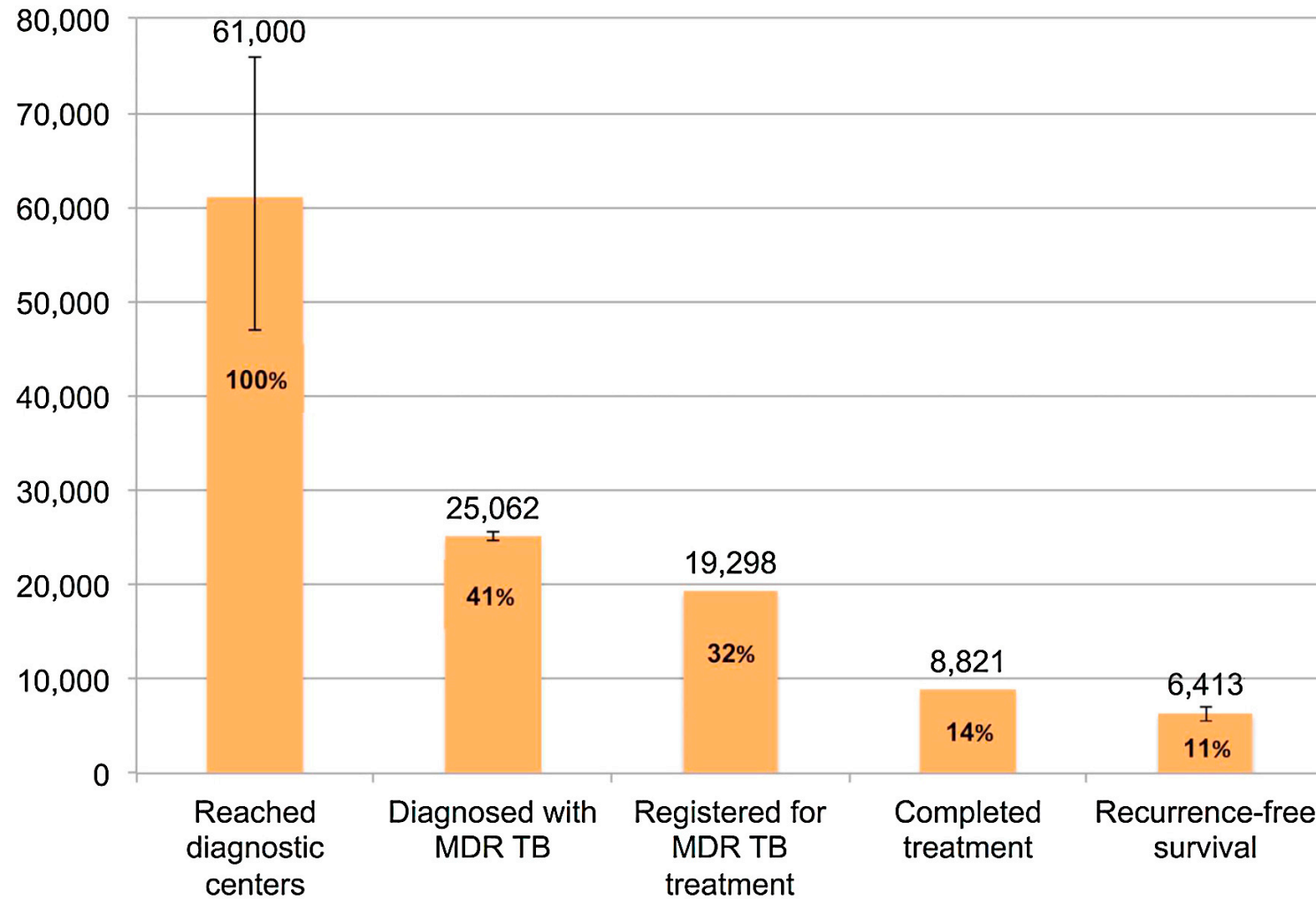
Model of TB



Global estimates of the number of people with a new episode of TB (incident cases) attributable to five risk factors,^a 2024

