LTBI 2022

REPORT ON LATENT TUBERCULOSIS INFECTION IN CALIFORNIA

California Department of Public Health
Tuberculosis Control Branch

https://www.cdph.ca.gov/Programs/CID/DCDC/Pages/TB-Disease-Data.aspx

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Acknowledgements

We are grateful for the collaborative efforts of local health departments, state partners, federal partners, laboratories, and clinics who devote time and resources towards tuberculosis elimination. These organizations carry out the difficult task of gathering, sharing, and acting upon information to improve the identification of potential latent TB infection, and improving the testing and treatment of people with LTBI throughout California.

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Dedication

We dedicate this report to the people, families, and communities affected by the devastating impacts of tuberculosis. We acknowledge the loss and hardship that this disease has caused and, together with our partners at local, community, state, and federal levels, we commit ourselves to making California TB-free.

Intended Audience

The audience for this report is public health program managers, medical providers, and policy makers in local health departments, health systems, local governments, and organizations that serve people who experience increased risk of tuberculosis. We hope that the information presented here proves useful to individuals and groups involved in tuberculosis prevention activities.

Executive Summary

Every year, 2,000 Californians are diagnosed with tuberculosis (TB) disease, of which close to 90% are the result of untreated latent TB infection (LTBI).[1] Although these cases can be prevented with treatment, most people with LTBI are unaware of their infection and are untreated. The purpose of this report is to describe the diagnosis and treatment of people with LTBI within California so that TB prevention in the state can be improved. This report brings together statewide data from multiple sources on the diagnosis and treatment of LTBI to show where these TB prevention activities are achieving their aims and where improvement is needed.

LTBI is asymptomatic infection with the bacteria that causes TB disease. LTBI can be identified with a blood test or a skin test. People with untreated LTBI are at risk for developing TB disease months, years, or decades after infection. Treatment for LTBI prevents people with LTBI from getting sick with TB disease.

This report is divided into five sections. The first section provides estimates for the number of Californians with LTBI. The following five sections provide information on populations for whom the California Department of Public Health (CDPH) collects information on LTBI, many of whom have elevated risk of TB, specifically: people who had a TB blood test, people with close contact to a person with respiratory TB disease, people who recently immigrated to the United States and have indications they may have TB, and people applying to be permanent residents of the United States (U.S.).

Key Findings

Nearly 2.4 million people in California have LTBI.

Nearly 2.4 million people in California are estimated to have LTBI, of which about 1.8 million (77%) are unaware of their LTBI status, and only 317,000 (13%) have received treatment. Finding and treating people with untreated LTBI is the goal of TB prevention programs across the state.

Changes to reporting policy for TB blood tests (IGRAs) resulted in actionable data.

Tuberculosis interferon-gamma release assay (IGRA) testing, performed on blood, is the preferred method to detect LTBI. Mandatory electronic laboratory reporting of positive IGRA results started on October 1, 2019 and nonpositive results on November 1, 2022. As a result of these changes, the number of IGRA tests reported increased to

Reports of TB blood tests can be used to:
1. link people to needed medical care;
2. identify medical providers for collaboration;
3. track testing patterns across the state.

approximately 4,200 per month after the positive mandate and again to approximately 61,000 per month after the nonpositive mandate. These data deliver information to local health departments for follow-up with patients and medical providers. Multiple local health departments have used these data to engage people with positive results and encourage them to be treated for LTBI.

The number of contacts identified for people with active infectious TB disease remains low in comparison to 2019.

A person who spent time in close proximity with another person who was sick with infectious TB disease is referred to as a contact. Contacts are elicited by local health departments through interviews. Contacts are at risk for LTBI and TB disease.

From 2019 through 2021, the number of people with active TB disease dropped by 17% and the number of elicited contacts to people with infectious TB dropped by 46% — more than twice the proportional drop in number of people with active TB disease. The number of elicited contacts rose in 2022 but remained lower overall compared to 2019. The proportion of elicited contacts who were evaluated and the proportion of elicited contacts who were treated increased during the early pandemic years of 2020–2021, and then fell in 2022. While these measures improved during 2020–2021, the absolute number of contacts at each step of the care cascade decreased by 15% to 42% compared to 2019. This decline in elicited contacts might have been related to pandemic changes, including social distancing reducing the number of exposed people, as well as local health department prioritizations (e.g., staff redirection to COVID-19 response) reducing the number of exposed people who were identified.

Treatment completion is low among recently immigrated people with LTBI.

Amongst those evaluated domestically, nearly half were diagnosed with LTBI. One third of those eligible to start LTBI treatment were known to have completed their treatment.

People who apply for permission to immigrate to the U.S. undergo a medical evaluation that includes evaluation for TB in their home country. Immigrants with findings concerning for TB or LTBI are reported to domestic health departments for follow-up. Immigration decreased significantly during the COVID-19 pandemic, especially in 2020 and 2021. As a result, the number of recently immigrated people with findings concerning for TB or LTBI sharply decreased during 2020 and 2021 compared to earlier years but increased to nearly pre-pandemic levels in 2022.

Of people who immigrated during 2019–2022 and had findings concerning for TB disease during their pre-immigration medical evaluation and were evaluated domestically, nearly half were

diagnosed with LTBI or inactive TB.* Among those evaluated who were eligible to start LTBI treatment, a third were known to have completed treatment by August 2023.

Roughly 18,000 people in California who are adjusting their immigration status are estimated to have LTBI each year, but most are not reported to CDPH and may be untreated.

Approximately 12-16% of people adjusting their immigration status with LTBI were reported to CDPH annually during 2019-2022.

People living in the U.S. with a temporary visa who seek to adjust their immigration status to permanent resident undergo medical evaluation, including for TB, by a civil surgeon. About 100,000 people in California adjust their immigration status annually, approximately 18,000 of whom are estimated to have LTBI. Reporting of LTBI by civil surgeons to the local health department is required by the Centers for Disease Control and Prevention (CDC). Although CDPH encourages electronic reporting, LTBI can be reported via other means. There appears to be substantial under-reporting of people with LTBI among persons adjusting their status. An estimated 12–16% of people adjusting their immigration status with LTBI were reported to CDPH each year during 2019–2022. Of those who were reported with LTBI, 14% had documented LTBI treatment initiation. As of August 2023, less than half of those reported in 2022 who started LTBI treatment had documented treatment completion., There were higher proportions (59–71%) of treatment completion for people reported with LTBI during 2019–2021.

Conclusion

Progress toward elimination is possible, but more work is needed.

Identifying and treating persons with LTBI is the most promising tool to eliminate TB from California. Nearly 90% of active TB cases might be prevented through testing and treatment for LTBI. This report highlights and quantifies gaps in the numerous steps of LTBI care among different populations, many of whom experience increased risk for TB. Specific gaps exist in supporting populations through LTBI treatment including people with close contact to infectious TB disease and people who are evaluated for TB during immigration. Addressing these gaps may increase TB prevention in California. TB elimination is an ambitious goal and will require continued effort from local health departments, community partners, health care providers, insurers, and others.

* Inactive TB, considered a subset of LTBI, consists of chest X-ray findings concerning for TB but negative sputum cultures and no other evidence of active TB. Like LTBI, inactive TB is treated to prevent active TB.

What is Included in this Report?

	Included in report	Not included in report
Populations	• People who had a positive TB IGRA blood test reported electronically except those people whose test was conducted in San Diego county or Los Angeles County. [1] • People recently immigrated to the U.S. who had overseas medical examinations identifying them as meeting tuberculosis Class B notification criteria (findings concerning for TB or LTBI) • People seeking to adjust their immigration status to become permanent residents who undergo immigration medical examination by a civil surgeon. • People who were identified as exposed to someone with respiratory TB disease.	• People who had a positive tuberculin skin test (TST) are not required to be reported electronically and are only included when used as part of a specific evaluation (e.g., people with close contact to someone with respiratory TB disease) • People who had electronic laboratory reports of IGRA blood tests in San Diego county or Los Angeles county.[1]
Characteristics	• Race and ethnicity, birthplace, age, sex • Limited information about medical risk factors for TB, country of birth, and socioeconomic status • Information available for each population varies	• Detailed information on gender or sexual orientation[2] • Detailed race and ethnicity[3] • Detailed medical histories or comorbidities

Information	Number and proportion of people at each step of an LTBI care cascade within each population • Including testing, treatment initiation, treatment completion • Information available for each step varies by population	• TB IGRA test positivity

[1] Most IGRA electronic lab reports from San Diego County and Los Angeles County are not reported to CalREDIE and are thus not available for analysis or inclusion in this report. Data for San Diego and Los Angeles Counties is included for other data sources in the report including LTBI estimates.
[2] Detailed information on gender and sexual orientation is not available from data sources used in this report. Please see the sexual orientation and gender identity disclaimer in the technical notes for details.
[3] Detailed race and ethnicity is not available from data sources used in this report.

General limitations of this report

This report represents a step in our effort to provide comprehensive monitoring of testing and treatment of people with LTBI. We believe this report has actionable insight, but it also reveals areas for improvement. Several disparate data sources, each with their own inherent limitations and specific data definitions, were combined to describe and quantify the burden of LTBI in California. Data on key populations and characteristics have yet to be incorporated into the system and we have outlined several gaps in the table above. For example, data on TB skin tests are underrepresented because, unlike TB blood tests, they are not required to be reported; data on comorbidities and treatment are unavailable for people with tests reported only via electronic laboratory report. Nevertheless, this report aims to build a picture of LTBI testing and treatment outcomes in California populations who are at an increased risk for TB infection, with the goal of empowering actions towards the elimination of tuberculosis.

Introduction

What is Tuberculosis?

Tuberculosis (TB) is a life-threatening infectious disease caused by the bacteria *Mycobacterium tuberculosis.*[2] TB usually affects the lungs and spreads through the air to people nearby when a person sick with TB coughs. Not everyone infected with the bacteria becomes sick. People who have been infected but are not sick have latent tuberculosis infection (LTBI). People with LTBI can become sick with TB disease in the future if they are not treated.

The Burden and Consequences of Tuberculosis

Every year, approximately 2,000 Californians are diagnosed with TB disease. One in six patients with TB disease die within five years of diagnosis, despite the availability of effective treatments.[3] Survivors of the disease may experience long-term disabilities such as impaired lung function or neurologic deficits and may have shorter lives.[4]

TB disease also has significant financial repercussions. Hospitalizations for TB disease are twice as expensive and four times as long when compared to other conditions.[5] The medical and societal costs of TB totaled $217 million in California in 2022.[6] The cost to treat one person with LTBI to prevent TB disease is low ($857) compared to the cost of diagnosing and treating one person with TB disease ($43,900).[7] Targeted testing and treatment has been shown to be cost effective.[8,9]

The good news is that the morbidity, mortality, and cost of TB disease are preventable. An estimated 87% of TB disease cases are caused by progression of LTBI to TB disease.[10] This means that screening for and treatment of LTBI will prevent most cases of TB disease and the associated devastating consequences. TB prevention through LTBI testing and treatment is the key foundation of the plan to eliminate TB from California. For additional data and information on TB disease in California, please visit Tuberculosis Disease Data and Publications (www.cdph.ca.gov/tbdata).

Bridging the Equity Gap

Tuberculosis disproportionately impacts communities of color, socioeconomically under-resourced communities, people born outside the U.S., people experiencing homelessness, people who are justice-involved, and those living in long term care facilities. These communities are burdened with higher rates of TB transmission and, consequently, higher risk of LTBI. In 2022, Asian people born outside the U.S. were diagnosed with TB at 70 times the rate of U.S.-born White people, far exceeding racial or ethnic disparities noted for other conditions.[11,12,13,14] People who live in neighborhoods with the lowest education had TB rates more than three times that of people in neighborhoods with highest education.[15] Furthermore, people with TB

who experience homelessness were 30% more likely to die with TB than those not experiencing homelessness.[16] These clear health disparities highlight the importance of putting equity at the center of TB elimination in California.

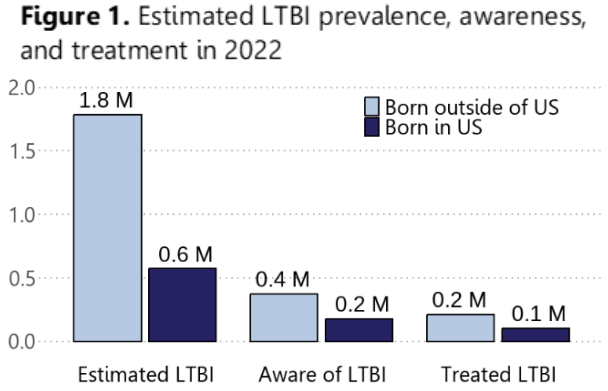
Estimated LTBI Burden

We estimated the LTBI burden across California by birthplace, race and ethnicity, and local health jurisdiction (LHJ). These estimates may help focus testing and treatment resources by identifying populations that experience increased risk of TB. These estimates are calculated using the last available general population survey of LTBI infection. Please refer to the Technical Notes for more detailed information about methods and data sources used in these estimations.

Table 1: Estimated People with LTBI, Awareness and Treatment Status by Birthplace

Birthplace	**LTBI Estimate**	**Aware of LTBI Status**	**Proportion Aware of LTBI Status**	**Treated for LTBI**	**Proportion Treated for LTBI**	**% Aware of LTBI Status**	**% Treated for LTBI**
Born outside of US	1,783,973	371,066	0.208	212,293	0.12	21%	12%
Born in US	571,939	179,589	0.314	104,665	0.18	31%	18%
Total	2,355,912	550,655	0.77	316,958	0.13	77%	13%

LTBI estimates were calculated by using data from NHANES 2011-2012. See Technical Notes for additional information.



