California Department of PUBLIC HEALTH

Progress and Path: TB Elimination in California

Outline

- Why pursue TB elimination in California?
- What are the barriers?
- What does the California TB Elimination Plan propose?
- What is next?
- Discussion

Why TB elimination in California?

Costs and consequences of TB: the case for TB prevention

Death

- 1 in 6 die within five years of diagnosis
- >10% do not survive treatment

Disability

- After treatment, impaired lung function and shorter life expectancy
- >80% of children with CNS TB die or permanently disabled

Hospitalization

- 50% of TB patients are hospitalized
- 2x as expensive and 4x longer than hospitalizations for other conditions

Cost

- Catastrophic costs to patients and families
- >$217 million in direct and societal costs in California in 2022

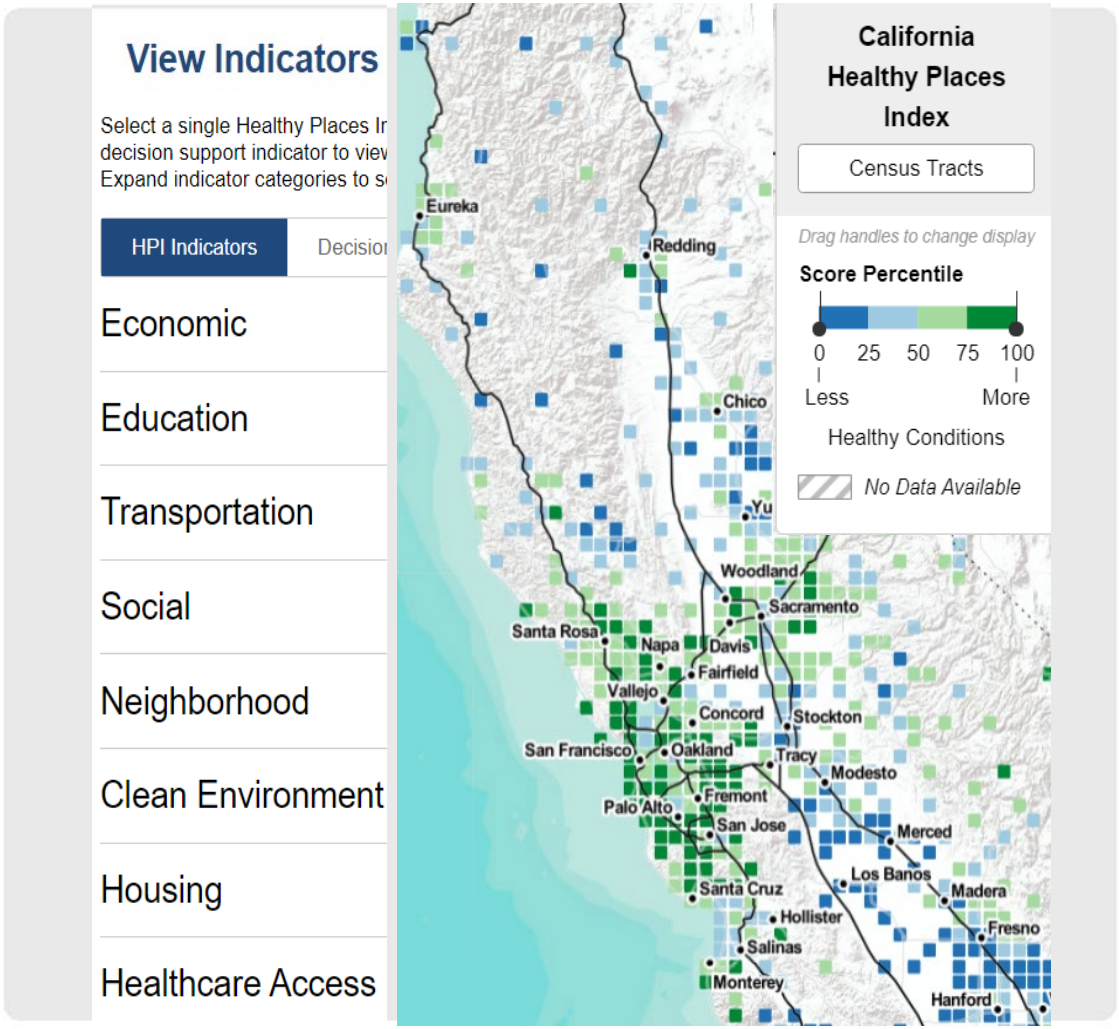
Costs and Consequences of TB in California (https://www.cdph.ca.gov/Programs/CID/DCDC/Pages/TB-Cost-Consequences-TB-in-California.aspx)

Health equity: TB affects the most vulnerable

- TB case rate among **Asians born outside the United States** is **43 times higher** than the case rate for US-born whites*
- 70% of persons diagnosed with TB live in the **2 least advantaged quartiles** of poverty/education/crowding**

Sources:
*2023 TB Snapshot; https://www.cdph.ca.gov/Programs/CID/DCDC/Pages/TB-Disease-Data.aspx
**Bakhsh Y, Readhead A, Flood J, Watt J, Barry P. (2019, March). Association of Area-Based Socioeconomic Measures With Tuberculosis Incidence Rates — California, 2012–2016. Poster presented at the California Tuberculosis Controller's Association Conference, Rohnert Park, CA.

TB disproportionately affects persons living in census tracts with low socio-economic status

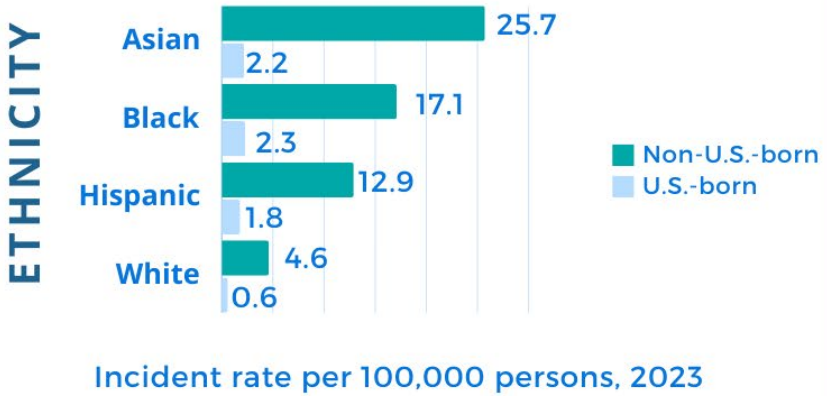


Healthy Places Index (HPI) score	No. (%)	
1st quartile (most advantaged)	1096/6027 (18%)	
2nd quartile	1378/6027 (23%)	
3rd quartile	1569/6027 (**26%**)	**59%**
4th quartile (least advantaged)	1984/6027 (**33%**)	

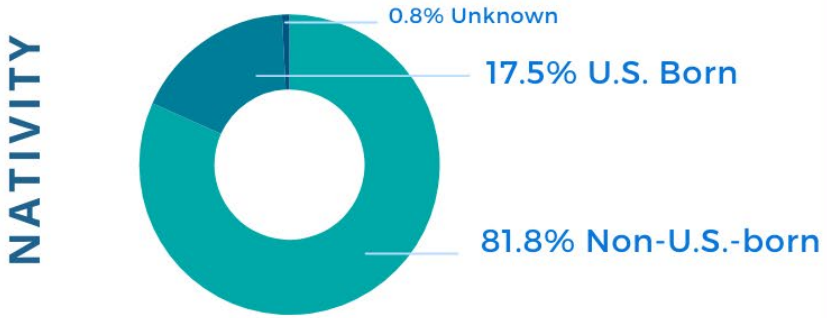
Source: Scott Nabity and Emily Han. TBCB, CDPH June 15, 2021
(TB cases 2017-2019)

TB: by the numbers

TUBERCULOSIS
DISPARITIES IN CALIFORNIA



Incident rate per 100,000 persons, 2023



Proportion of TB cases by nativity, 2023

2,113 new California TB cases in 2023

1 in 10 people with TB in California dies

>85% of active TB begins as latent TB and could have been prevented

>2 million Californians have latent TB - or every one in 17 Californians

1 in 4 non-US-born Californians have latent TB

$265 million medical and societal TB costs in California in 2023

TBCB CDPH, 2023

One survivor's perspective: why focus on LTBI?