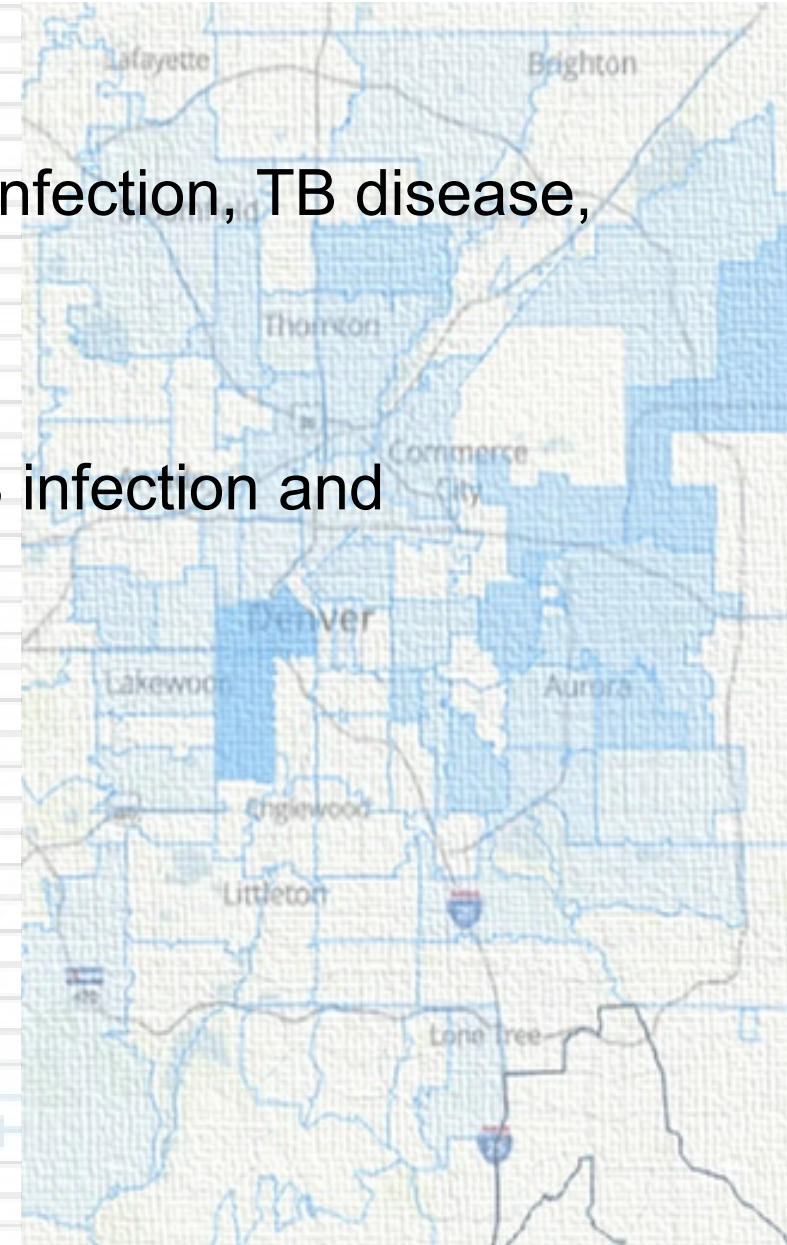


Implementation challenges: MDR-TB in India



Objectives

- Review global and U.S. estimates and trends in TB infection, TB disease, DR-TB, and death from TB
- Describe social-structural factors associated with TB infection and outcomes



Additional references

Haddad MB, Raz KM, Lash TL, Hill AN, Kammerer J, Winston CA, et al. Simple Estimates for Local Prevalence of Latent Tuberculosis Infection, United States, 2011–2015. *Emerg Infect Dis*. 2018;24(10):1930-1933.