Nearly 2.4 million people in California are estimated to have LTBI, of which about 1.8 million (77%) are unaware of their LTBI status, and only 317,000 (13%) have received treatment (Table 1). Those without treatment or awareness of their LTBI status are more commonly people born outside the U.S. About 79% (1.4 million) of people born outside the U.S. are unaware of their LTBI. Only about 212,000 people born outside the U.S. have received LTBI treatment. Of the estimated 1.8 million people born outside of the U.S. with LTBI, over 814,000 (46%) are Asian people, while over 785,000 (44%) are Hispanic or Latinx people (Table 2). This underscores the importance of enhancing testing among communities with elevated risk for TB infection, such as people from countries with a high TB burden in Asia and Latin America.

Table 2: Estimated People with LTBI by Birthplace, Race and Ethnicity

Birthplace	Race and Ethnicity	LTBI Estimate	LTBI Proportion	Population	*% LTBI*
Born in US	White	83,961	0.01	11,994,466	*1%*
	Black	97,320	0.05	1,908,241	*5%*
	Hispanic/Latinx	308,424	0.03	10,635,324	*3%*
	Asian	56,167	0.02	2,340,287	*2%*
	Other	26,067	0.02	1,737,811	*2%*
Born outside of US	White	128,867	0.09	1,370,920	*9%*
	Black	23,546	0.15	154,908	*15%*
	Hispanic/Latinx	785,653	0.16	5,036,235	*16%*
	Asian	814,286	0.22	3,651,507	*22%*
	Other	31,621	0.16	198,872	*16%*

The Hispanic/Latinx category includes all people with Hispanic/Latinx ethnicity, regardless of their racial group. LTBI estimates were calculated by using data from NHANES 2011-2012. See Technical Notes for additional information.

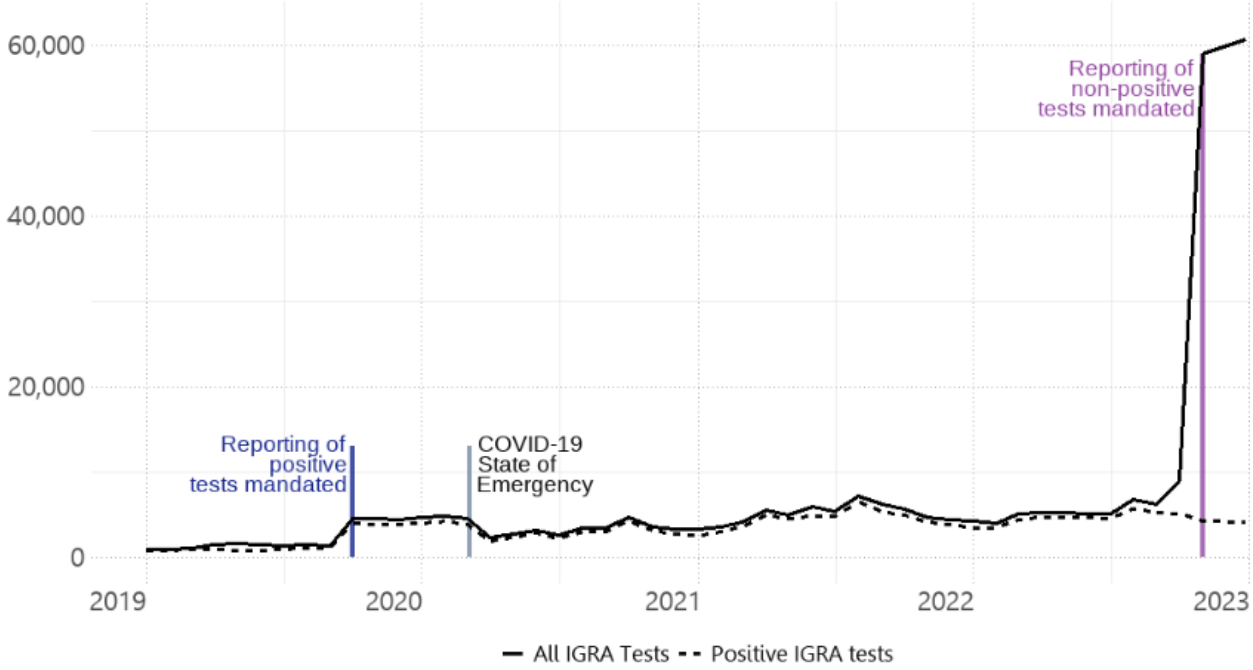
The counties with the largest estimated number of residents with LTBI include Los Angeles County with 665,000, Orange County with 208,000, followed by San Diego and Santa Clara Counties each with 168,000 people with LTBI. Imperial County, which has a TB disease rate that is over eight times the national average and over four times the state average, is estimated to have 11,000 people with LTBI. Data on these counties and other local health jurisdictions are available in the supplemental tables.

TB IGRA Results via Electronic Laboratory Reporting

The TB interferon-gamma release assay (IGRA) is a blood test that detects whether a person is infected with *Mycobacterium tuberculosis*. The IGRA is generally more accurate than the TST, and U.S. guidelines from the CDC recommend the IGRA over the TST for most people.[17] IGRAs may be used to screen for LTBI or as an aid to diagnosis of active TB disease. A person with a positive result may have TB disease or LTBI and should undergo further evaluation. Laboratories are required to report TB IGRA results through electronic laboratory reporting to the California Reportable Disease Information Exchange (CalREDIE), California's web-based communicable disease reporting system. Electronic laboratory reports do not contain information about birthplace, medical risks, or treatment. Please refer to the Technical Notes section for detailed information.

Tables 3A and Figure 2 show the volume of reported IGRAs during 2019–2022. The volume of reported IGRAs increased during this period because of changes in reporting requirements.

Figure 2. Monthly IGRA Electronic Laboratory Reports



Reported from Jan 1, 2019 through December 31, 2022. IGRA reports from Los Angeles and San Diego Counties were not available for analysis. Please see the Technical Notes for more information.

Mandatory electronic laboratory reporting of IGRA positive results began on October 1, 2019. Prior to the mandate, IGRA reporting was optional. Mandatory reporting of nonpositive results, which includes negative, borderline, or indeterminate results, began on November 1, 2022. Please note that only two months of mandated nonpositive IGRA results are included in this report. Figure 2 shows the increase in volume in October 2019, followed by a sharp decrease

from about 5,000 tests per month in early 2020 to 2,500 tests per month in April of 2020, corresponding to public health restrictions in response to the COVID-19 pandemic. Volume gradually increased to over 5,000 tests per month by April 2021. There was a nearly a 14-fold increase in volume following the start of nonpositive reporting. There were approximately 4,000 tests per month from 2019 to November 2022 and more than 60,000 tests per month in November and December 2022 (Figure 2).

Table 3A: IGRA Electronic Laboratory Reporting

	2019		2020		2021		2022	
	Number	%	Number	%	Number	%	Number	%
Total reported								
	24,217	*100%*	41,417	*100%*	57,140	*100%*	168,372	*100%*
IGRA result								
Positive	19,201	*79%*	35,850	*87%*	50,236	*88%*	51,246	*30%*
Negative	2,133	*9%*	2,422	*6%*	3,168	*6%*	110,705	*66%*
Not Done	11	*<1%*	19	*<1%*	73	*<1%*	32	*<1%*
Indeterminate	1,025	*4%*	2,818	*7%*	3,230	*6%*	4,848	*3%*
Borderline			122	*<1%*	185	*<1%*	789	*<1%*
Unknown: Incomplete results	1,847	*8%*	186	*<1%*	248	*<1%*	752	*<1%*

Includes people in data stream during reporting year. Positive reporting began Oct 2019. Reporting of nonpositive (negative, indeterminate, or borderline) results remained optional until November 1, 2022. The percent in the positive row should not be interpreted as test positivity in this report due to the small number of nonpositive results reported. Unknown IGRA category includes results that could not be clearly categorized into positive, negative, or indeterminate results. IGRA reports from Los Angeles and San Diego counties were not available for analysis. Please see the Technical Notes section for more information.

Positive IGRA results were unevenly distributed by demographic characteristics (Table 3B). Race and ethnicity data was missing in over 85% of IGRA reports, which reduces the ability to use these data to describe health inequities. Across all years, the majority of IGRA positive tests reported were among people aged 15–64 years. In 2022, 80% of all positive tests were in this age range. There were few positive IGRA tests among children, however, with current data we cannot determine if this is the result of low testing in this group. Nevertheless, a positive TB test in a child is a sentinel public health finding because it is a marker for recent TB transmission especially among children born in the U.S. Additionally, particularly in the youngest age group, these infections are more likely to progress to TB disease including the most severe forms of TB such as TB meningitis.[18,19] With regard to sex and gender, women had a higher number of positive IGRA tests reported, despite TB disease being more frequent in men.[20-21]

Table 3B: IGRA Electronic Laboratory Reporting

	2019		2020		2021		2022	
	Number	%	Number	%	Number	%	Number	%
Total positive								
	19,201	*100%*	35,850	*100%*	50,236	*100%*	51,246	*100%*
Race and ethnicity								
White, Not Hispanic	691	*4%*	951	*3%*	1,183	*2%*	1,301	*3%*
Black, Not Hispanic	157	*<1%*	300	*<1%*	346	*<1%*	309	*<1%*
Hispanic	866	*5%*	1,344	*4%*	1,733	*3%*	2,323	*5%*
Asian	822	*4%*	1,397	*4%*	2,487	*5%*	2,955	*6%*
American Indian/Alaska Native	8	*<1%*	14	*<1%*	24	*<1%*	25	*<1%*
Native Hawaiian/Pacific Islander	42	*<1%*	132	*<1%*	154	*<1%*	171	*<1%*
Multi-racial	441	*2%*	733	*2%*	1,127	*2%*	1,102	*2%*
Unknown	16,174	*84%*	30,979	*86%*	43,182	*86%*	43,060	*84%*
Age (years)								
0-4	79	*<1%*	148	*<1%*	227	*<1%*	189	*<1%*
5-14	351	*2%*	662	*2%*	1,150	*2%*	1,090	*2%*
15-24	1,544	*8%*	3,093	*9%*	4,350	*9%*	4,116	*8%*
25-44	7,275	*38%*	14,330	*40%*	21,080	*42%*	20,233	*39%*
45-64	6,766	*35%*	12,283	*34%*	16,045	*32%*	16,975	*33%*
65-74	2,015	*10%*	3,496	*10%*	4,714	*9%*	5,615	*11%*
75+	1,166	*6%*	1,819	*5%*	2,652	*5%*	2,995	*6%*
Unknown	5	*<1%*	19	*<1%*	18	*<1%*	33	*<1%*
Sex and gender								
Male	8,529	*44%*	15,343	*43%*	22,096	*44%*	22,163	*43%*
Female	10,622	*55%*	20,363	*57%*	27,925	*56%*	28,748	*56%*
Transgender woman	7	*<1%*	1	*<1%*	1	*<1%*		
Unknown	43	*<1%*	143	*<1%*	214	*<1%*	335	*<1%*

Includes people with positive IGRA results excluding those reported with active TB disease. IGRA reports from Los Angeles and San Diego counties were not available for analysis. Please see the Technical Notes section for more information.

Electronic laboratory reports contain information about the facility ordering the test and residential address of the patient. From this information, testing in congregate settings like correctional facilities and long-term care facilities can be identified. LTBI testing is recommended in these settings because of an increased risk of transmission in congregate settings. In the period from 2019 to 2022, approximately 4% of positive IGRA tests were among people in correctional facilities. Because negative test results were not reported during this time, measures of TB risk such as percent of tests that were positive could not be calculated.

Due to the current reporting infrastructure, IGRA tests from Los Angeles and San Diego Counties were not available for analysis at CDPH. Efforts are underway to address this issue. Another limitation of the system is the lack of information on testing patterns or test positivity. With the recent mandate for nonpositive IGRA reporting, testing rates and test positivity will be available in future reports.

In 2022, there were about 8,134 positive IGRAs in Santa Clara County; 5,126 in Alameda County; 5,691 in Orange County; 3,660 in Kern County; and 3,126 in Riverside County reported to the state system. These data and data from additional local health jurisdictions are found in the supplemental tables. Imperial County reported over 1,500 annual positive IGRAs in 2021 and 2022, a near two-fold increase from 2020. The number of positive IGRAs reported for each jurisdiction has steadily increased each year from 2019 through 2021.

Summary

IGRA reporting reveals the large volume of positive IGRAs in California each year. These data also provide insights particularly regarding the age distribution among people with positive IGRAs. Additionally, this report shows that 4% of positive reports came from correctional facilities in 2019–2022. However, these results also reveal the limitations of current laboratory reporting including missing race and ethnicity data in most test reports. Because only positive results were required to be reported during this period, the data is unable to provide further insights such as test positivity or test volume by demographics, socioeconomic status, correctional facility residence or geography. This gap has been partially addressed with implementation of mandated nonpositive reporting on November 1, 2022. As reporting of IGRA tests increases in volume, more can be understood about people who are tested with IGRA and rates of positivity.

LTBI Among People Exposed to Infectious TB Disease

People with Close Contact to a Person with Respiratory TB Disease

Health departments conduct contact investigations to find people who had close contact with a person with infectious TB disease. These people are called contacts. Because tuberculosis is transmitted through the air through coughing or breathing, and because TB disease is more likely to occur in 1–2 years following infection, people with close contact to a person with respiratory TB disease (pulmonary or laryngeal TB) are of particular importance to identify. In this process, identified contacts are evaluated for LTBI and TB disease, and are provided with appropriate treatment if necessary. Information on this process is reported annually to CDPH and the CDC through the Aggregate Reports for Tuberculosis Program Evaluation (ARPE)–Contact Investigation forms. Please refer to the Technical Notes section for detailed information.