" If I had been sat down when I was 19 and told, 'hey, you have latent TB, and if you don't finish your treatment, it can develop into dangerous TB disease,' I would have done so. It would have saved me a lot of grief in the future. It would have saved me seven months in isolation. So I think stopping TB at that initial stage, when it's latent, and when you're not infectious, I think is something that we need to educate more people about."

- Khayr, a TB survivor

Source: CDC Khayr's Story
https://www.cdc.gov/tb/stories/khayr.html

What are the barriers?

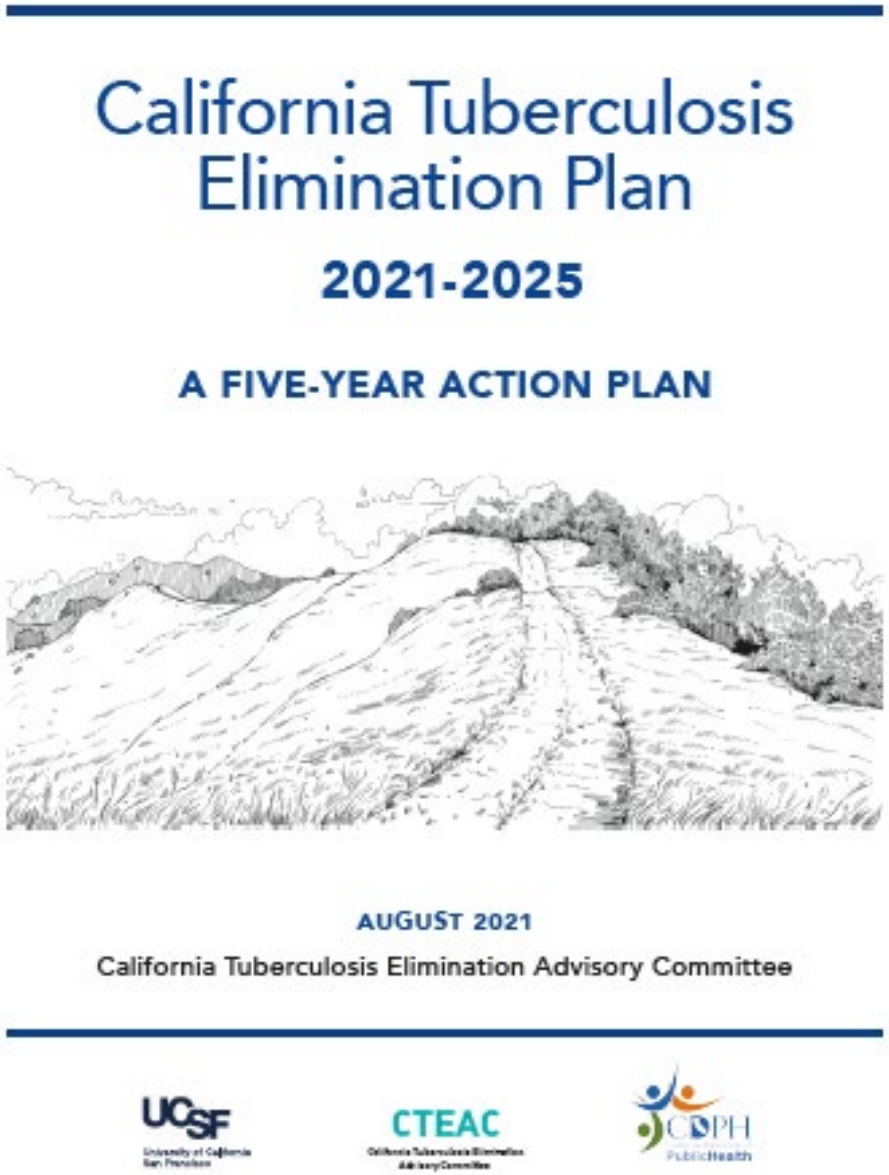
Challenges for optimizing TB prevention cascade and scale-up

- TB prevention not yet mainstreamed
- Health systems and patient access not yet simple
- Policies and funding not yet in place for large scale change
- No national or statewide LTBI metric
- Pandemic created pause in prevention activities (and TB evaluation/detection)
- Lack of visibility and recognition of TB as an important problem. TB prevention not a valued intervention

What is needed?

- National campaign with unified messaging to public and providers
- National measures adopted across healthcare settings
- Streamlined mechanism for LTBI tracking/reporting
- Costs removed for TB tests and drugs

What does the California TB Elimination Plan propose?



Health Equity Focus – TB Elimination Plan (2021-2025)

Health equity statement

Improving the healthcare outcomes for California's most vulnerable populations is a prerequisite of TB elimination. The California TB Elimination Plan, 2021-2025, was developed with an emphasis on reducing health inequities in patient awareness, healthcare access and treatment outcomes in order to address the disproportionate impact of TB on non-U.S.-born persons.[1] To address TB in subgroups defined by race, ethnicity, nativity and socioeconomic status, the following recommendations and actions are set forth. CTEAC members and its partners believe the work towards equity of healthcare access and outcomes is the foundation for TB elimination in California.

New Targets

Targets for California TB Elimination Plan, 2021-2025 — TB disease, disparities and death

OUTCOMES	CURRENT STATUS (2019)		TARGETS		
	CASES	RATE	CASES	RATE	YEAR
Reduce TB cases by at least 30%	2,115	53/million	1,500	38/million	2025
Reduce TB disparities — reduce non-U.S.-born case rate by at least 25%	1,772	163/million	1,222	116/million	2025
Reduce TB deaths by at least 25%	200	5.3/million	150	3.8/million	2025

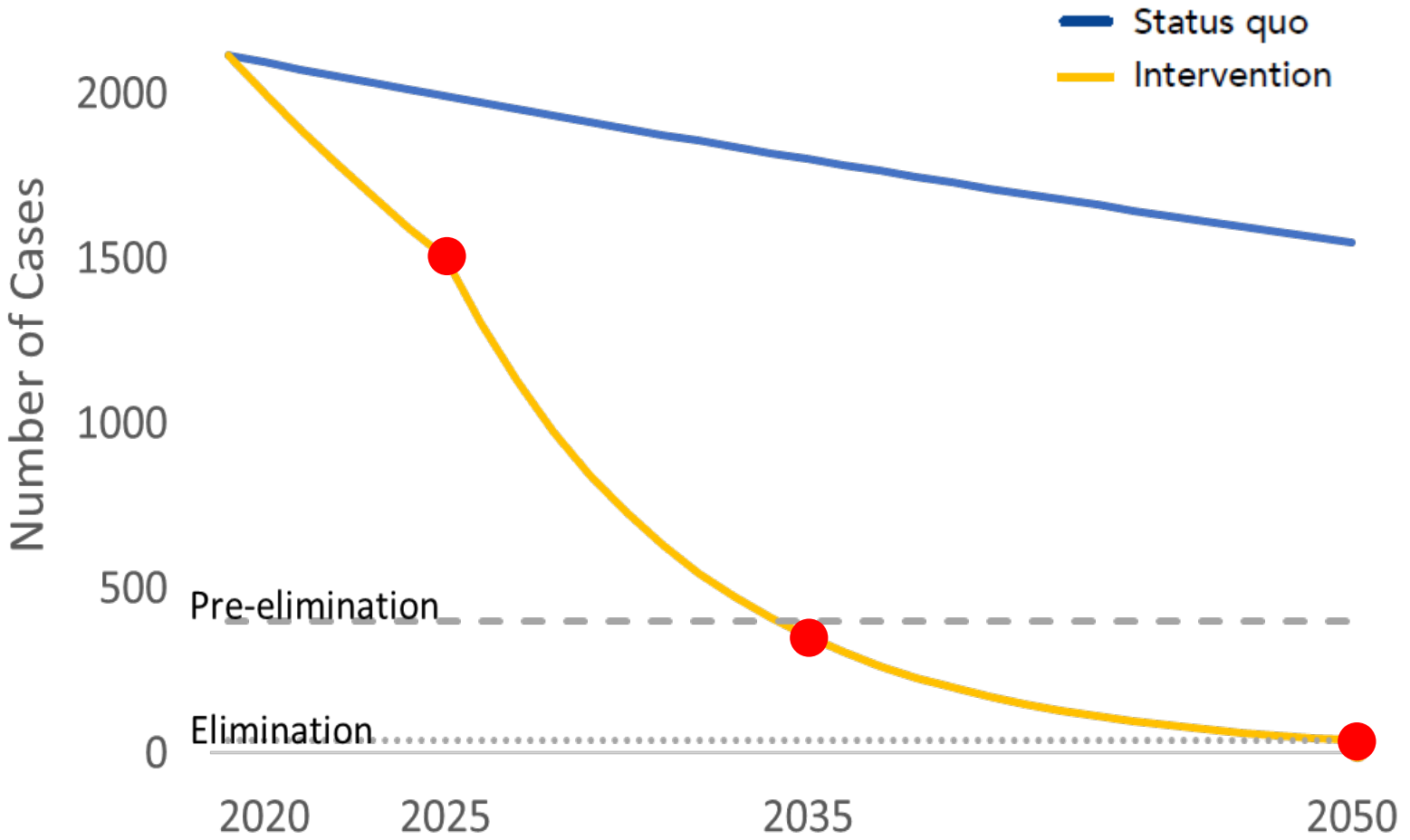
Pre-elimination and elimination

OUTCOMES	TARGETS		
	CASES	RATE	YEAR
Pre-elimination	400	<10/million	2035
Elimination	40	<1/million	2050