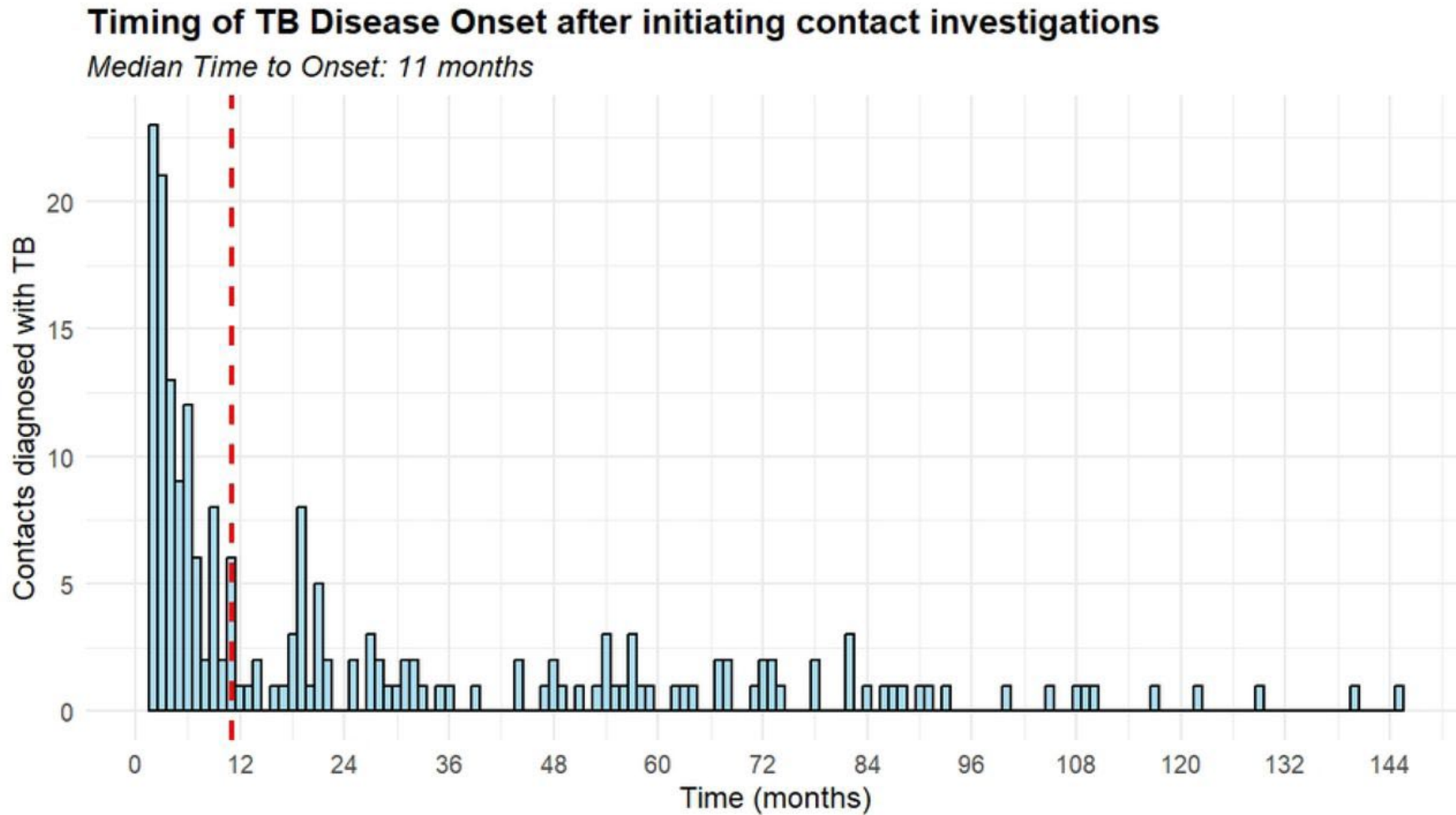
<https://doi.org/10.3201/eid2410.180716>

Houben RM, Dodd PJ. The Global Burden of Latent Tuberculosis Infection: A Re-estimation Using Mathematical Modelling. *PLoS Med*. 2016 Oct 25;13(10):e1002152. doi: 10.1371/journal.pmed.1002152. PMID: 27780211; PMCID: PMC5079585.

Narasimhan P, Wood J, Macintyre CR, Mathai D. Risk factors for tuberculosis. *Pulm Med*. 2013;2013:828939. doi: 10.1155/2013/828939. Epub 2013 Feb 12. PMID: 23476764; PMCID: PMC3583136.

Mirzazadeh A, Kahn JG, Haddad MB, Hill AN, Marks SM, Readhead A, Barry PM, Flood J, Mermin JH, Shete PB. State-level prevalence estimates of latent tuberculosis infection in the United States by medical risk factors, demographic characteristics and nativity. *PLoS One*. 2021 Apr 1;16(4):e0249012. doi: 10.1371/journal.pone.0249012. PMID: 33793612

Likelihood of TB disease declines in contacts



Timing and Predictors of Tuberculosis Incidence among Contacts

Michael Asare-Baah, Michael Lauzardo, Lori Johnston, Lina Dominique, Marie Nancy Séraphin

medRxiv 2024.11.02.24316631; doi: <https://doi.org/10.1101/2024.11.02.24316631>