LTBI Among People with Close Contact to a Person with Respiratory TB Disease

Information on contacts and their evaluation for TB is provided in Table 4A. Nearly 13,000 contacts to respiratory disease were identified in 2019, a substantial workload for local health departments (LHDs) throughout the state. Even before the COVID-19 pandemic, 25% of elicited contacts were not able to be evaluated completely. The number of contacts identified declined in 2020 and 2021 to fewer than 7,000 contacts. While the number of people with active TB dropped by 17% between 2019 and 2021,[22] the number of contacts dropped by 46%, more than twice the proportional case drop. This decline in elicited contacts might have been related to pandemic changes, including social distancing reducing the number of exposed people, as well as local health department prioritizations (e.g., staff redirection to COVID-19 response) reducing the number of exposed people who were identified. We cannot distinguish between these possibilities with existing data. The proportion of contacts evaluated for TB disease ranged from 69% to 82%.

Reporting on the type of test used for evaluation has improved steadily between 2020 and 2022, with most evaluated contacts receiving IGRA tests during those years. Although birth outside the U.S. is important to interpreting the results of TB skin testing among contacts, this information is missing from more than 60% of contacts each year.

Table 4A: People with Close Contact to a Person with Respiratory (Pulmonary or Laryngeal) TB Disease

	2019		2020		2021		2022	
	Number	%	Number	%	Number	%	Number	%
Total identified and reported								
	12,885	*100%*	6,757	*100%*	6,990	*100%*	8,051	*100%*
Birthplace								
Born in the U.S.	862	*7%*	929	*14%*	1,144	*16%*	1,200	*15%*
Born outside of the U.S.	901	*7%*	1,397	*21%*	1,349	*19%*	1,476	*18%*
Unknown/Not reported	11,122	*86%*	4,431	*66%*	4,497	*64%*	5,375	*67%*
Total evaluated for TB disease and LTBI								
	9,614	*75%*	5,516	*82%*	5,689	*81%*	5,556	*69%*
Evaluation test type								
IGRA	3,274	*34%*	3,260	*59%*	3,524	*62%*	3,865	*70%*
TST	621	*6%*	637	*12%*	683	*12%*	440	*8%*
Test type not reported	5,719	*59%*	1,619	*29%*	1,482	*26%*	1,251	*23%*

Includes people in data source during reporting year, including those without evaluation. Chest x-ray information is not available as a separate data element. All people in close contact with a person with TB disease who were reported as 'evaluated' should have had a chest x-ray if they were IGRA positive, TST positive, or reported TB symptoms. Please see the Technical Notes section for more information.

Table 4B and Figure 3 show the number of contacts diagnosed with LTBI and their LTBI treatment start and completion. Among contacts evaluated, 16–19% were diagnosed with LTBI.

Among contacts diagnosed with LTBI, 63–75% were started on treatment. Although information on treatment regimen was frequently missing, short course regimens, which include three months of isoniazid and rifapentine (3HP) and four months of rifampin (4R), were prescribed most often. For contacts who started treatment, 70–74% of contacts completed treatment. Treatment completion data for 2022 are not yet available. Common reasons for not completing LTBI treatment were because the contact chose to stop treatment or was lost to follow-up, not because of a reported adverse event. However, a reason for not completing treatment was missing in over half of people who did not complete treatment.

During 2019–2021, the overall proportion of contacts with LTBI who completed treatment was 46%, 55%, and 57%, respectively (Figure 3).

Additional information by LHJ is available in the supplemental tables. Table S2 shows the number and percent of elicited contacts diagnosed with LTBI. Table S3 shows the average number of contacts elicited per case by LHJ.

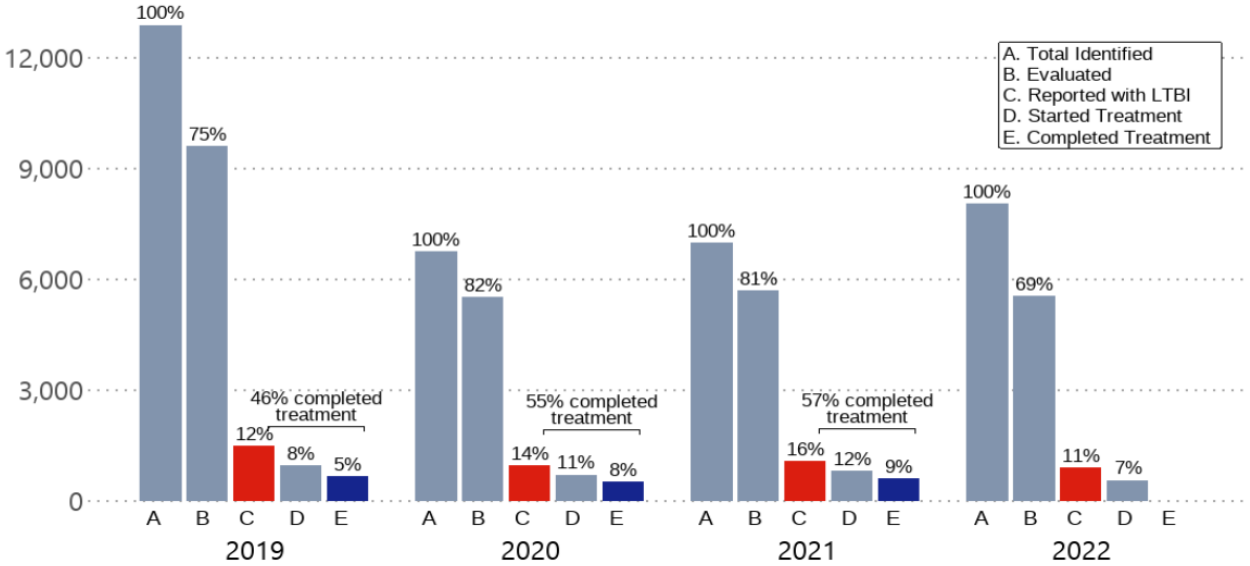
Table 4B: People with Close Contact to a Person with Respiratory (Pulmonary or Laryngeal) TB Disease

	2019		2020		2021		2022	
	Number	%	Number	%	Number	%	Number	%
Percent of evaluated people diagnosed with LTBI								
		16%		*18%*		*19%*		*16%*
Total with LTBI								
	1,490	*100%*	967	*100%*	1,086	*100%*	906	*100%*
Started LTBI treatment								
Yes	969	*65%*	721	*75%*	827	*76%*	570	*63%*
No/Unknown	521	*35%*	246	*25%*	259	*24%*	336	*37%*
Initial LTBI treatment regimen, among those who started treatment								
Isoniazid/Rifapentine (3 months, 3HP)	19	*2%*	42	*6%*	94	*11%*	49	*9%*
Isoniazid/Rifampin (3 months, 3HR)	0	*0%*	3	*<1%*	17	*2%*	14	*2%*
Rifampin (4 months; 4R)	110	*11%*	260	*36%*	288	*35%*	229	*40%*
Isoniazid (6 months; 6H)	5	*<1%*	18	*2%*	23	*3%*	13	*2%*
Isoniazid (9 months; 9H)	64	*7%*	52	*7%*	30	*4%*	24	*4%*
Other	21	*2%*	10	*1%*	18	*2%*	6	*1%*
Unknown/Not Reported	750	*77%*	336	*47%*	357	*43%*	235	*41%*
Completed LTBI treatment, among those who started treatment								
Yes	678	*70%*	530	*74%*	620	*75%*		
No/Unknown	291	*30%*	191	*26%*	207	*25%*		
Ending LTBI treatment regimen, among those who completed treatment								
Isoniazid/Rifapentine (3 months, 3HP)	33	*5%*	35	*7%*	84	*14%*		
Isoniazid/Rifampin (3 months, 3HR)	0	*0%*	1	*<1%*	15	*2%*		
Rifampin (4 months; 4R)	86	*13%*	211	*40%*	248	*40%*		
Isoniazid (6 months; 6H)	4	*<1%*	14	*3%*	13	*2%*		
Isoniazid (9 months; 9H)	28	*4%*	40	*8%*	18	*3%*		
Other	19	*3%*	5	*<1%*	17	*3%*		
Unknown/Not Reported	508	*75%*	224	*42%*	225	*36%*		
Reason LTBI treatment not completed, among those who started treatment								
Active TB developed	0	*0%*	0	*0%*	2	*<1%*		
Adverse effect of medicine	15	*5%*	14	*7%*	7	*3%*		
Contact chose to stop	45	*15%*	31	*16%*	42	*20%*		
Contact lost to follow-up	69	*24%*	36	*19%*	32	*15%*		
Contact moved (follow-up unknown)	5	*2%*	2	*1%*	7	*3%*		

Death	3	*1%*	4	*2%*	5	*2%*		
Provider decision	5	*2%*	4	*2%*	3	*1%*		
Unknown/Not reported	149	*51%*	100	*52%*	109	*53%*		

Includes contacts newly diagnosed with LTBI. Information about treatment completion for 2022 is not available at this time. Please see the Technical Notes section for more information.

Figure 3. LTBI Care Cascade for People with Close Contact to Respiratory (Pulmonary or Laryngeal) TB Disease



Percent labels are calculated out of the total contacts identified and reported via ARPE (step A) for each year. Data for treatment completion (step E) is not yet available for 2022. Please see the Technical Notes section for more information about this data source.

Summary

Eliciting, evaluating, and treating LTBI among contacts to infectious TB disease is a core function of public health TB programs. Although the overall number of cases of active TB disease dropped between 2019 and 2021, disproportionally fewer contacts were elicited. Although the proportion of contacts identified with LTBI who completed LTBI treatment increased during this time, the total number of people with LTBI was smaller. Overall, these numbers show work that LHDs have done to evaluate contacts and treat those with LTBI. These numbers also show areas for improvement, including evaluation and starting treatment.

LTBI Among Communities Born Outside of the U.S.

People who Recently Immigrated

TB Classification of Recently Immigrated People Based on Overseas Medical Evaluations

Refugees and people seeking to immigrate to the U.S. receive overseas medical evaluations from U.S.-designated physicians to ensure that active TB disease is identified and treated before immigration to the U.S.[23] These people are assigned a TB classification based on these overseas medical evaluations.

People who have signs of TB, past treatment for active TB, or abnormal chest x-rays consistent with TB, but negative sputum smears and cultures are categorized as Class B1. People who have positive IGRA results and normal chest x-rays indicating they have LTBI are categorized as Class B2. Most people categorized as Class B2 are children 2–14 years of age.

Local and state health departments are notified by the CDC about people who recently immigrated with a TB classification who are planning to reside in their jurisdiction. LHDs then conduct their own domestic evaluations to determine whether the recently arriving immigrants have TB disease or LTBI. Many immigrants arriving with a B1 classification are determined by LHDs to have inactive TB, a subset of LTBI in which there are chest X-ray findings concerning for TB but there is no other evidence of active disease including negative sputum cultures. Inactive TB is treated similarly to LTBI in order to prevent future active TB. Domestic evaluations may include IGRAs, repeat chest x-rays, and sputum testing. LHDs also will treat them if eligible. Please refer to the Technical Notes section for detailed information.

LTBI Among Recently Immigrated People with Overseas Signs, Symptoms, or Chest X-rays Concerning for TB (Class B1)

Information on people categorized with Class B1 and their domestic evaluation is provided in Table 5A. The number of people with a B1 classification decreased dramatically during the height of the COVID-19 pandemic in 2020 and 2021 when immigration restrictions were in place. Completion of domestic evaluation remained stable in 2019–2021, with about 60% evaluated for TB in the U.S. Completion of domestic evaluation dropped to 47% in 2022, however, it is likely that a lag in reporting is contributing to this apparent decrease. Nearly half of those evaluated were diagnosed with LTBI or inactive TB. A small proportion (1–2%) of those evaluated were diagnosed with active TB disease.

Table 5A: Recently Immigrated People with Overseas Signs, Symptoms, or Chest X-rays Concerning for TB (Class B1)

	2019		2020		2021		2022	
	Number	%	Number	%	Number	%	Number	%
Total reported								
	4,319	*100%*	1,330	*100%*	1,628	*100%*	3,361	*100%*
Total evaluated for TB disease and LTBI in U.S.								
	2,634	*61%*	764	*57%*	980	*60%*	1,571	*47%*
IGRA result								
Positive	810	*37%*	241	*38%*	332	*37%*	482	*33%*
Negative	1,345	*62%*	396	*62%*	564	*63%*	960	*66%*
Not Done	0	*0%*	0	*0%*	0	*0%*	0	*0%*
Indeterminate	4	*<1%*	3	*<1%*	3	*<1%*	5	*<1%*
Unknown	5	*<1%*	1	*<1%*	2	*<1%*	3	*<1%*
TST result								
Positive	27	*47%*	8	*67%*	3	*38%*	6	*33%*
Negative	29	*51%*	1	*8%*	4	*50%*	9	*50%*
Not Done	0	*0%*	0	*0%*	0	*0%*	0	*0%*
Unknown	1	*2%*	3	*25%*	1	*12%*	3	*17%*
Chest X-ray completed in U.S.								
	2,502	*95%*	743	*97%*	952	*97%*	1,522	*97%*
U.S. Chest X-ray result								
Normal	1,209	*48%*	386	*52%*	472	*50%*	868	*57%*
Abnormal	1,277	*51%*	354	*48%*	474	*50%*	647	*42%*
Abnormal, suggestive of TB	730	*57%*	211	*59%*	304	*64%*	395	*61%*
Abnormal, non-TB condition	548	*43%*	142	*40%*	171	*36%*	249	*38%*
Abnormal, unknown	4	*<1%*	2	*<1%*	0	*0%*	7	*1%*
Not Interpretable	12	*<1%*	2	*<1%*	4	*<1%*	5	*<1%*
Unknown	4	*<1%*	1	*<1%*	2	*<1%*	2	*<1%*
TB diagnosis after domestic evaluation								
No TB exposure or TB exposure with no evidence of infection	1,387	*32%*	389	*29%*	510	*31%*	914	*27%*
LTBI	509	*12%*	140	*10%*	205	*13%*	289	*9%*
Active TB	50	*1%*	19	*1%*	25	*2%*	8	*<1%*
Inactive TB	697	*16%*	218	*16%*	245	*15%*	362	*11%*

Includes people in data source during reporting year, including those without evaluation. Please see the Technical Notes section for more information.