Status quo vs. intervention in California

We can avert:

- **36,000 TB cases**
- **3,600 deaths with TB**
- **one billion dollars in medical costs**
- **one billion dollars in societal costs**



Sources:
Cost from Shephardson et al. inflated to 2020 dollars. Shepardson D, Marks SM, Chesson H, et al. Cost-effectiveness of a 12-dose regimen for treating latent tuberculous infection in the United States. Int J Tuberc Lung Dis. 2013.
Oh P, Pascopella L, Barry PM, Flood JM. A systematic synthesis of direct costs to treat and manage tuberculosis disease applied to California, 2015. BMC Res Notes. 2017.

5 recommendations (40 action steps)

1. Find and **engage** persons at high risk and providers
2. Apply effective strategies for **LTBI testing and treatment**
3. Develop a California LTBI **surveillance system**
4. Secure sufficient **resources** for Plan implementation
5. Conduct **research** to evaluation TB prevention strategies

Rec 1: Engagement

1. Outreach to priority primary care providers
2. Engage primary care medical organizations
3. Implement "CA TB Hero" program
4. Partner with health equity organizations
5. Train non-licensed health workers on TB prevention
6. Tailor communications to high risk populations
7. Integrate TB prevention messages into other materials
8. Support TB survivors' efforts
9. Develop campaigns for AANHPI & Latinx populations
10. Select and post effective patient materials

Rec 2: LTBI testing and treatment

1. Produce and disseminate TB prevention "playbook"
2. Improve LTBI care cascades of community clinics
3. Disseminate LTBI care linkage steps to civil surgeons
4. Increase LTBI treatment of groups already tested
5. Couple LTBI and COVID prevention efforts
6. Enhance Medi-Cal Managed Care plans' LTBI efforts
7. Promote TB prevention for DHCS Innovation Awards

Rec 3: Surveillance

1. Publish annual LTBI report
2. Map TB and COVID-19 cases
3. Establish statewide LTBI measures
4. Update Medi-Cal LTBI treatment completion rates
5. Implement statewide TB contact surveillance system
6. Enhance IGRA reporting to capture risk
7. Create EHR data flow for LTBI surveillance
8. Promote LTBI testing/treatment measurement
9. Promote USPSTF LTBI recommendations

Rec 4: Resources

1. Define necessary resources for 2021-2025 TB Elimination Plan
2. Develop TB prevention business case
3. Expand TB coalitions
4. Ensure coordination across CA TB elimination plans
5. Secure funding to support TB prevention efforts
6. Monitor inventory/price of rifamycin medications
7. Ensure all rifamycins are on Medi-Cal Rx formulary
8. Ensure full coverage of IGRAs by all CA health plans
9. Reduce TB prevention costs for healthcare systems

Rec 5: Research

1. Establish CA LTBI research network
2. Establish TB case and disparity reduction targets
3. Promote LTBI testing/treatment implementation research
4. Assess strategies to prevent LTBI care cascade attrition
5. Analyze non-traditional data on LTBI testing/treatment

Where is the 2021-2025 TB Elimination Plan?

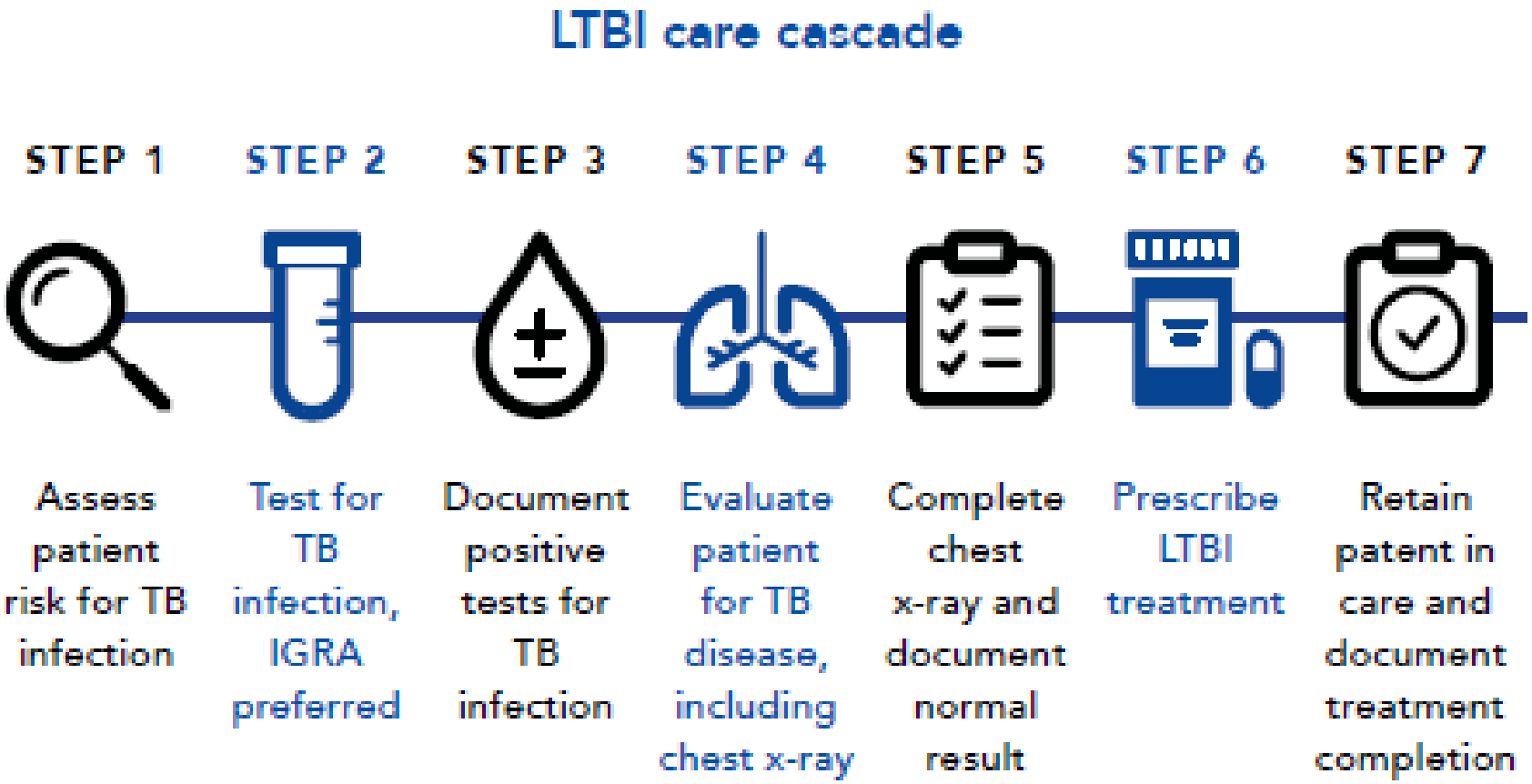
Online:

Tuberculosis Control Branch website
https://www.cdph.ca.gov/Programs/CID/DCDC/Pages/TBCB.aspx

Under the section "*Advocacy and Partners for TB*"

What is next?

Measuring LTBI testing and treatment



Prevention effectiveness

- Testing for LTBI is a **recommended standard of care** for asymptomatic non-US-born adults to prevent TB disease (USPSTF 2023)

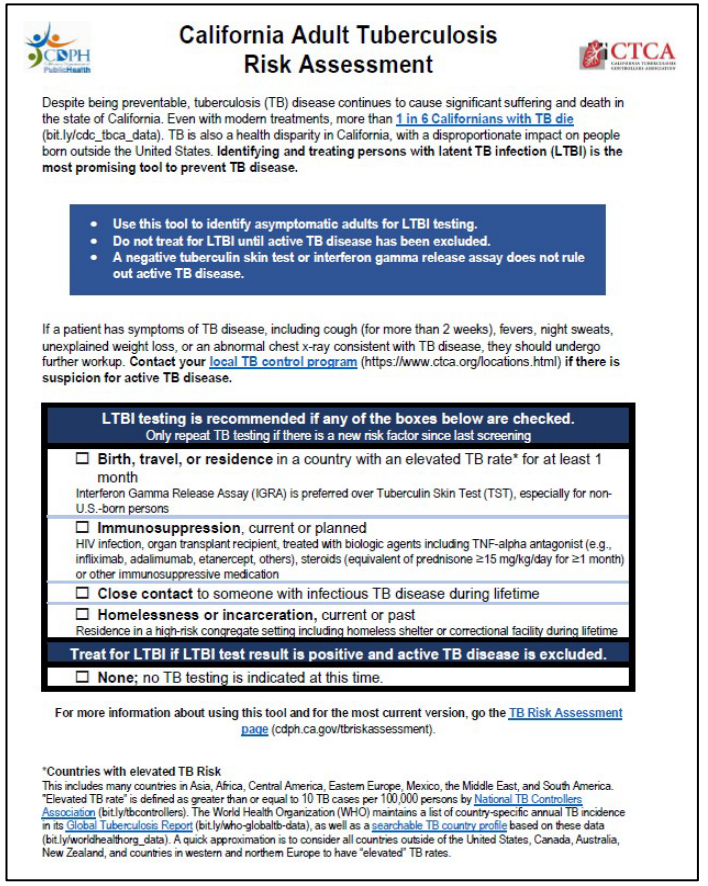
- TB prevention is **cost-effective** especially if IGRA and short course regimens used

- Among non-US-born diabetics, **500 needed to screen and treat** to prevent one TB case

- Meets acceptable threshold of willingness to pay

California TB Risk Assessments

- All patients at increased risk for TB disease should be **screened**
- To prevent TB disease: **test** those who answer "yes" to any question(s)
- Some settings/counties utilize population-specific risk assessments



California Adult Tuberculosis Risk Assessment

Despite being preventable, tuberculosis (TB) disease continues to cause significant suffering and death in the state of California. Even with modern treatments, more than 1 in 6 Californians with TB die (bit.ly/cdc_tbca_data). TB is also a health disparity in California, with a disproportionate impact on people born outside the United States. **Identifying and treating persons with latent TB infection (LTBI) is the most promising tool to prevent TB disease.**

- **Use this tool to identify asymptomatic adults for LTBI testing.**
- **Do not treat for LTBI until active TB disease has been excluded.**
- **A negative tuberculin skin test or interferon gamma release assay does not rule out active TB disease.**

If a patient has symptoms of TB disease, including cough (for more than 2 weeks), fevers, night sweats, unexplained weight loss, or an abnormal chest x-ray consistent with TB disease, they should undergo further workup. **Contact your local TB control program** (https://www.ctca.org/locations.html) **if there is suspicion for active TB disease.**

LTBI testing is recommended if any of the boxes below are checked.
Only repeat TB testing if there is a new risk factor since last screening

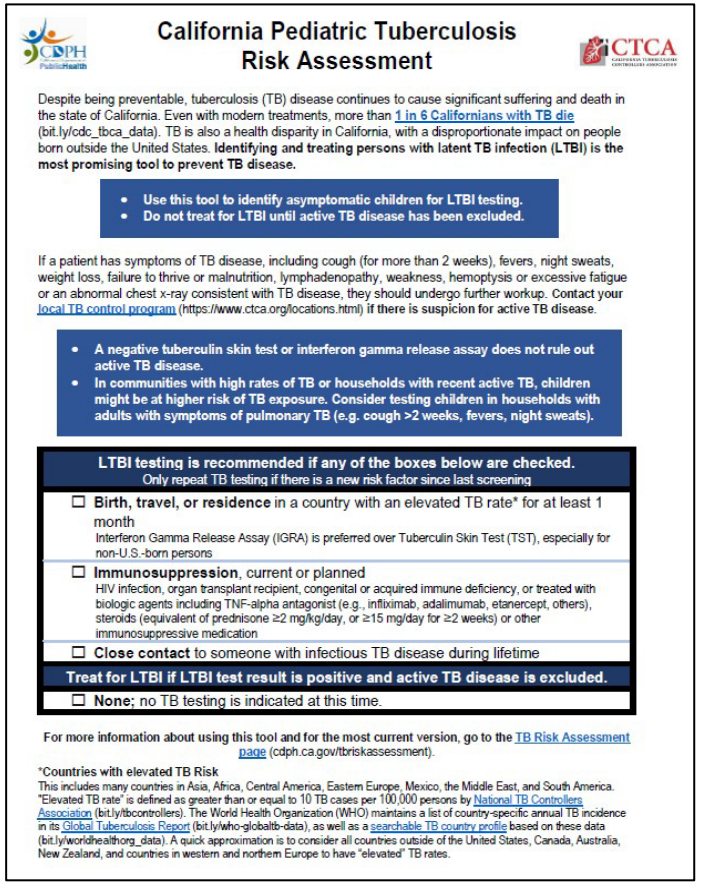
- ☐ **Birth, travel, or residence** in a country with an elevated TB rate* for at least 1 month
  Interferon Gamma Release Assay (IGRA) is preferred over Tuberculin Skin Test (TST), especially for non-U.S.-born persons
- ☐ **Immunosuppression**, current or planned
  HIV infection, organ transplant recipient, treated with biologic agents including TNF-alpha antagonist (e.g., infliximab, adalimumab, etanercept, others), steroids (equivalent of prednisone ≥15 mg/kg/day for ≥1 month) or other immunosuppressive medication
- ☐ **Close contact** to someone with infectious TB disease during lifetime
- ☐ **Homelessness or incarceration,** current or past
  Residence in a high-risk congregate setting including homeless shelter or correctional facility during lifetime

Treat for LTBI if LTBI test result is positive and active TB disease is excluded.

- ☐ **None;** no TB testing is indicated at this time.

For more information about using this tool and for the most current version, go the TB Risk Assessment page (cdph.ca.gov/tbriskassessment).

*Countries with elevated TB Risk
This includes many countries in Asia, Africa, Central America, Eastern Europe, Mexico, the Middle East, and South America. "Elevated TB rate" is defined as greater than or equal to 10 TB cases per 100,000 persons by National TB Controllers Association (bit.ly/tbcontrollers). The World Health Organization (WHO) maintains a list of country-specific annual TB incidence in its Global Tuberculosis Report (bit.ly/who-globaltb-data), as well as a searchable TB country profile based on these data (bit.ly/worldhealthorg_data). A quick approximation is to consider all countries outside of the United States, Canada, Australia, New Zealand, and countries in western and northern Europe to have "elevated" TB rates.



California Pediatric Tuberculosis Risk Assessment

Despite being preventable, tuberculosis (TB) disease continues to cause significant suffering and death in the state of California. Even with modern treatments, more than 1 in 6 Californians with TB die (bit.ly/cdc_tbca_data). TB is also a health disparity in California, with a disproportionate impact on people born outside the United States. **Identifying and treating persons with latent TB infection (LTBI) is the most promising tool to prevent TB disease.**

- **Use this tool to identify asymptomatic children for LTBI testing.**
- **Do not treat for LTBI until active TB disease has been excluded.**

If a patient has symptoms of TB disease, including cough (for more than 2 weeks), fevers, night sweats, weight loss, failure to thrive or malnutrition, lymphadenopathy, weakness, hemoptysis or excessive fatigue or an abnormal chest x-ray consistent with TB disease, they should undergo further workup. Contact your local TB control program (https://www.ctca.org/locations.html) **if there is suspicion for active TB disease.**

- **A negative tuberculin skin test or interferon gamma release assay does not rule out active TB disease.**
- **In communities with high rates of TB or households with recent active TB, children might be at higher risk of TB exposure. Consider testing children in households with adults with symptoms of pulmonary TB (e.g. cough >2 weeks, fevers, night sweats).**

LTBI testing is recommended if any of the boxes below are checked.
Only repeat TB testing if there is a new risk factor since last screening

- ☐ **Birth, travel, or residence** in a country with an elevated TB rate* for at least 1 month
  Interferon Gamma Release Assay (IGRA) is preferred over Tuberculin Skin Test (TST), especially for non-U.S.-born persons
- ☐ **Immunosuppression**, current or planned
  HIV infection, organ transplant recipient, congenital or acquired immune deficiency, or treated with biologic agents including TNF-alpha antagonist (e.g., infliximab, adalimumab, etanercept, others), steroids (equivalent of prednisone ≥2 mg/kg/day, or ≥15 mg/day for ≥2 weeks) or other immunosuppressive medication
- ☐ **Close contact** to someone with infectious TB disease during lifetime

Treat for LTBI if LTBI test result is positive and active TB disease is excluded.