Information on people with the Class B1 category who were diagnosed with LTBI or inactive TB during their domestic evaluation is shown in Table 5B. Annually, about half of people in Class B1 are 45–64 years old. Also, 64–79% of this group were born in the Philippines, Vietnam, or China. In 2022, about one in six (17%) had a history of tobacco use and nearly one in eight (12%) had diabetes mellitus. Both tobacco use and diabetes increase the risk of progression from LTBI to active TB.

Throughout the four-year period, the proportion of people with a B1 classification and LTBI or inactive TB who started treatment remained stable at around a third each year (30–37%). Consistently, the main reason for not starting domestic treatment in this period was due to having completed treatment prior to immigrating to the U.S. People with prior treatment are generally not re-treated in the U.S and are considered ineligible for treatment in table 5B. Those with contraindications for treatment are also considered ineligible or treatment in the U.S.

Among those arriving during 2019–2022, who were eligible for treatment, nearly half (45–50% each year) started treatment and a third (28–42% each year) had completed treatment by August 2023 (Figure 4). The majority of recently immigrated people with Class B1 starting domestic treatment were prescribed the recommended short course regimens, and this percentage increased from 73% in 2019 to 80% in 2022.

Please see the supplemental tables for more information by LHJ (Table S4).

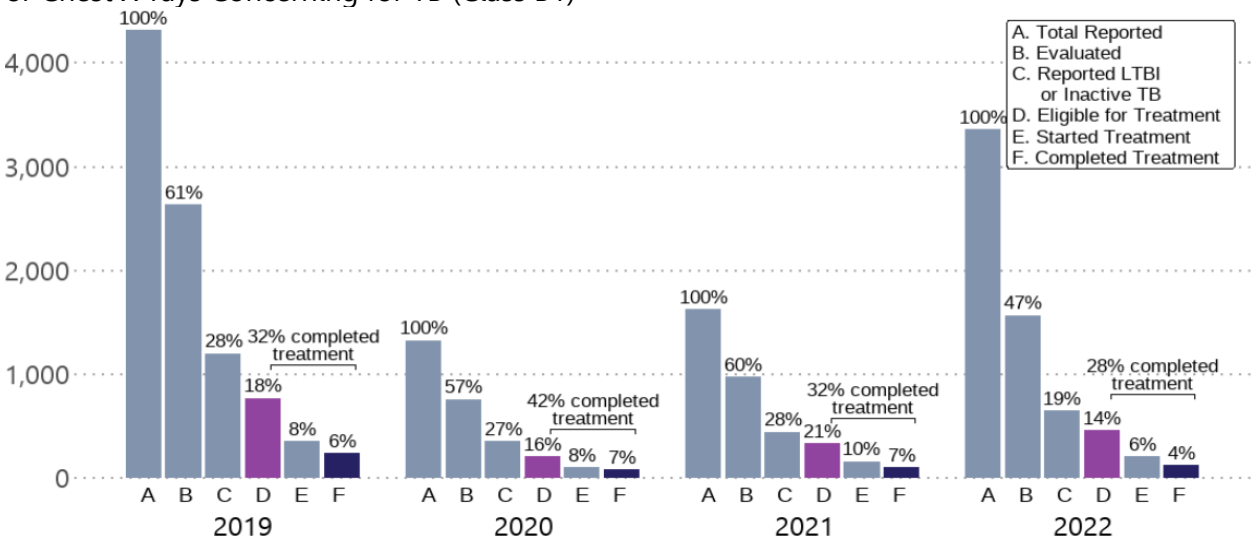
Table 5B: Recently Immigrated People with Overseas Signs, Symptoms, or Chest X-rays Concerning for TB (Class B1)

	2019		2020		2021		2022	
	Number	%	Number	%	Number	%	Number	%
Total with LTBI or inactive TB								
	1,206	*100%*	358	*100%*	450	*100%*	651	*100%*
Total eligible for domestic treatment								
	775	*64%*	212	*59%*	336	*75%*	464	*71%*
Age (years)								
0-4	3	*<1%*	0	*0%*	0	*0%*	0	*0%*
5-14	7	*<1%*	1	*<1%*	1	*<1%*	2	*<1%*
15-24	44	*4%*	21	*6%*	16	*4%*	16	*2%*
25-44	272	*23%*	89	*25%*	88	*20%*	138	*21%*
45-64	575	*48%*	188	*52%*	228	*51%*	309	*48%*
65-74	216	*18%*	50	*14%*	87	*19%*	140	*22%*
75+	89	*7%*	9	*2%*	30	*7%*	46	*7%*
Sex								
Male	631	*52%*	187	*52%*	224	*50%*	336	*52%*
Female	575	*48%*	171	*48%*	226	*50%*	315	*48%*
Country of birth								
China	118	*10%*	27	*8%*	81	*18%*	66	*10%*
Mexico	74	*6%*	18	*5%*	19	*4%*	45	*7%*
Philippines	540	*45%*	138	*38%*	109	*24%*	193	*30%*
Vietnam	280	*23%*	118	*33%*	99	*22%*	167	*26%*
Other	194	*16%*	57	*16%*	142	*32%*	180	*28%*
Medical risk factors								
Diabetes mellitus	135	*11%*	30	*8%*	50	*11%*	81	*12%*
Chronic renal disease	12	*1%*	5	*1%*	5	*1%*	8	*1%*
History of tobacco use	296	*24%*	92	*26%*	97	*22%*	111	*17%*
Current tobacco use	123	*10%*	34	*10%*	42	*9%*	43	*7%*
Started LTBI treatment								
Yes	361	*30%*	107	*30%*	167	*37%*	210	*32%*
No	603	*50%*	181	*51%*	207	*46%*	288	*44%*
Unknown	242	*20%*	70	*20%*	76	*17%*	153	*24%*
Initial LTBI treatment regimen, among those who started treatment								
Isoniazid/Rifapentine (3 months; 3HP)	58	*16%*	9	*8%*	17	*10%*	14	*7%*
Isoniazid/Rifampin (3 months; 3HR)	3	*<1%*	4	*4%*	7	*4%*	8	*4%*
Isoniazid/Rifampin (4 months; 4HR)	29	*8%*	4	*4%*	20	*12%*	15	*7%*

Rifampin (4 months; 4R)	172	*48%*	67	*63%*	96	*58%*	131	*62%*
Isoniazid (6 months; 6H)	10	*3%*	3	*3%*	5	*3%*	6	*3%*
Isoniazid (9 months; 9H)	44	*12%*	9	*8%*	6	*4%*	17	*8%*
Rifampin/Isoniazid/Pyrazinamide/Ethambutol (2 months; RIPE)	9	*2%*	4	*4%*	7	*4%*	8	*4%*
Other	9	*2%*	2	*2%*	4	*2%*	7	*3%*
Unknown	27	*8%*	5	*5%*	5	*3%*	4	*2%*
Reason LTBI treatment not started								
Patient declined	94	*16%*	18	*10%*	58	*28%*	57	*20%*
Lost to follow-up	15	*2%*	2	*1%*	8	*4%*	15	*5%*
Moved within U.S.	3	*<1%*	0	*0%*	2	*1%*	2	*<1%*
Moved outside the U.S.	8	*1%*	3	*2%*	3	*1%*	6	*2%*
Contraindication for treatment	1	*<1%*	1	*<1%*	1	*<1%*	3	*1%*
Not offered based on clinic guidelines	2	*<1%*	0	*0%*	1	*<1%*	0	*0%*
Prior treatment completed	430	*71%*	145	*80%*	113	*55%*	184	*64%*
Other	46	*8%*	11	*6%*	14	*7%*	15	*5%*
Unknown	4	*<1%*	1	*<1%*	7	*3%*	6	*2%*
Completed LTBI treatment, among those who started treatment								
Yes	246	*68%*	89	*83%*	109	*65%*	132	*63%*
No	57	*16%*	9	*8%*	19	*11%*	22	*10%*
Unknown	58	*16%*	9	*8%*	39	*23%*	56	*27%*
Reason LTBI treatment not completed, among those who started treatment								
Patient stopped/declined	7	*12%*	3	*33%*	3	*16%*	3	*14%*
Lost to follow-up	12	*21%*	2	*22%*	3	*16%*	4	*18%*
Adverse effect	15	*26%*	2	*22%*	4	*21%*	8	*36%*
Provider decision	1	*2%*	0	*0%*	1	*5%*	0	*0%*
Moved outside the U.S.	2	*4%*	0	*0%*	0	*0%*	1	*4%*
Moved within U.S.	3	*5%*	1	*11%*	0	*0%*	0	*0%*
Developed TB (after initial LTBI diagnosis)	1	*2%*	0	*0%*	0	*0%*	0	*0%*
Other	11	*19%*	1	*11%*	0	*0%*	4	*18%*
Unknown	5	*9%*	0	*0%*	8	*42%*	2	*9%*

Includes those evaluated with a final disposition of LTBI or inactive TB who are not known to have developed active TB. Medical risk factors sourced from overseas examination. There may be overlap among people counted for each medical risk factor. People are considered eligible for domestic treatment if they have no prior treatment completed and no contraindication to treatment reported. Please see the Technical Notes section for more information.

Figure 4. LTBI Care Cascade for Recently Immigrated People with Overseas Signs, Symptoms, or Chest X-rays Concerning for TB (Class B1)



Percent labels are calculated out of the number in step A: the total number of recently immigrated people with overseas signs, symptoms, or chest x-ray concerning for TB (Class B1) reported for each year. Arrivers were considered eligible for domestic LTBI treatment if they did not complete treatment prior to arrival in the U.S. and if no contraindications for treatment were reported. Please see the Technical Notes section for more information about this data source.

LTBI Among Recently Immigrated People with Overseas Diagnosis of LTBI (Class B2)

Similar to people with B1 classification, the number people with a B2 classification also decreased in 2020 and 2021 when pandemic immigration restrictions were in place (Table 6A). Among this group, completion of domestic evaluation declined steadily each year, dropping from 37% in 2019 to 22% in 2022, though a lag in reporting may be contributing to the decrease in 2022. The majority of those evaluated were diagnosed with LTBI or inactive TB (74–90%), and only four were diagnosed with active TB disease.

Data on people with a B2 classification that were later domestically confirmed to have LTBI or inactive TB is shown in Table 6B. Most of this group were 5–14 years old and in 2022 nearly half were born Mexico. During the four-year period, the majority started domestic treatment (72–96% each year). People with a B2 classification who completed treatment prior to immigrating were considered ineligible for treatment in the U.S. and the proportion that did not

start treatment ranged from 0% to 46%. Among those eligible for treatment, the majority (76–96%) started treatment and over half (55% overall, 49–71% each year) completed treatment by August 2023 (Figure 5). The majority of people with a B2 classification who started domestic treatment were prescribed the recommended short course regimens (88% overall, 83–93% each year).

Table 6A: Recently Immigrated People with Overseas Diagnosis of LTBI (Class B2)

	2019		2020		2021		2022	
	Number	%	Number	%	Number	%	Number	%
Total reported								
	644	*100%*	199	*100%*	365	*100%*	551	*100%*
Total evaluated for TB disease and LTBI in U.S.								
	239	*37%*	63	*32%*	110	*30%*	121	*22%*
IGRA result								
Positive	32	*46%*	7	*47%*	13	*54%*	24	*50%*
Negative	38	*54%*	8	*53%*	11	*46%*	24	*50%*
Not Done	0	*0%*	0	*0%*	0	*0%*	0	*0%*
Indeterminate	0	*0%*	0	*0%*	0	*0%*	0	*0%*
Unknown	0	*0%*	0	*0%*	0	*0%*	0	*0%*
TST result								
Positive	3	*43%*	1	*100%*	2	*100%*	1	*20%*
Negative	4	*57%*	0	*0%*	0	*0%*	4	*80%*
Not Done	0	*0%*	0	*0%*	0	*0%*	0	*0%*
Unknown	0	*0%*	0	*0%*	0	*0%*	0	*0%*
Chest X-ray completed in U.S.								
	137	*57%*	52	*82%*	53	*48%*	68	*56%*
U.S. Chest X-ray result								
Normal	126	*92%*	50	*96%*	49	*92%*	62	*91%*
Abnormal	11	*8%*	1	*2%*	4	*8%*	6	*9%*
Abnormal, suggestive of TB	4	*36%*	0	*0%*	3	*75%*	1	*17%*
Abnormal, non-TB condition	7	*64%*	1	*100%*	1	*25%*	4	*67%*
Not Interpretable	0	*0%*	0	*0%*	0	*0%*	1	*17%*
Unknown	0	*0%*	1	*2%*	0	*0%*	0	*0%*
TB diagnosis after domestic evaluation								
No TB exposure or TB exposure with no evidence of infection	42	*6%*	7	*4%*	10	*3%*	31	*6%*
LTBI	190	*30%*	56	*28%*	97	*27%*	87	*16%*
Active TB	2	*<1%*	1	*<1%*	1	*<1%*	0	*0%*

Inactive TB	6	*<1%*	0	*0%*	3	*<1%*	3	*<1%*

Includes people in data source during reporting year, including those without evaluation. Please see the Technical Notes for more information.