- ☐ **None;** no TB testing is indicated at this time.

For more information about using this tool and for the most current version, go to the TB Risk Assessment page (cdph.ca.gov/tbriskassessment).

*Countries with elevated TB Risk
This includes many countries in Asia, Africa, Central America, Eastern Europe, Mexico, the Middle East, and South America. "Elevated TB rate" is defined as greater than or equal to 10 TB cases per 100,000 persons by National TB Controllers Association (bit.ly/tbcontrollers). The World Health Organization (WHO) maintains a list of country-specific annual TB incidence in its Global Tuberculosis Report (bit.ly/who-globaltb-data), as well as a searchable TB country profile based on these data (bit.ly/worldhealthorg_data). A quick approximation is to consider all countries outside of the United States, Canada, Australia, New Zealand, and countries in western and northern Europe to have "elevated" TB rates.

CDC recommends the following TB prevention best practices:

- **IGRA** as the preferred test

- Short course **rifamycin-based LTBI treatment** regimens as the preferred treatment

Source:
[Latent TB Infection Testing and Treatment: Summary of U.S. Recommendations](https://www.cdc.gov/tb/publications/ltbi/pdf/CDC-USPSTF-LTBI-Testing-Treatment-Recommendations-508.pdf)
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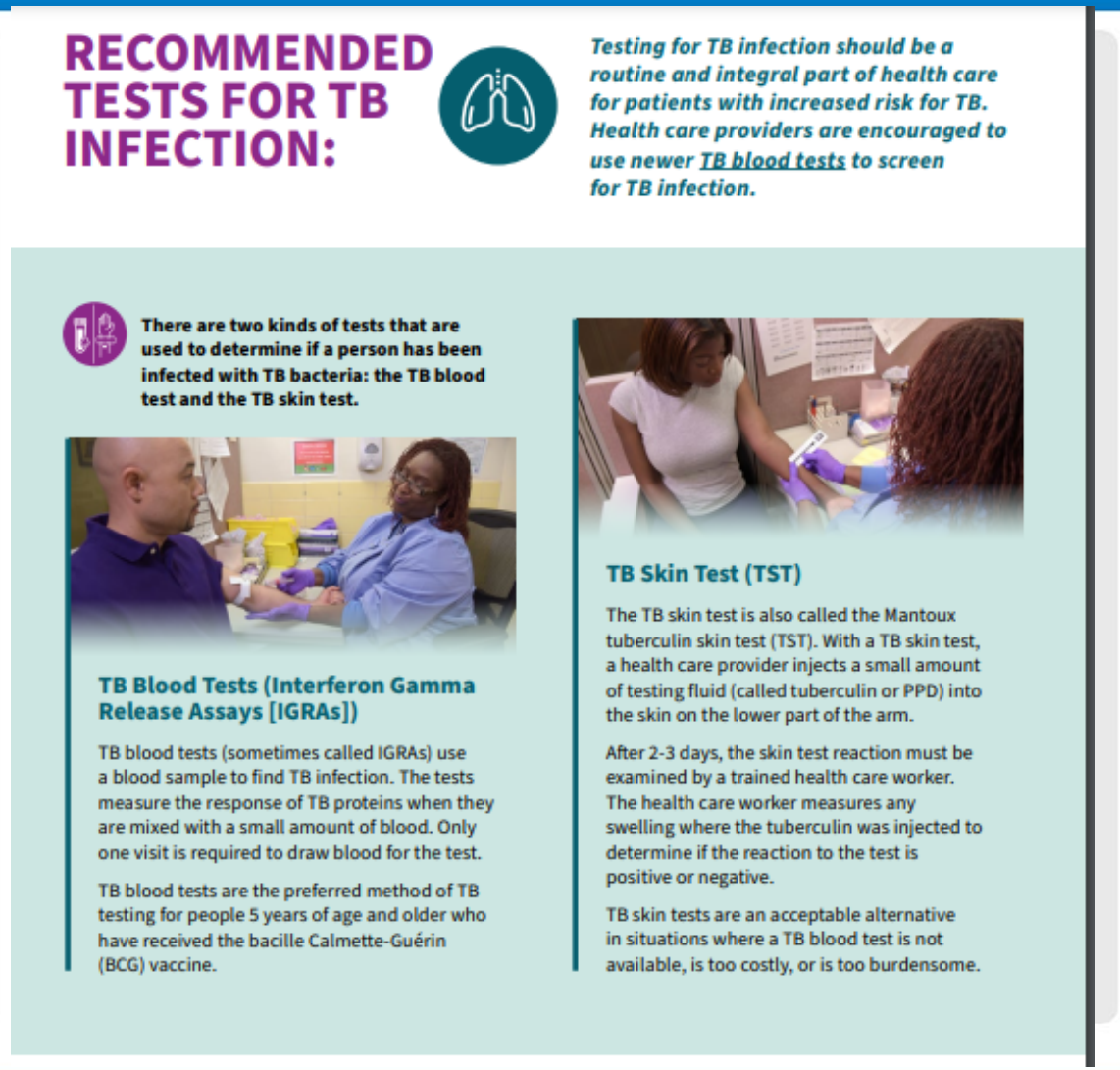


RECOMMENDED TESTS FOR TB INFECTION:

Testing for TB infection should be a routine and integral part of health care for patients with increased risk for TB. Health care providers are encouraged to use newer TB blood tests to screen for TB infection.

There are two kinds of tests that are used to determine if a person has been infected with TB bacteria: the TB blood test and the TB skin test.

TB Blood Tests (Interferon Gamma Release Assays [IGRAs])

TB blood tests (sometimes called IGRAs) use a blood sample to find TB infection. The tests measure the response of TB proteins when they are mixed with a small amount of blood. Only one visit is required to draw blood for the test.

TB blood tests are the preferred method of TB testing for people 5 years of age and older who have received the bacille Calmette-Guérin (BCG) vaccine.

TB Skin Test (TST)

The TB skin test is also called the Mantoux tuberculin skin test (TST). With a TB skin test, a health care provider injects a small amount of testing fluid (called tuberculin or PPD) into the skin on the lower part of the arm.

After 2-3 days, the skin test reaction must be examined by a trained health care worker. The health care worker measures any swelling where the tuberculin was injected to determine if the reaction to the test is positive or negative.

TB skin tests are an acceptable alternative in situations where a TB blood test is not available, is too costly, or is too burdensome.

Actions to make TB prevention routine

Action	Assurance
Use standardized risk assessment	Ensure residence / birth outside US is in EHR intake/history section
Use IGRA	Remove impediments to IGRA use
Ensure process for TB evaluation prior to LTBI treatment is streamlined	Easy access to chest x-ray and AFB culture
Ensure access to LTBI short course regimens whenever possible	Rifapentine on formularies
Track completion of LTBI treatment for those with positive test	Measure LTBI treatment completion
Provide access to expert TB resources for patients with complications/comorbidities	Ensure no barriers for referrals
Engage and and bring awareness to communities at risk	Measure understanding and acceptance for linkage to LTBI testing/rx

Opportunities

- **COVID innovations** - can advance outreach, testing capacity, disparity focus for TB prevention

- **Synergies** – partnerships with Diabetes and Hep B organizations to integrate LTBI testing and treatment

- **TBESC** - research findings arm us with evidence for changing practice

- **Policy** – partnership with Medi-Cal to remove barriers for LTBI testing and treatment for beneficiaries

- **4 California TB elimination plans (San Diego, San Francisco, Los Angeles, California)** - can sharpen focus and amplify efforts and chances of reaching targets

- **Strengthen advocacy** - include survivors and focus on disparities

Tuberculosis – getting to zero

Source: The Lancet, UK, 2017
Pamela Das, Richard Horton

Tuberculosis—getting to zero

Reviewing research *The Lancet* has published on the global tuberculosis epidemic, one will be struck by how little the situation has changed over the years, and how the same calls to action get repeated from one year to the next. For decades, a piecemeal approach with a narrow treatment focus and a cost imperative has prevailed. The result? A global epidemic of disease. For more than a decade the global tuberculosis incidence rate has declined, but only message that this approach should be taken and donors are also not insisting upon it. Often the message is that tuberculosis is too complex, or that newer technologies are needed. But as this Series shows, there is no reason not to use existing interventions that do work and can stop the epidemic. Despite the evidence, there is a gap between data and implementation. The policy and implementation frameworks that have been adopted in

"For decades, a piecemeal approach with a narrow treatment focus and a cost imperative has prevailed. The result? A global epidemic of disease….There needs to be a change in mindset."

Mainstreaming LTBI Testing and Treatment in the U.S.

"With full adoption of TB prevention in primary care using currently available modern tools, we can progress from TB control to TB elimination…"

Invited Commentary

Mainstreaming Latent Tuberculosis Infection Testing and Treatment in the United States

Who and How

Jennifer Flood, MD, MPH; Pennan M. Barry, MD, MPH

Every hour in the United States a clinician makes a new diagnosis of tuberculosis (TB) disease, and 5% to 10% of those newly diagnosed will die. The internist has a critical role in changing the fate of patients who are at risk for TB. More than 80% US born residents of the United States. Although the testing strategies that were most cost-effective differed somewhat, by population, testing with IGRA alone was favored for the non-US born individuals without a comorbidity and also was favorable in those

Source: Tuberculosis Control Branch, California Department of Public Health, 2017
JAMA Internal Medicine

Summary

- TB is deadly, costly, and disrupting lives in California
- The California TB Elimination Plan gives prevention traction
- TB survivors are critically important for communicating the potential TB prevention offers
- Visibility and attention to gaps needed
- Not over yet, but on our way

Discussion

Ideas to advance TB prevention?

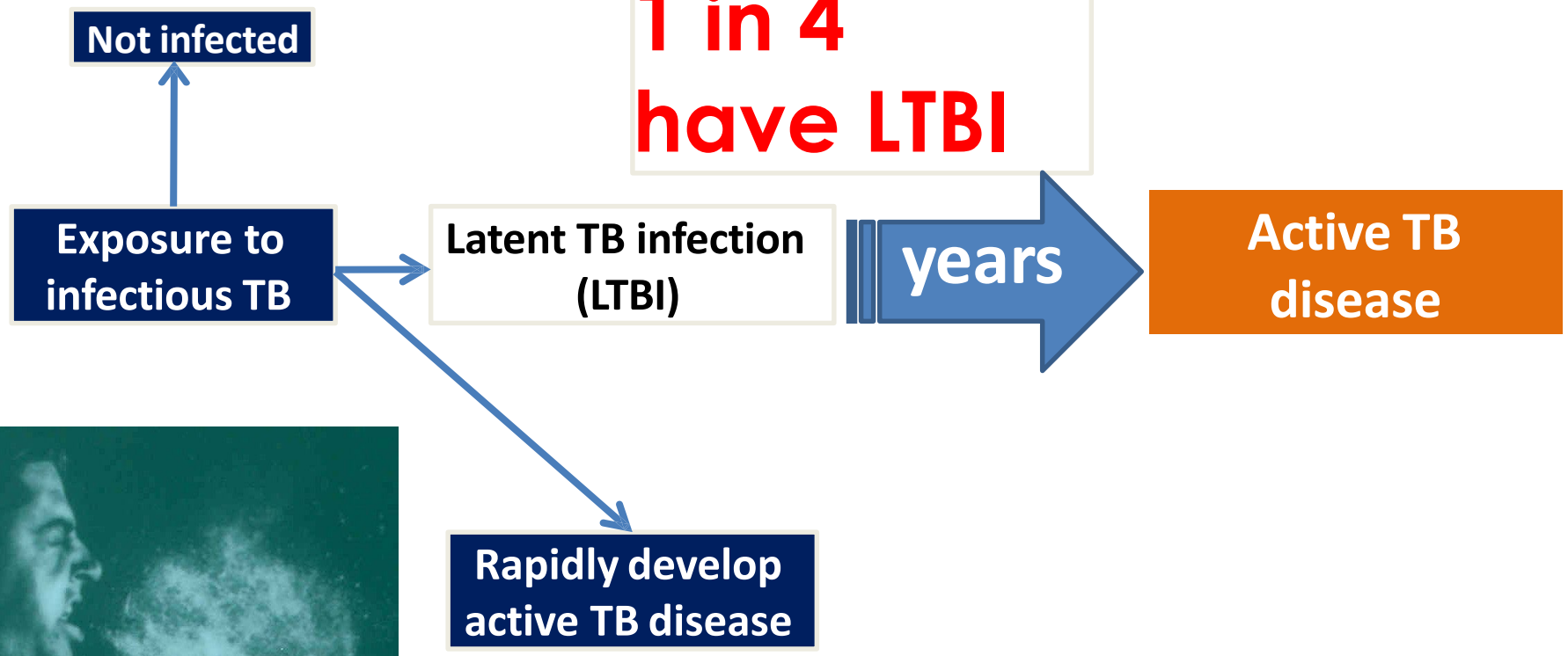
EXTRA SLIDES

Most TB disease results from progression of latent TB infection after years

TB is preventable!

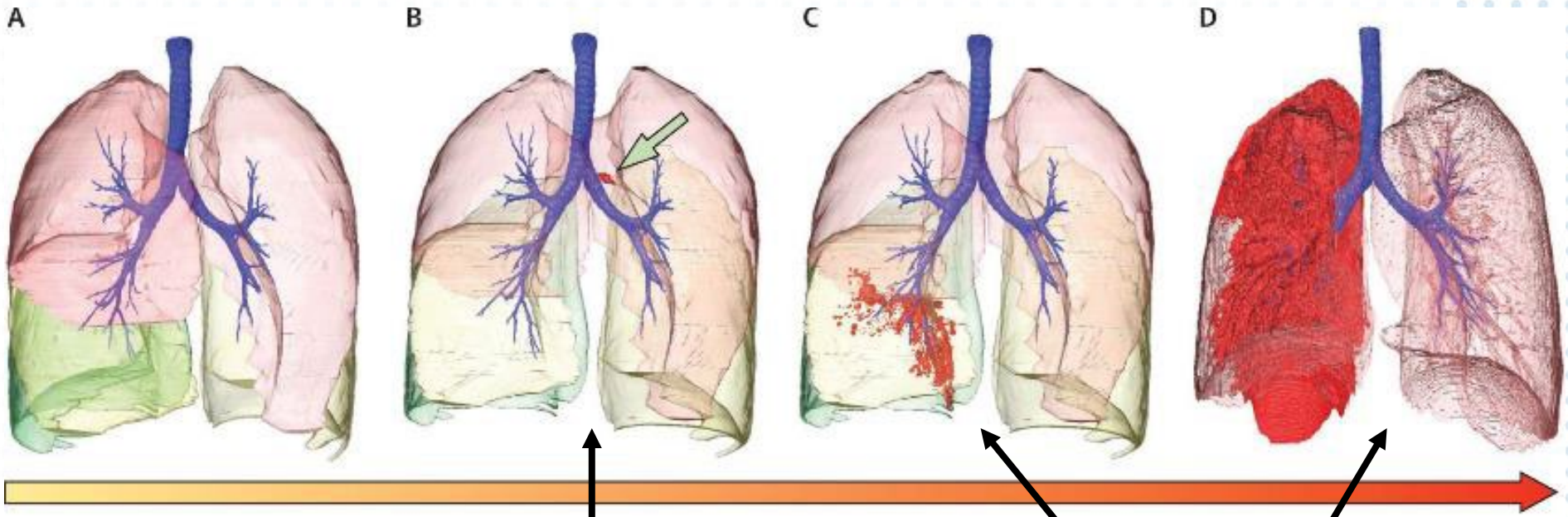
Natural History of TB

Globally, 1 in 4 have LTBI



Miramontes R, et al. (2015) Tuberculosis Infection in the United States: Prevalence Estimates from the National Health and Nutrition Examination Survey, 2011-2012.