Table 6B: Recently Immigrated People with Overseas Diagnosis of LTBI (Class B2)

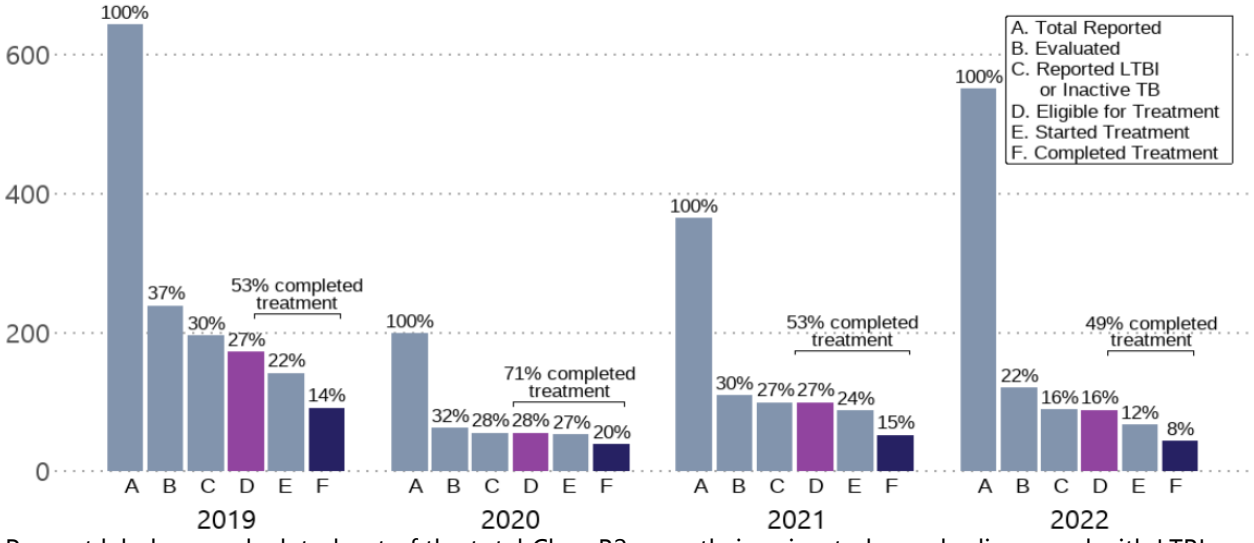
	2019		2020		2021		2022	
	Number	%	Number	%	Number	%	Number	%
Total with LTBI or inactive TB								
	196	*100%*	56	*100%*	100	*100%*	90	*100%*
Total eligible for domestic treatment								
	173	*88%*	56	*100%*	100	*100%*	89	*99%*
Age (years)								
0-4	9	*5%*	0	*0%*	9	*9%*	2	*2%*
5-14	134	*68%*	52	*93%*	86	*86%*	77	*86%*
15-24	12	*6%*	2	*4%*	4	*4%*	5	*6%*
25-44	18	*9%*	0	*0%*	1	*1%*	4	*4%*
45-64	22	*11%*	2	*4%*	0	*0%*	1	*1%*
65-74	1	*<1%*	0	*0%*	0	*0%*	1	*1%*
75+	0	*0%*	0	*0%*	0	*0%*	0	*0%*
Sex								
Male	99	*50%*	31	*55%*	46	*46%*	48	*53%*
Female	97	*50%*	25	*45%*	54	*54%*	42	*47%*
Country of birth								
Mexico	60	*31%*	16	*29%*	60	*60%*	41	*46%*
Other	136	*69%*	40	*71%*	40	*40%*	49	*54%*
Medical risk factors								
Diabetes mellitus	4	*2%*	0	*0%*	1	*1%*	1	*1%*
Chronic renal disease	0	*0%*	0	*0%*	0	*0%*	0	*0%*
History of tobacco use	9	*5%*	1	*2%*	1	*1%*	0	*0%*
Current tobacco use	5	*3%*	0	*0%*	1	*1%*	0	*0%*
Started LTBI treatment								
Yes	142	*72%*	54	*96%*	88	*88%*	68	*76%*
No	50	*26%*	1	*2%*	5	*5%*	6	*7%*
Unknown	4	*2%*	1	*2%*	7	*7%*	16	*18%*
Initial LTBI treatment regimen, among those who started treatment								
Isoniazid/Rifapentine (3 months; 3HP)	11	*8%*	2	*4%*	8	*9%*	2	*3%*
Isoniazid/Rifampin (4 months; 4HR)	1	*<1%*	0	*0%*	0	*0%*	1	*2%*
Rifampin (4 months; 4R)	106	*75%*	48	*89%*	74	*84%*	58	*85%*
Isoniazid (6 months; 6H)	2	*1%*	1	*2%*	0	*0%*	1	*2%*
Isoniazid (9 months; 9H)	16	*11%*	2	*4%*	4	*4%*	4	*6%*

Unknown	6	*4%*	1	*2%*	2	*2%*	2	*3%*
Reason LTBI treatment not started								
Patient declined	12	*24%*	1	*100%*	1	*20%*	3	*50%*
Moved within U.S.	1	*2%*	0	*0%*	1	*20%*	0	*0%*
Moved outside the U.S.	3	*6%*	0	*0%*	0	*0%*	0	*0%*
Prior treatment completed	23	*46%*	0	*0%*	0	*0%*	1	*17%*
Other	9	*18%*	0	*0%*	2	*40%*	2	*33%*
Unknown	2	*4%*	0	*0%*	1	*20%*	0	*0%*
Completed LTBI treatment, among those who started treatment								
Yes	92	*65%*	40	*74%*	53	*60%*	44	*65%*
No	11	*8%*	2	*4%*	1	*1%*	2	*3%*
Unknown	39	*28%*	12	*22%*	34	*39%*	22	*32%*
Reason LTBI treatment not completed, among those who started treatment								
Patient stopped/declined	2	*18%*	2	*100%*	0	*0%*	1	*50%*
Lost to follow-up	2	*18%*	0	*0%*	0	*0%*	0	*0%*
Adverse effect	2	*18%*	0	*0%*	1	*100%*	0	*0%*
Died	0	*0%*	0	*0%*	0	*0%*	1	*50%*
Other	5	*46%*	0	*0%*	0	*0%*	0	*0%*

Includes those evaluated with a final disposition of LTBI or inactive TB who are not known to have developed active TB. Medical risk factors sourced from overseas examination. There may be overlap among people counted for each medical risk factor. People are considered eligible for domestic treatment if they have no prior treatment completed and no contraindication to treatment reported. Please see the Technical Notes section for more information.

Please see the supplemental tables for more information by LHJ (Table S5).

Figure 5. LTBI Care Cascade for Recently Immigrated People with Overseas Diagnosis of LTBI (Class B2)



Percent labels are calculated out of the total Class B2 recently immigrated people diagnosed with LTBI during overseas pre-immigration examinations (step A) reported each year. Recently immigrated people are considered eligible for domestic LTBI treatment if they did not complete treatment prior to arrival in the U.S. Please see the Technical Notes section for more information about this data source.

Summary

LHDs perform domestic follow-up evaluations for people identified with a TB classification (e.g., B1, B2) during overseas pre-immigration medical examination. The number of people with B1 and B2 classifications decreased during the height of the COVID-19 pandemic in 2020 and 2021 but returned to near pre-pandemic levels in 2022. People with a B1 classification who were diagnosed domestically with LTBI or inactive TB were primarily born in the Philippines, Vietnam, and China while people with a B2 classification who were with domestically confirmed LTBI or inactive TB were primarily born in Mexico. Completion of domestic evaluation for TB among people with the B2 classification declined steadily during the time period.

Among people with a B1 classification and with LTBI or inactive TB in 2019–2022 who were eligible for treatment in the U.S., over half started treatment and a third completed treatment. Although a minority of people with a B2 classification were evaluated by LHDs in the U.S., the majority (84%) with confirmed LTBI or inactive TB who were eligible for treatment in the U.S. started treatment and over half (55%) completed treatment.

People Seeking to Adjust their Immigration Status to Permanent Resident

Civil Surgeon Reporting on Medical Evaluations of People Adjusting their Immigration Status to Permanent Resident

People who entered the U.S. with a nonpermanent immigration status and later wish to become permanent residents do so through a process called "status adjustment." As part of this process, they must undergo a medical evaluation by a physician certified by the U.S. Bureau of Citizenship and Immigration Services. These physicians are called civil surgeons.[24] The medical evaluation includes a medical history, a physical exam, and an IGRA test for people two years old or older. If the evaluation results in a positive IGRA, the person has known HIV infection, or the person shows symptoms of active TB disease, a chest x-ray is completed to determine whether the person has LTBI or active TB disease. Those with LTBI are required to be reported to LHDs by civil surgeons. Civil surgeons can submit reports online through the CDPH CalREDIE system; however, not all civil surgeons use this method of reporting. Please refer to the Technical Notes section for detailed information.

LTBI Among People Adjusting their Immigration Status to Permanent Resident

Over 100,000 Californians adjust their immigration status to permanent resident annually (Table 7A), about 18,000 of whom are estimated to have LTBI (Figure 6). Although civil surgeons have been required to report LTBI among people adjusting their immigration status since 2018, we estimate that approximately 12–16% of people with LTBI who are adjusting their immigration status are reported each year to CDPH (Figure 6). Of those who are reported with LTBI (2,234 in 2022), less than 15% (309) had documented LTBI treatment initiation and 6% (136) had documented LTBI treatment completion (Table 7B). Among those who started treatment, the percentage who reported completing treatment decreased each year from 71% in 2019 to 59% in 2021. Data from 2022 are incomplete. Among the group that started treatment, an increasing proportion were prescribed short course regimens, 53% in 2019 to 66% in 2022. However, high missingness (over 80%) in treatment regimen type reported may mask true patterns. About a third of people adjusting their immigration status reported with LTBI were Asian, and a third or more were Hispanic or Latinx each year between 2019 and 2022. Please see the supplemental table S6 for more information by LHJ.

Table 7A: People Adjusting Immigration Status to Permanent Resident

	2019		2020		2021		2022	
	Number	%	Number	%	Number	%	Number	%
Total reported								
	108,310	*100%*	76,501	*100%*	101,372	*100%*	105,773	*100%*
Estimated people with LTBI*								
	*17,945**	*17%*	*13,037**	*17%*	*17,852**	*18%*	*18,663**	*18%*

Includes people in data source during reporting year, including those without evaluation. No evaluation information available. People adjusting their immigration status who have non-positive IGRA test results are not reported, and those with positive IGRA tests are underreported. *Estimates of people with LTBI are calculated using NHANES 2011-2012 data. Please see the Technical Notes section for more information.

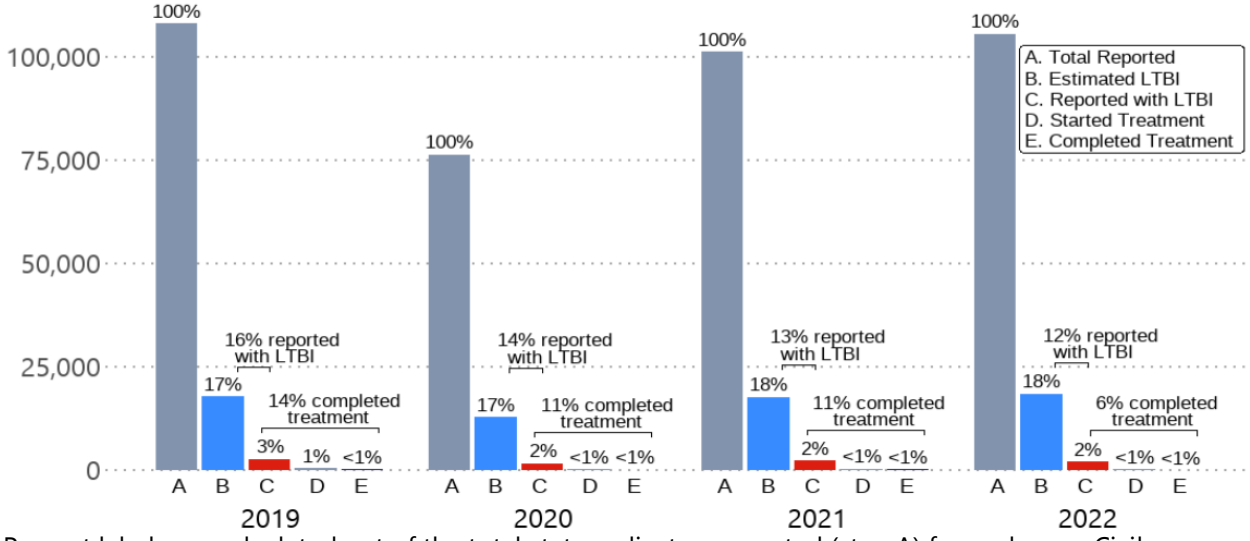
Table 7B: People Adjusting Immigration Status to Permanent Resident

	2019		2020		2021		2022	
	Number	%	Number	%	Number	%	Number	%
Total with LTBI								
	2,797	*100%*	1,775	*100%*	2,367	*100%*	2,234	*100%*
Race and ethnicity								
White, Not Hispanic	59	*2%*	29	*2%*	41	*2%*	42	*2%*
Black, Not Hispanic	49	*2%*	24	*1%*	22	*<1%*	18	*<1%*
Hispanic/Latinx	1,255	*45%*	559	*31%*	800	*34%*	829	*37%*
Asian	882	*32%*	555	*31%*	794	*34%*	730	*33%*
American Indian/Alaska Native	7	*<1%*	0	*0%*	1	*<1%*	1	*<1%*
Native Hawaiian/Pacific Islander	6	*<1%*	1	*<1%*	1	*<1%*	1	*<1%*
Multi-racial	33	*1%*	13	*<1%*	28	*1%*	12	*<1%*
Other	146	*5%*	67	*4%*	64	*3%*	58	*3%*
Unknown	356	*13%*	354	*20%*	462	*20%*	543	*24%*
Missing	4	*<1%*	173	*10%*	154	*7%*	0	*0%*
Age (years)								
0-4	7	*<1%*	1	*<1%*	4	*<1%*	4	*<1%*
5-14	26	*<1%*	14	*<1%*	24	*1%*	19	*<1%*
15-24	119	*4%*	85	*5%*	78	*3%*	83	*4%*
25-44	1,157	*41%*	776	*44%*	1,213	*51%*	1,037	*46%*
45-64	952	*34%*	551	*31%*	692	*29%*	685	*31%*
65-74	199	*7%*	114	*6%*	134	*6%*	218	*10%*
75+	37	*1%*	19	*1%*	18	*<1%*	40	*2%*
Unknown	300	*11%*	215	*12%*	204	*9%*	148	*7%*
Sex and gender								
Male	1,306	*47%*	837	*47%*	1,128	*48%*	1,034	*46%*
Female	1,471	*53%*	907	*51%*	1,224	*52%*	1,172	*52%*
Transgender man	2	*<1%*	0	*0%*	0	*0%*	0	*0%*
Transgender woman	4	*<1%*	0	*0%*	1	*<1%*	0	*0%*
Decline to state	0	*0%*	0	*0%*	0	*0%*	1	*<1%*
Unknown	14	*<1%*	31	*2%*	14	*<1%*	27	*1%*
Country of birth								
China	117	*4%*	58	*3%*	61	*3%*	82	*4%*
El Salvador	102	*4%*	30	*2%*	34	*1%*	14	*<1%*
Guatemala	31	*1%*	11	*<1%*	16	*<1%*	16	*<1%*

India	174	*6%*	144	*8%*	340	*14%*	347	*16%*
Mexico	691	*25%*	379	*21%*	354	*15%*	711	*32%*
Philippines	110	*4%*	45	*3%*	40	*2%*	43	*2%*
South Korea	57	*2%*	16	*<1%*	13	*<1%*	11	*<1%*
Other countries	284	*10%*	165	*9%*	179	*8%*	151	*7%*
Unknown	1,175	*42%*	927	*52%*	1,330	*56%*	859	*38%*
Started LTBI treatment								
Yes	548	*20%*	307	*17%*	449	*19%*	309	*14%*
No/Unknown	2,249	*80%*	1,468	*83%*	1,918	*81%*	1,925	*86%*
Initial LTBI treatment regimen, among those who started treatment								
Isoniazid/Rifapentine or Isoniazid/Rifampin (3 months; 3HR or 3HP)	116	*4%*	64	*4%*	95	*4%*	55	*2%*
Isoniazid/Rifampin or Rifampin (4 months; 4HR or 4R)	176	*6%*	122	*7%*	208	*9%*	149	*7%*
Isoniazid (6 months; 6H)	35	*1%*	8	*<1%*	6	*<1%*	5	*<1%*
Isoniazid (9 months; 9H)	216	*8%*	57	*3%*	94	*4%*	40	*2%*
Other	5	*<1%*	56	*3%*	46	*2%*	60	*3%*
Completed LTBI treatment, among those who started treatment								
Yes	390	*71%*	196	*64%*	263	*59%*	136	*44%*
No/Unknown	158	*29%*	111	*36%*	186	*41%*	173	*56%*

Includes people adjusting their status to permanent resident who were diagnosed with LTBI. Please see the Technical Notes section for more information.

Figure 6. LTBI Care Cascade for People Adjusting Immigration Status to Permanent Resident



Percent labels are calculated out of the total status adjustors reported (step A) for each year. Civil surgeons may be submitting reports of LTBI directly to LHDs via fax, mail, and other means. Only reports to CDPH are captured in these data. Please see the Technical Notes section for more information about this data source.

Summary

A large number of people born outside the U.S. undergo LTBI testing each year as part of immigration status adjustment. However, in 2019–2022 only approximately 12–16% of people adjusting their immigration status with LTBI were reported to CDPH, with fewer than 15% (6–14%) having documentation of treatment completion each year. Although the proportion has decreased steadily in the past two years, roughly half of people with LTBI adjusting their immigration status who started treatment completed it. These data indicate opportunities for improving LTBI reporting and TB prevention in this population.

Conclusion

This report describes the burden of LTBI among the people of California and the efforts to address that burden among selected populations. Although the picture of LTBI in California remains incomplete, these data show some improvement in both LTBI surveillance and TB prevention. However, this report highlights areas in which improvement is needed. There are clear gaps in most steps of the LTBI care cascade in most populations. LTBI treatment initiation and completion is in particular need of improvement even among groups with elevated risk. For example, in 2021, 11% of people seeking to adjust their immigration status to permanent resident with LTBI had documented treatment completion. Less than a third (32%, 109/336) of previously untreated people who recently immigrated with overseas signs or symptoms of TB (Class B1) diagnosed with LTBI or inactive TB domestically completed treatment in 2021. Only about half of contacts to people with respiratory TB disease who were diagnosed with LTBI were known to have completed treatment in 2020. The report also suggests gaps in reporting to the still developing statewide LTBI surveillance system.

Each subpopulation described in this statewide report has different needs and challenges and these also differ across LHJs. Supplemental tables provide these data by LHJ and may be useful to develop local interventions for filling specific care cascade gaps highlighted in this report.

TB can be eliminated from California, but additional work is needed to achieve this goal. The ongoing, concerted efforts of community partners, medical providers, health plans, and state and local public health departments already prevent numerous TB cases in California. We will continue to strengthen the LTBI surveillance system and to support LHDs in their efforts to take public health action on LTBI surveillance.

As is clear from this report, the mechanism by which we monitor the targeted testing and treatment of people experiencing risk for TB infection is a patchwork of reporting systems, none of which have the complete picture of this crucial prevention activity. CDPH is working to harmonize data between several longstanding data systems that have information on populations with risk for TB infection. We are working to make new data sources and platforms for working with these reports available to local programs. We plan to work with new nonpositive IGRA reports to generate detailed estimates of IGRA test positivity and volume that could help inform state and local public health action. We are working to provide more data to support public health action in the future.

Vocabulary

Acronyms

ACS - American Community Survey; annual demographics survey conducted by the U.S. Census Bureau
ATS - The American Thoracic Society
CalREDIE - California Reportable Disease Information Exchange
CDPH - California Department of Public Health
CDC - Centers for Disease Control and Prevention
CSTE - Council of State and Territorial Epidemiologists
CTCA - California Tuberculosis Controllers Association
DGMH - Division of Global Migration Health (formerly Division of Global Migration and Quarantine)
EDN - Electronic Disease Notification system[25]
HHS - U.S. Department of Health and Human Services
IGRA - tuberculosis interferon gamma release assay
LHD - local health department
LHJ - local health jurisdiction
LTBI - latent tuberculosis infection
NHANES - National Health and Nutrition Examination Survey
ORR - Office of Refugee Resettlement, an office within the U.S. Department of Health and Human Services
TB - tuberculosis
TST - tuberculin skin test; sometimes referred to as "PPD"

Definitions

B classification - See *Recently Immigrated people with TB Classifications Based on Overseas Medical Evaluations* subsection for detailed information about B classification.

Care cascade - A care cascade is a model used to visualize the steps of care that a patient undergoes for a particular disease or condition. Typically, this model is visualized as a bar graph in which each bar represents a step within the care cascade, from screening and identification of risk of disease to completion of treatment for the disease. The model is read from left to right, where the population in the leftmost bar depicts the total population identified for the care cascade and subsequent bars indicate the proportion of the population who completed each step of the care cascade. These proportions may be represented cumulatively (using the same denominator of the total population identified in the first leftmost bar across each step of the cascade), or subsequently (each bar is a proportion of people who completed the previous step in the care cascade who then completed this care cascade step).

Case - occurrence of active TB disease in a person.

Child - A person under the age of 18.

Contact - A person who came into close contact with and was therefore exposed to a person who was diagnosed with active TB disease

Contraindication - A designation given by a health care provider that means that a person has a medical or circumstantial (e.g., pregnancy, allergy, cardiovascular disease) reason why they should not receive a certain treatment or medical service.

Elimination - Complete prevention of the transmission of a disease within a specific population or geographic area; the agreed-upon definition of TB elimination is an incidence of <1 per 1,000,000 people per year.

Inactive TB – Having a positive TST or TB IGRA indicating infection with *Mycobacterium tuberculosis*, abnormal but stable radiographic findings, and possibly a history of TB disease, but no evidence of current TB disease including negative microbiologic testing such as sputum culture. Considered to be a subset of LTBI.

Infectious TB – Defined in this report as having respiratory (pulmonary or laryngeal) TB.

Justice-involved people - According to the Department of Health Care Services, justice-involved people are defined as people who are now, or have spent time, in jails, youth correctional facilities, or prisons.[26]

Latent tuberculosis infection (LTBI) - Having a positive TST or TB IGRA result, indicating infection with *Mycobacterium tuberculosis* but without active TB disease. Active TB is typically ruled out with normal radiographic findings and no clinical evidence of current TB disease. In this report LTBI is defined in various ways depending on available data. For most data streams, a positive IGRA or TST and an absence of known active TB diagnosis was used to define LTBI.[27] Patients with an abnormal chest X-ray but negative sputum cultures and no other evidence of active TB may be determined to have inactive TB, considered a subset of LTBI.

Local Health Jurisdiction (LHJ) – Primarily the same as county except for the separate city health departments of Berkeley, Pasadena, and Long Beach. There are 61 local health jurisdictions in California.

M. tuberculosis - *Mycobacterium tuberculosis* and other species of mycobacteria in the *M. tuberculosis* complex, are bacteria that infect people and cause LTBI and TB disease.

Birthplace - status that defines in which country they were born, often aggregated into “people born outside of the U.S.” and “people born in the U.S.”

Respiratory TB - TB involving the respiratory system. Includes pulmonary and laryngeal TB and is typically considered infectious.

Surveillance - As defined by the CDC and in *Field Epidemiology*, surveillance is the ongoing, systematic collection, analysis, and interpretation of health-related data essential to planning, implementation, and evaluation of public health practice, closely integrated with the timely dissemination of these data to those responsible for prevention and control.[28,29]

Transmission - The process through which a person who has an infectious disease passes the infection to another person.

Technical Notes

LTBI Case Definition

LTBI stands for latent tuberculosis infection. LTBI is defined as meeting the Council of State and Territorial Epidemiologists (CSTE) suspected or confirmed LTBI case definition (either IGRA positive or TST positive without active TB disease).

LTBI Care Cascade

An LTBI care cascade describes the discrete steps needed to identify people with LTBI and ensure that they complete treatment to prevent progression to TB disease.[30] It is a model to present the evaluation of patients through different stages starting from LTBI screening to LTBI treatment completion.[31]

This report includes unique people counted from each data source, including people without evaluation. The term "unique people" indicates that these data sources went through deduplication processes to ensure that each person is only counted once within each data source. Percentage LTBI positive is calculated using the total number evaluated as the denominator. Percentage started treatment is calculated using the total number of LTBI positive people as the denominator. Percentage completed treatment uses the total number who started treatment as the denominator.

LTBI Estimates

Estimates of LTBI prevalence are needed to understand the potential pool of people who may progress to TB disease, and for whom testing and treatment could decrease TB morbidity in the future. The prevalence of LTBI was estimated by applying the proportions of people born in the U.S. with a positive TST and proportions of people born outside of the U.S. with a positive IGRA from the 2011–2012 National Health and Nutrition Examination Survey (NHANES) (www.cdc.gov/nchs/nhanes/index.htm), (www.ncbi.nlm.nih.gov/pmc/articles/PMC4633161), to the total number of people born in the U.S. and total number of people born outside of the U.S. stratified by race and ethnicity.[32] To estimate current number of people born outside of the U.S and people born in the U.S. in California (and in selected LHJs), we used population proportions from the U.S. Census Bureau's *American Community Survey* (ACS) made available through the *Integrated Public Use Microdata Series* (IPUMS)[33] Version 6.0. This number was then multiplied by total populations from the California Department of Finance estimates series. Due to ACS sampling methods, estimates of LTBI are not available for all L HJs in California. Other methods have been used to estimate LTBI in California and the U.S.[34] which provide similar results to estimates presented in this report.

Sexual Orientation and Gender Identity Disclaimer

California is a diverse state, and different communities experience a wide range of factors that can increase or decrease health risks. To better assess health risk and identify health related disparities, California Department of Public Health (CDPH) collects demographic information, when available. In addition to general categories of sex, race, and ethnicity defined by national data standards, CDPH also collects data on sexual orientation and gender identity, and more detailed data on ethnicity. Presenting data disaggregated into more detailed groups can illuminate health disparities that may be masked when collapsing data only into general categories. When possible, data reports issued by the Center for Infectious Diseases (CID) will include disaggregated data. However, due to limitations in the data received by CID, disaggregated data may not always be available for presentation. Reasons that disaggregated data may not be presented include incomplete or missing data and patient data privacy requirements.

Data Sources

IGRA Electronic Laboratory Reporting

The IGRA, or interferon-gamma release assay, data consists of IGRA results reported by laboratories through CalREDIE. People evaluated included those whose IGRA results were reported to CalREDIE within the period January 1, 2019 to December 31, 2022. On October 1, 2019, laboratories were mandated to report positive IGRA laboratory reports to CalREDIE. Although only positives were required, some laboratories reported negative results voluntarily. Therefore, "people reported" within IGRA includes both positive and nonpositive IGRAs (e.g., negative, indeterminate, borderline). Although positive IGRA results were not matched to the TB case registry for this report, people with an active TB disease classification (ATS Class 3) were excluded. People were identified as living in long term care facilities or correctional facilities based on their reported residential address.

> Limited Data Availability from San Diego and Los Angeles: Most IGRA electronic lab reports from San Diego and Los Angeles are not reported to CalREDIE and are thus not available for analysis by CDPH and are not included in this report.
>
> No Information on chest x-ray: Chest x-ray is typically the next step performed after a positive IGRA to rule out TB disease. However, IGRA reporting does not include information on chest x-rays. Therefore, LTBI positive includes IGRA positive people without regard to chest x-ray results. A small number of people with positive IGRA results and abnormal chest x-rays indicating likely active TB disease might be included in the IGRA LTBI dataset. People with positive IGRA results associated with a case of active TB in CalREDIE were excluded in order to address this limitation.