The Spectrum of Tuberculosis



A – Clearance
B – Latent infection
C – Pulmonary disease (active)
D – Disseminated disease (active)

Latent TB Infection (LTBI)

Active TB Disease

Image: Dheda K. Lancet, 2016

Opportunity

LTBI testing is now more accurate

Treatment is now shorter and safer

" Scaling up LTBI treatment will be critical to drive down global TB incidence", - WHO, 2019

Who is caring for Californians at risk for TB?

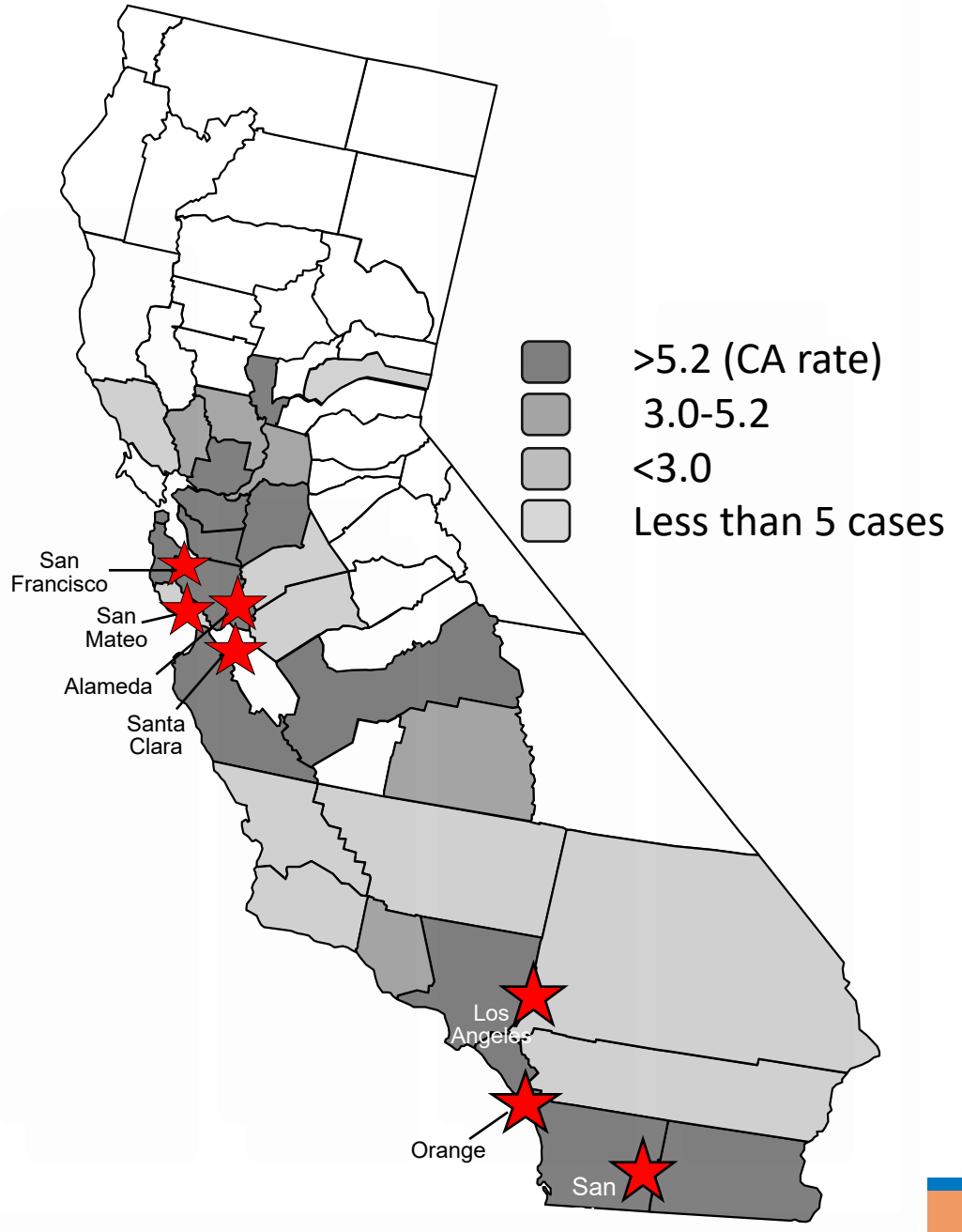
Health Departments
12,000 contacts
7,000 immigrants and refugees

Civil Surgeons
100,000 status adjusters

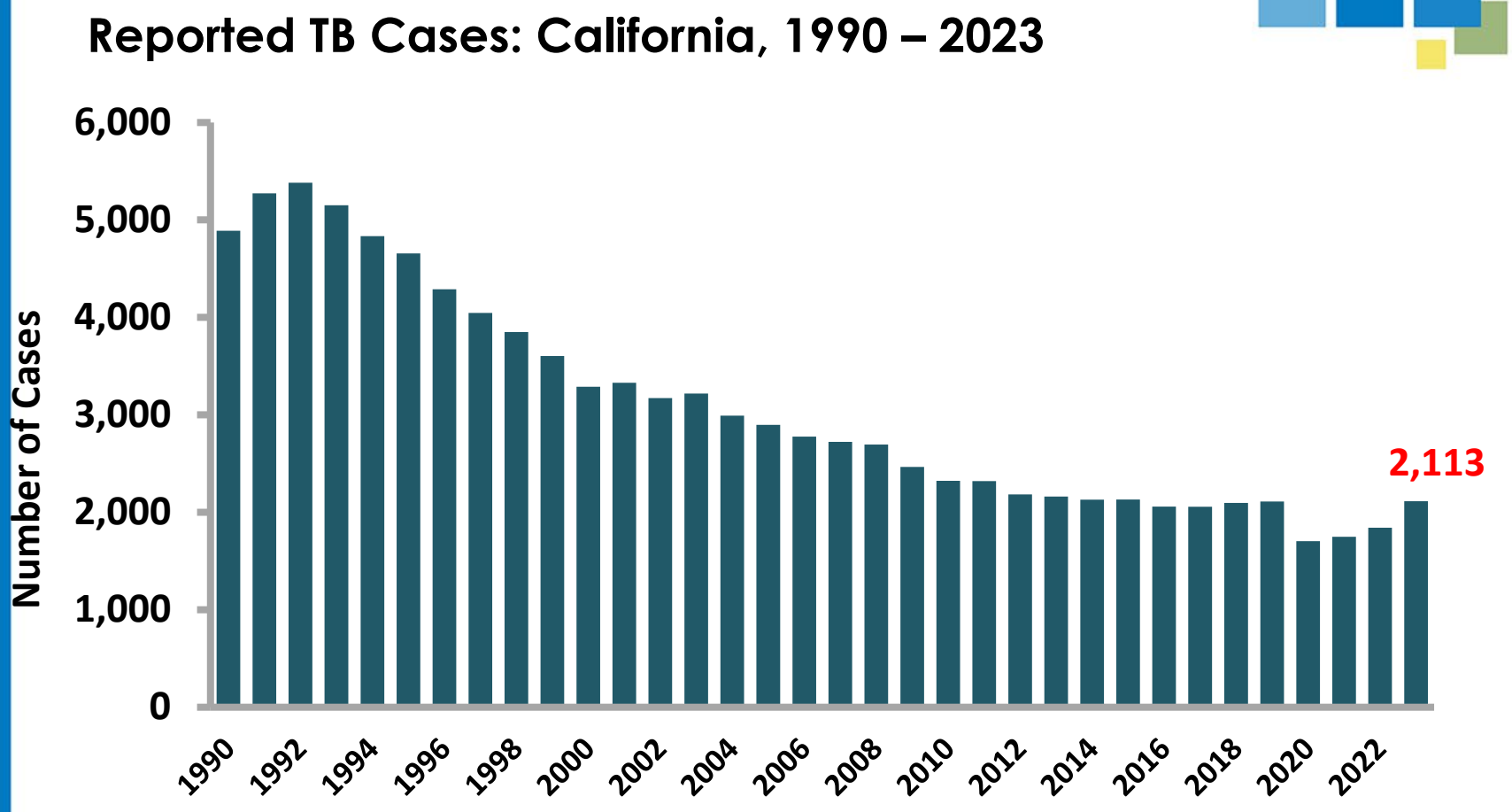
Primary care
FQHCs >5 million
Kaiser >9 million
Other >100,000