People with close contact to a person with respiratory TB disease

The Contacts dataset includes people with close contact to a person with respiratory TB disease and are reported by local TB programs to CDPH annually in March, with most current data updated as of March 2023. This includes only aggregate data on people with close contact to persons with respiratory TB disease who had a positive sputum smear or culture. Data shown are for people with close contact to people who were reported as TB cases in the given year, regardless of when the contact was identified or evaluated. Chest x-ray is not available as a separate data element for evaluated contacts; however, all contacts reported as "evaluated" should have had chest x-ray if reporting TB symptoms or if positive on IGRA or TST. Information about a person diagnosed with LTBI is not available for: race, ethnicity, age, sex, country of birth, socioeconomic status measure, medical risk factors, and reason that LTBI treatment was not started was not available in this dataset. Treatment completion information is not yet available for 2022.

Recently Immigrated People with TB Classifications Based on Overseas Medical Evaluations

Overseas immigration examination information is from the Electronic Disease Notification (EDN) system. People included in this data source are included based on the date their respective LHDs were notified of their arrival. Data on the total number of people with Class B1 and B2 who were evaluated typically lags by more than one year and is likely underreported. Medical risk factor information was collected from the overseas examination while information on testing and treatment are from follow up done in the U.S. Sex and gender data is limited to male and female categories due to the federal forms used for data collection.

This report focused on Class B1 (including both Pulmonary and Extrapulmonary) and Class B2 arrivers. See the table below for definitions of TB classifications assigned from the Overseas Immigration Examination.[35]

Detailed B Classifications from Overseas Immigration Examination:

Classification	**Clinical Findings**
No TB Classification	Applicants without current clinical findings of TB disease, without known HIV infection, and with a normal chest x-ray (and for applicants who require it, a negative IGRA) with normal TB disease screening examinations.
Class A TB Disease	All applicants who have TB disease, including applicants with extrapulmonary TB who have chest x-ray findings suggestive of pulmonary TB disease regardless of sputum smear and culture results.

Class B0 TB, Pulmonary	Applicants who were diagnosed with TB disease by the panel physician or presented to the panel physician while on TB treatment and successfully completed Division of Global Migration Health (DGMH)-defined directly observed therapy (DOT) under the supervision of a panel physician prior to immigration.
Class B1 TB, Pulmonary	Applicants who have signs or symptoms, physical exam, or chest x-ray findings suggestive of tuberculosis disease, or have known HIV infection, but have negative AFB sputum smears and cultures and are not diagnosed with TB disease. This classification also includes applicants who were diagnosed with TB disease by the panel physician, refused DOT treatment, and are returning after treatment and completion of 1-year wait.
Class B1 TB, Extrapulmonary	Applicants diagnosed with extrapulmonary TB with normal chest x-ray findings and negative sputum AFB smear results and cultures.
Class B2 TB, LTBI	Applicants who have a positive IGRA or TST but otherwise have a negative evaluation for TB. Documentation of IGRA or TST results, LTBI treatment status, medications used should be documented. Contacts with a positive IGRA or TST ≥5 mm will receive B2 classification in addition to a Class B3.
Class B3 TB, Contact Evaluation	Applicants who are a recent contact of a known TB disease case, regardless of IGRA or TST results. If the IGRA or TST is positive and there is no evidence of TB disease, there will be two classifications, B2 and B3; if negative, B3 only. Additional information can be found in the Contacts of Tuberculosis Cases section.

People Adjusting Immigration Status to Permanent Resident

This data set includes the total number of people seeking to adjust their immigration status to permanent resident in California and by LHJ. This data set is obtained from the United States Citizenship and Immigration Services (USCIS) and includes the most recent available data as of August 2023. Data on people adjusting their immigration status diagnosed with LTBI are reported by civil surgeons and local TB programs to TBCB via the CalREDIE Provider Portal, except San Diego and San Francisco, which report to TBCB via dataset twice per year. Civil surgeons also may be submitting reports via fax, mail, and other means instead of through CalREDIE but only CalREDIE reports and reports to San Diego and San Francisco are included in these data.

People adjusting their immigration status with nonpositive IGRA test results are not reported by civil surgeons, and those with positive IGRA tests are underreported. Therefore, percent of people adjusting their immigration status with LTBI is incomplete. Information on detailed race, medical risk factors, socioeconomic status, reasons for not starting treatment, ending treatment regimen, and reason not completing treatment is not available for people adjusting their immigration status with LTBI. Estimates of LTBI among status adjusters are calculated using the same method described under “LTBI Estimates” in these Technical Notes.

Supplemental Tables

Local Health Jurisdiction (LHJ) Tables

Table S0: Estimated People with LTBI, Selected Jurisdictions in California, 2022	
	LTBI Estimate
California	**2,355,912**
Alameda	120,947
Butte	5,007
Contra Costa	67,781
El Dorado	4,752
Fresno	51,741
Humboldt	2,578
Imperial	11,543
Kern	45,097
Kings	7,242
Long Beach	27,259
Los Angeles	664,908
Madera	6,988
Marin	9,625
Merced	16,671
Napa	6,444
Orange	207,785
Pasadena	9,204
Placer	12,461
Riverside	128,837
Sacramento	83,356
San Bernardino	117,911
San Diego	167,723
San Francisco	63,398
San Joaquin	47,232
San Luis Obispo	7,528
San Mateo	54,807
Santa Barbara	21,751
Santa Clara	167,632
Santa Cruz	10,261
Shasta	3,000
Solano	24,453
Sonoma	18,707
Stanislaus	27,920
Tulare	25,561
Ventura	40,094

Yolo	11,153
LTBI estimates were calculated by using data from NHANES 2011-2012. See Technical Notes for additional information.	

Table S1: People with Positive IGRA Electronic Laboratory Reports, by Local Health Jurisdiction										
	2019		**2020**		**2021**		**2022**		**2021-2022**	
	Number	*%*	Number	*%*	Number	*%*	Number	*%*	Change	*Change (%)*
California	**19,201**	*100%*	**35,850**	*100%*	**50,236**	*100%*	**51,246**	*100%*	**1,010**	*2%*
Alameda	2,759	*14%*	4,180	*12%*	5,650	*11%*	5,126	*10%*	-524	*-9%*
Amador	9	*<1%*	13	*<1%*	18	*<1%*	14	*<1%*	-4	*-22%*
Berkeley	48	*<1%*	98	*<1%*	148	*<1%*	142	*<1%*	-6	*-4%*
Butte	65	*<1%*	125	*<1%*	153	*<1%*	176	*<1%*	23	*15%*
Calaveras	11	*<1%*	8	*<1%*	17	*<1%*	16	*<1%*	-1	*-6%*
Colusa	11	*<1%*	42	*<1%*	47	*<1%*	30	*<1%*	-17	*-36%*
Contra Costa	987	*5%*	1,684	*5%*	2,330	*5%*	2,466	*5%*	136	*6%*
Del Norte					9	*<1%*	9	*<1%*	0	
El Dorado	26	*<1%*	50	*<1%*	87	*<1%*	89	*<1%*	2	*2%*
Fresno	675	*4%*	1,401	*4%*	1,655	*3%*	1,796	*4%*	141	*9%*
Glenn	9	*<1%*	25	*<1%*	36	*<1%*	32	*<1%*	-4	*-11%*
Humboldt	30	*<1%*	50	*<1%*	92	*<1%*	71	*<1%*	-21	*-23%*
Imperial	190	*<1%*	827	*2%*	1,511	*3%*	1,556	*3%*	45	*3%*
Inyo	5	*<1%*	10	*<1%*	17	*<1%*	17	*<1%*	0	
Kern	928	*5%*	2,117	*6%*	4,203	*8%*	3,660	*7%*	-543	*-13%*
Kings	89	*<1%*	152	*<1%*	243	*<1%*	174	*<1%*	-69	*-28%*
Lake	68	*<1%*	54	*<1%*	55	*<1%*	46	*<1%*	-9	*-16%*
Lassen	9	*<1%*	24	*<1%*	23	*<1%*	15	*<1%*	-8	*-35%*
Madera	101	*<1%*	216	*<1%*	391	*<1%*	369	*<1%*	-22	*-6%*
Marin	290	*2%*	585	*2%*	538	*1%*	428	*<1%*	-110	*-20%*
Mariposa			6	*<1%*	6	*<1%*	12	*<1%*	6	*100%*
Mendocino	40	*<1%*	54	*<1%*	61	*<1%*	61	*<1%*	0	
Merced	250	*1%*	395	*1%*	436	*<1%*	432	*<1%*	-4	*-1%*
Mono			9	*<1%*	14	*<1%*	15	*<1%*	1	*7%*
Monterey	522	*3%*	773	*2%*	984	*2%*	739	*1%*	-245	*-25%*
Napa	137	*<1%*	203	*<1%*	236	*<1%*	188	*<1%*	-48	*-20%*
Nevada	7	*<1%*	27	*<1%*	45	*<1%*	41	*<1%*	-4	*-9%*
Orange	1,334	*7%*	3,417	*10%*	5,092	*10%*	5,691	*11%*	599	*12%*
Placer	98	*<1%*	245	*<1%*	361	*<1%*	363	*<1%*	2	*1%*
Plumas					5	*<1%*	20	*<1%*	15	*300%*
Riverside	696	*4%*	1,924	*5%*	2,979	*6%*	3,126	*6%*	147	*5%*
Sacramento	878	*5%*	1,659	*5%*	2,339	*5%*	2,957	*6%*	618	*26%*
San Benito	24	*<1%*	98	*<1%*	75	*<1%*	75	*<1%*	0	
San Bernardino	796	*4%*	2,127	*6%*	2,791	*6%*	2,615	*5%*	-176	*-6%*
San Francisco	1,000	*5%*	1,501	*4%*	1,965	*4%*	1,814	*4%*	-151	*-8%*
San Joaquin	644	*3%*	1,462	*4%*	1,767	*4%*	1,686	*3%*	-81	*-5%*
San Luis Obispo	55	*<1%*	125	*<1%*	144	*<1%*	96	*<1%*	-48	*-33%*
San Mateo	756	*4%*	1,244	*3%*	1,592	*3%*	1,594	*3%*	2	*0%*
Santa Barbara	115	*<1%*	262	*<1%*	424	*<1%*	387	*<1%*	-37	*-9%*
Santa Clara	3,566	*19%*	4,493	*13%*	6,831	*14%*	8,134	*16%*	1,303	*19%*
Santa Cruz	187	*<1%*	349	*<1%*	457	*<1%*	363	*<1%*	-94	*-21%*
Shasta	62	*<1%*	96	*<1%*	137	*<1%*	140	*<1%*	3	*2%*
Siskiyou	19	*<1%*	6	*<1%*	14	*<1%*	21	*<1%*	7	*50%*
Solano	274	*1%*	710	*2%*	772	*2%*	761	*1%*	-11	*-1%*
Sonoma	286	*1%*	577	*2%*	629	*1%*	613	*1%*	-16	*-3%*
Stanislaus	293	*2%*	698	*2%*	759	*2%*	790	*2%*	31	*4%*
Sutter	34	*<1%*	74	*<1%*	102	*<1%*	133	*<1%*	31	*30%*
Tehama	6	*<1%*	39	*<1%*	44	*<1%*	51	*<1%*	7	*16%*
Tulare	224	*1%*	482	*1%*	725	*1%*	714	*1%*	-11	*-2%*
Tuolumne	13	*<1%*	22	*<1%*	25	*<1%*	31	*<1%*	6	*24%*
Ventura	409	*2%*	811	*2%*	888	*2%*	1,037	*2%*	149	*17%*
Yolo	122	*<1%*	229	*<1%*	251	*<1%*	248	*<1%*	-3	*-1%*
Yuba	29	*<1%*	63	*<1%*	58	*<1%*	58	*<1%*	0	

Unknown	1	*<1%*	2	*<1%*	1	*<1%*	1	*<1%*	0	

Percent change in number of people with LTBI is calculated by comparing the number of people reported for each jurisdiction in 2021 to 2022. Values fewer than 5 people are omitted. Any local health jurisdictions not listed in the table had fewer than 5 people reported across all years. Please see Technical Notes for more information.

Table S2: People Diagnosed with LTBI Who Are in Close Contact with a Person with (Pulmonary or Laryngeal) TB Disease, by Local Health Jurisdiction										
	2019		**2020**		**2021**		**2022**		**2021-2022**	
	Number	*%*	Number	*%*	Number	*%*	Number	*%*	Change	*Change (%)*
California	**1,490**	*100%*	**967**	*100%*	**1,086**	*100%*	**906**	*100%*	**-180**	*-17%*
Alameda	56	*4%*	38	*4%*	57	*5%*	57	*6%*	0	
Butte	10	*<1%*	8	*<1%*			5	*<1%*		
Contra Costa	26	*2%*	11	*1%*	15	*1%*	46	*5%*	31	*207%*
Fresno	58	*4%*	27	*3%*	50	*5%*	30	*3%*	-20	*-40%*
Humboldt			5	*<1%*	8	*<1%*				
Imperial	123	*8%*	30	*3%*	29	*3%*	45	*5%*	16	*55%*
Kern	25	*2%*	23	*2%*	30	*3%*	17	*2%*	-13	*-43%*
Kings	5	*<1%*			5	*<1%*				
Long Beach	9	*<1%*	26	*3%*	34	*3%*	18	*2%*	-16	*-47%*
Los Angeles	378	*25%*	238	*25%*	281	*26%*	211	*23%*	-70	*-25%*
Madera	5	*<1%*								
Marin	7	*<1%*					7	*<1%*		
Merced			9	*<1%*			19	*2%*		
Monterey	6	*<1%*	10	*1%*	26	*2%*	8	*<1%*	-18	*-69%*
Napa	5	*<1%*			5	*<1%*				
Orange	80	*5%*	48	*5%*	50	*5%*	73	*8%*	23	*46%*
Placer			7	*<1%*	6	*<1%*				
Riverside	50	*3%*	32	*3%*	59	*5%*	42	*5%*	-17	*-29%*
Sacramento	56	*4%*	35	*4%*	48	*4%*	36	*4%*	-12	*-25%*
San Bernardino	46	*3%*	24	*2%*	20	*2%*	5	*<1%*	-15	*-75%*
San Diego	114	*8%*	97	*10%*	68	*6%*	74	*8%*	6	*9%*
San Francisco	82	*6%*	59	*6%*	61	*6%*	39	*4%*	-22	*-36%*
San Joaquin	56	*4%*	33	*3%*	39	*4%*	13	*1%*	-26	*-67%*
San Luis Obispo			7	*<1%*	5	*<1%*				
San Mateo	69	*5%*	51	*5%*	54	*5%*	30	*3%*	-24	*-44%*
Santa Barbara	49	*3%*	33	*3%*	38	*3%*	18	*2%*	-20	*-53%*
Santa Clara	101	*7%*	65	*7%*	56	*5%*	36	*4%*	-20	*-36%*
Solano	17	*1%*	15	*2%*	7	*<1%*	13	*1%*	6	*86%*
Sonoma					7	*<1%*				
Stanislaus							11	*1%*		
Sutter	7	*<1%*								
Tulare	6	*<1%*			5	*<1%*				
Ventura	31	*2%*	6	*<1%*	7	*<1%*	14	*2%*	7	*100%*
Yolo			11	*1%*			10	*1%*		

Percent change in number of people with LTBI is calculated by comparing the number of people reported for each jurisdiction in 2021 to 2022. Values fewer than 5 people are omitted. Any local health jurisdictions not listed in the table had fewer than 5 people reported across all years. Please see Technical Notes for more information.

Table S3: Average Number of People with Close Contact Identified per Person with Active TB Disease

	2019			2020			2021			2022		
	Cases	Contacts	*Contacts per Case*	Cases	Contacts	*Contacts per Case*	Cases	Contacts	*Contacts per Case*	Cases	Contacts	*Contacts per Case*
California	1,459	12,885	***8.8***	1,133	6,757	***6.0***	1,185	6,990	***5.9***	1,348	8,051	***6.0***
Alameda	74	403	*5.4*	62	344	*5.5*	65	337	*5.2*	94	733	*7.8*
Contra Costa	40	389	*9.7*	26	194	*7.5*	24	243	*10.1*	45	261	*5.8*
Fresno	28	622	*22.2*	27	311	*11.5*	33	241	*7.3*	26	152	*5.8*
Imperial	44	351	*8.0*	18	60	*3.3*	21	104	*5.0*	28	153	*5.5*
Kern	16	136	*8.5*	23	110	*4.8*	33	194	*5.9*	21	94	*4.5*
Long Beach	17	164	*9.6*	22	123	*5.6*	16	108	*6.8*	14	366	*26.1*
Los Angeles	381	2,861	*7.5*	299	1,638	*5.5*	312	1,670	*5.4*	391	1,875	*4.8*
Merced	7	72	*10.3*	9	0	*0.0*				7	127	*18.1*
Monterey	9	92	*10.2*	7	47	*6.7*	19	161	*8.5*	10	179	*17.9*
Orange	135	776	*5.7*	100	335	*3.4*	104	379	*3.6*	140	493	*3.5*
Riverside	57	217	*3.8*	31	180	*5.8*	52	196	*3.8*	46	145	*3.2*
Sacramento	56	623	*11.1*	32	209	*6.5*	49	292	*6.0*	43	667	*15.5*

San Bernardino	62	263	*4.2*	41	153	*3.7*	42	174	*4.1*	36	115	*3.2*
San Diego	168	645	*3.8*	117	477	*4.1*	124	358	*2.9*	144	343	*2.4*
San Francisco	67	612	*9.1*	40	341	*8.5*	48	326	*6.8*	41	437	*10.7*
San Joaquin	43	1,745	*40.6*	31	252	*8.1*	31	551	*17.8*	22	161	*7.3*
San Mateo	43	680	*15.8*	38	587	*15.4*	32	503	*15.7*	32	400	*12.5*
Santa Barbara	17	404	*23.8*	15	192	*12.8*	19	151	*7.9*	12	146	*12.2*
Santa Clara	106	572	*5.4*	93	373	*4.0*	80	293	*3.7*	100	268	*2.7*
Solano	19	208	*10.9*	18	169	*9.4*	10	144	*14.4*	17	102	*6.0*
Tulare	7	26	*3.7*	8	29	*3.6*	9	14	*1.6*	13	13	*1.0*
Ventura	21	428	*20.4*	9	53	*5.9*	12	61	*5.1*	16	112	*7.0*
Berkeley				6	47	*7.8*						
Placer				8	64	*8.0*	5	60	*12.0*	7	47	*6.7*
San Luis Obispo				5	0	*0.0*						
Sonoma				7	15	*2.1*	9	95	*10.6*			
Stanislaus				6	33	*5.5*	7	45	*6.4*	13	108	*8.3*
Yolo				5	52	*10.4*				5	88	*17.6*

These quantities are based on the number of people with active TB disease who were culture-positive (both smear-negative and smear-positive) that were reported by each local health jurisdiction for investigation purposes. The numbers are generated from ARPE data and may vary from numbers reported based on RVCT (Reporting of Verified Cases of Tuberculosis) data. Local health jurisdictions with fewer than 5 people reported are omitted. Please see glossary for definitions of 'case' and 'contact'.

Table S4: Recently Immigrated People with Overseas Signs, Symptoms, or Chest X-rays Concerning for TB (Class B1) with LTBI, by Local Health Jurisdiction										
	2019		**2020**		**2021**		**2022**		**2021-2022**	
	Number	*%*	Number	*%*	Number	*%*	Number	*%*	Change	*Change (%)*
California	**1,206**	*100%*	**358**	*100%*	**450**	*100%*	**651**	*100%*	**201**	*45%*
Contra Costa	39	*3%*			9	*2%*	24	*4%*	15	*167%*
Fresno	15	*1%*			6	*1%*	12	*2%*	6	*100%*
Imperial	5	*<1%*								
Kern	11	*<1%*			6	*1%*	9	*1%*	3	*50%*
Kings	7	*<1%*								
Long Beach	13	*1%*			9	*2%*	18	*3%*	9	*100%*
Los Angeles	189	*16%*	52	*14%*	105	*23%*	96	*15%*	-9	*-9%*
Monterey	13	*1%*								
Orange	161	*13%*	61	*17%*	58	*13%*	84	*13%*	26	*45%*
Pasadena	9	*<1%*								
Riverside	56	*5%*	17	*5%*	11	*2%*				
Sacramento	51	*4%*	23	*6%*	30	*7%*	24	*4%*	-6	*-20%*
San Bernardino	18	*2%*			12	*3%*	21	*3%*	9	*75%*
San Diego	167	*14%*	67	*19%*	62	*14%*	124	*19%*	62	*100%*
San Francisco	87	*7%*	24	*7%*	37	*8%*	43	*7%*	6	*16%*
San Joaquin	14	*1%*	8	*2%*	9	*2%*	25	*4%*	16	*178%*
San Luis Obispo	5	*<1%*								
San Mateo	59	*5%*	12	*3%*	23	*5%*	32	*5%*	9	*39%*
Santa Barbara							5	*<1%*		
Santa Clara	196	*16%*	56	*16%*	59	*13%*	89	*14%*	30	*51%*
Solano	28	*2%*	6	*2%*			17	*3%*		
Stanislaus	20	*2%*					5	*<1%*		
Sutter							5	*<1%*		
Ventura	12	*1%*								

Percent change in number of people with LTBI is calculated by comparing the number of people reported for each jurisdiction in 2021 to 2022. Values fewer than 5 people are omitted. Any local health jurisdictions not listed in the table had fewer than 5 people reported across all years. Please see Technical Notes for more information.

Table S5: Recently Immigrated People with Overseas Diagnosis of LTBI (Class B2), by Local Health Jurisdiction										
	2019		**2020**		**2021**		**2022**		**2021-2022**	
	Number	*%*	Number	*%*	Number	*%*	Number	*%*	Change	*Change (%)*
California	**196**	*100%*	**56**	*100%*	**100**	*100%*	**90**	*100%*	**-10**	*-10%*
Fresno					11	*11%*	5	*6%*	-6	*-55%*
Imperial					10	*10%*	5	*6%*	-5	*-50%*
Monterey	6	*3%*								
Orange	39	*20%*	18	*32%*	17	*17%*	15	*17%*	-2	*-12%*
Sacramento	12	*6%*								
San Bernardino					7	*7%*				
San Diego	54	*28%*	14	*25%*	33	*33%*	22	*24%*	-11	*-33%*
San Francisco	14	*7%*								
Santa Clara	26	*13%*	13	*23%*	8	*8%*	9	*10%*	1	*12%*
Solano	6	*3%*								

Percent change in number of people with LTBI is calculated by comparing the number of people reported for each jurisdiction in 2021 to 2022. Values fewer than 5 people are omitted. Any local health jurisdictions not listed in the table had fewer than 5 people reported across all years. Please see Technical Notes for more information.

Table S6: People Adjusting Immigration Status to Permanent Resident with LTBI, by Local Health Jurisdiction										
	2019		**2020**		**2021**		**2022**		**2021-2022**	
	Number	*%*	Number	*%*	Number	*%*	Number	*%*	Change	*Change (%)*
California	**2,797**	*100%*	**1,775**	*100%*	**2,367**	*100%*	**2,234**	*100%*	**-133**	*-6%*
Alameda	76	*3%*	17	*<1%*						
Butte	6	*<1%*			5	*<1%*				
Contra Costa	197	*7%*	102	*6%*	120	*5%*	112	*5%*	-8	*-7%*
Imperial	75	*3%*	7	*<1%*	17	*<1%*				
Kern	30	*1%*	16	*<1%*						
Long Beach	27	*<1%*	13	*<1%*						
Los Angeles	827	*30%*	399	*22%*	564	*24%*	224	*10%*	-340	*-60%*
Marin	13	*<1%*								
Monterey	32	*1%*	6	*<1%*						
Napa			8	*<1%*						
Orange	434	*16%*	231	*13%*	252	*11%*	286	*13%*	34	*13%*
Pasadena	10	*<1%*					6	*<1%*		
Placer	5	*<1%*	6	*<1%*						
Riverside	11	*<1%*	78	*4%*	106	*4%*				
Sacramento	55	*2%*	17	*<1%*			73	*3%*		
San Bernardino	96	*3%*	56	*3%*	39	*2%*	29	*1%*	-10	*-26%*
San Diego			259	*15%*	264	*11%*	722	*32%*	458	*173%*
San Francisco					105	*4%*	24	*1%*	-81	*-77%*
San Joaquin					6	*<1%*				
San Luis Obispo	6	*<1%*	8	*<1%*	13	*<1%*	15	*<1%*	2	*15%*
San Mateo	139	*5%*	110	*6%*	122	*5%*	113	*5%*	-9	*-7%*
Santa Barbara	25	*<1%*	16	*<1%*	27	*1%*	22	*<1%*	-5	*-19%*
Santa Clara	558	*20%*	323	*18%*	594	*25%*	521	*23%*	-73	*-12%*
Solano	7	*<1%*	9	*<1%*	5	*<1%*				

Sonoma	16	*<1%*								
Stanislaus	51	*2%*	22	*1%*	57	*2%*	20	*<1%*	-37	*-65%*
Sutter			6	*<1%*	6	*<1%*	9	*<1%*	3	*50%*
Tulare	5	*<1%*								
Ventura	39	*1%*	35	*2%*	28	*1%*	14	*<1%*	-14	*-50%*
Yolo	27	*<1%*	6	*<1%*			15	*<1%*		

Percent change in number of people with LTBI is calculated by comparing the number of people reported for each jurisdiction in 2021 to 2022. Values fewer than 5 people are omitted. Any local health jurisdictions not listed in the table had fewer than 5 people reported across all years. Please see Technical Notes for more information.

Resources

Centers for Disease Control and Prevention, LTBI Resources:
www.cdc.gov/tb/latent-tb-infection-resources/
California Department of Public Health, TB Control Branch:
www.cdph.ca.gov/Programs/CID/DCDC/Pages/TBCB.aspx
TB Free California:
www.cdph.ca.gov/Programs/CID/DCDC/Pages/TB-Free-California.aspx
TB Prevention Guidebook (non-ADA):
www.cdph.ca.gov/Programs/CID/DCDC/CDPH%20Document%20Library/Preventing-TB-in-Your-Clinical-Setting-A-Practical-Guidebook-nonADA.pdf
TB Prevention Guidebook (ADA):
www.cdph.ca.gov/Programs/CID/DCDC/CDPH%20Document%20Library/Preventing-TB-in-Your-Clinical-Setting_A-Practical-Guidebook-ADA.pdf
TB Elimination Plan:
www.cdph.ca.gov/Programs/CID/DCDC/CDPH%20Document%20Library/TBCB-TB-Elimination-Plan-2021-2025.pdf
CDPH TB Risk Assessments:
www.cdph.ca.gov/Programs/CID/DCDC/Pages/TB-Risk-Assessment.aspx
California TB Controllers Association:
ctca.org

Contact Information

California Department of Public Health
Tuberculosis Control Branch
850 Marina Bay Parkway
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Richmond, CA 94804-6403

Phone: (510) 620-3000
Fax: (510) 620-3034
Confidential Fax: (510) 620-3035
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