Risk concentrated in

25 zip codes



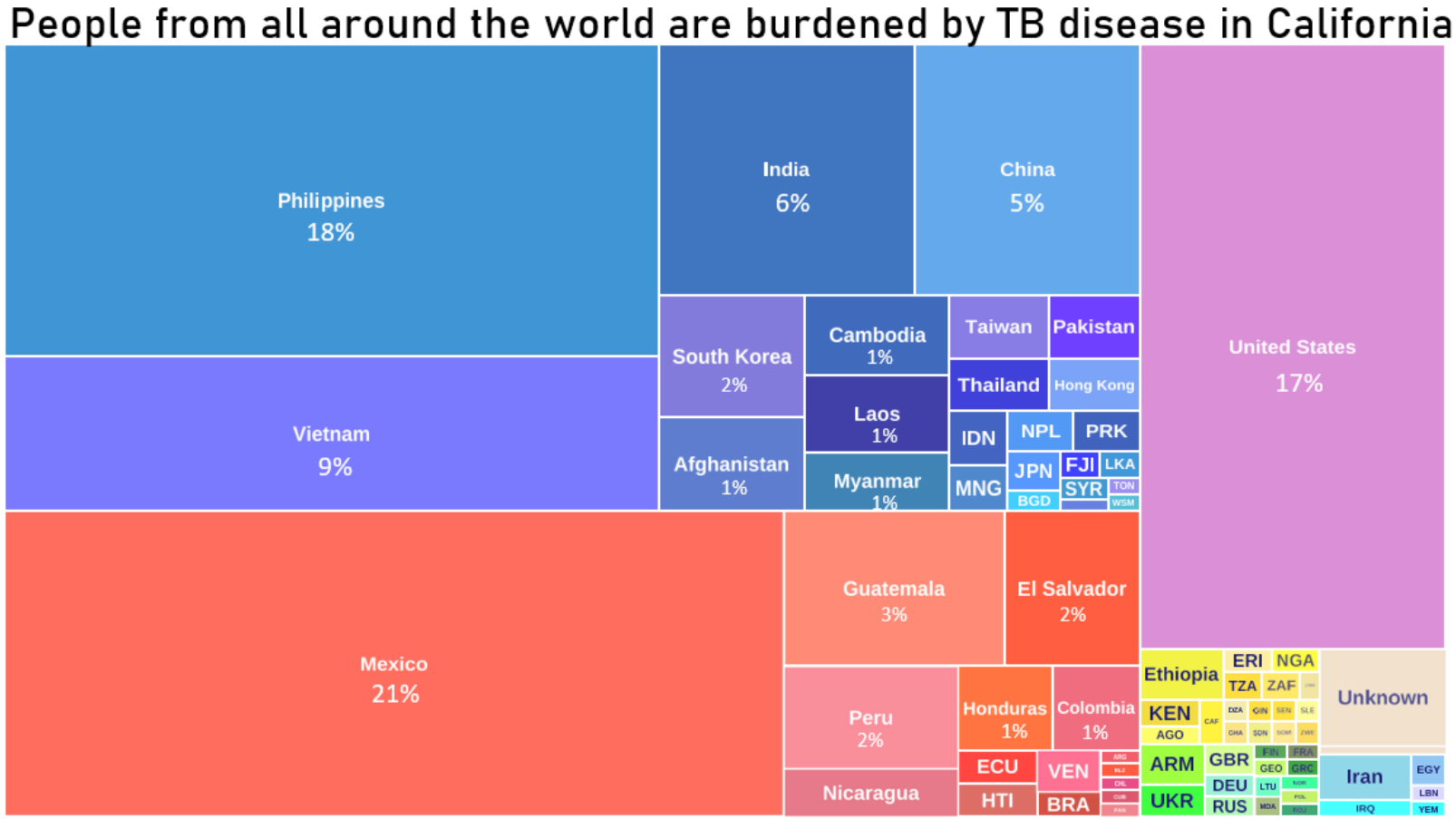
Trends in California TB Cases



TBCB CDPH, 2024

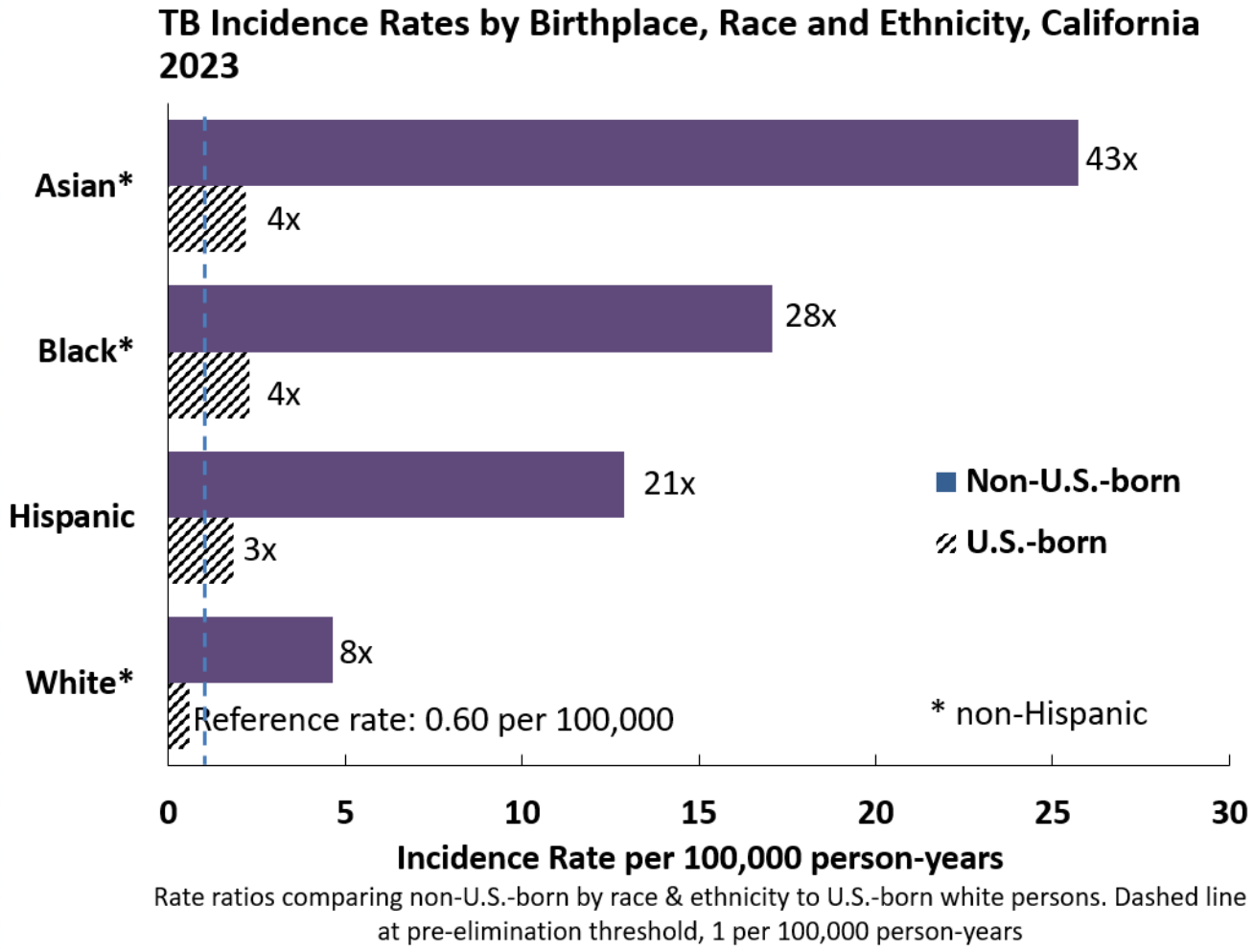
TB Cases in California: Country of Birth

83% born outside U.S.



Reported Verified Cases of Tuberculosis (RVCT) 2023

TB in California, 2023



Rate ratios comparing non-U.S.-born by race & ethnicity to U.S.-born white persons. Dashed line at pre-elimination threshold, 1 per 100,000 person-years

Research: new evidence for action

TB Epidemiologic Studies Consortium:

- IGRA is better predictor of TB disease
- Baseline LTBI care cascade measured; barriers and facilitators identified

CDPH: contributed evidence for IGRA use in children

CDC TB modeling consortium- UCSF/ Harvard /Johns Hopkins:

- Produced 3 models on strategies for elimination in California
- Tabby 2 = model posted for use to examine effect of interventions

TB Treatment Clinical Trials Consortium (TBTC): 6 week LTBI rx

CDC: Effective messaging on TB prevention for community outreach

TB free CALIFORNIA

A Partnership to Eliminate Tuberculosis in California