



Tuberculosis in Alameda County, 2011

Alameda County Public Health Department

Tuberculosis Overview

Tuberculosis (TB) is a preventable and curable disease that remains one of the leading causes of death worldwide. TB is a communicable disease caused by the bacteria *Mycobacterium tuberculosis* and spreads from person-to-person through the air. When a person with active TB disease coughs, sneezes, laughs, or sings, the bacteria can be released into the air, aerosolizing the bacteria. Transmission can occur when people breathe in the bacteria while in close and prolonged contact with a person with infectious TB. Although TB can affect any part of the body, it most often affects the lungs.

Once TB bacteria have been inhaled, that person may become infected with TB. In most cases, the body is able to keep the bacteria from growing, but will still show evidence of exposure or infection. In persons with latent TB infection (LTBI), the TB bacteria in the body remain alive but inactive, and cannot be spread to others. Individuals with latent TB infection have a 5-10% chance of developing TB over their lifetime. For some, TB infection can progress to TB disease when the immune system cannot fight off the bacteria. Both LTBI and TB disease are medically treatable. The treatment regimens can take at least six to nine months, possibly longer if the case is co-infected with other diseases or the strain is drug resistant. If TB disease goes untreated, it can cause serious illness or death.

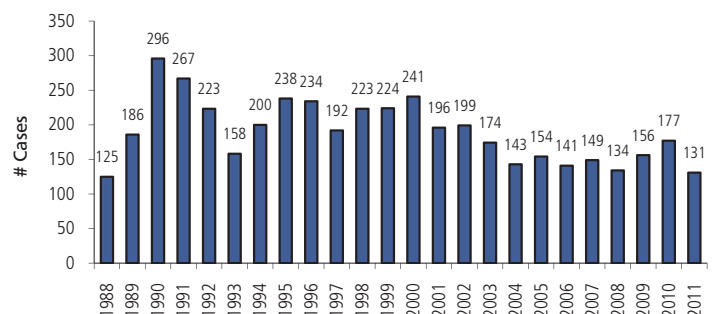
Tuberculosis is a disease that has been around for millennia, spreading through human populations wherever people congregate. It can infect anyone who lives, works, and breathes in proximity to active cases – regardless of age, sex, race, or socioeconomic status. However, it disproportionately affects the poor, homeless, and other socially marginalized groups who live in overcrowded conditions and/or lack access to healthcare. Poor nutrition, psychological stress, substance abuse, and co-infection with HIV, diabetes or cancer can also weaken the immune system and increase vulnerability to TB. Poverty can limit access to TB health services and essential supports that promote treatment adherence, like having family support in medication taking or transportation to get to medical appointments at a health facility.

Approximately one-third of the world's population, or over 2 billion people, are infected with *mycobacterium tuberculosis*, with more than 9 million becoming sick with TB disease annually. Over 90% of TB cases and TB deaths worldwide are concentrated in resource-poor developing nations where multiple risk factors such as poverty, overcrowding, malnutrition, and insufficient TB control infrastructure make TB endemic. Increased global trade, travel, and population mobility have hastened the spread of tuberculosis. Migration from countries with high TB prevalence has led to high and rising rates of TB among foreign-born populations in the United States and California in particular.

Alameda County TB Cases and Rates

After decades of decline in tuberculosis rates, TB re-emerged nationwide during the 1980s and the number of new TB cases rapidly increased into the early 1990s. The HIV epidemic, immigration from countries with high TB prevalence, and a combination of social factors (rising poverty, homelessness, and overcrowded conditions) fueled this re-emergence of TB. At the same time, a false sense of security that TB was under control in the U.S. led to a national reduction in funding of TB programs – which reduced capacity for timely detection and treatment of this unexpected rise in TB cases. In Alameda County, the number of TB cases peaked at nearly 300 cases in 1990, with an especially high burden of disease in Oakland. In fact, Oakland reported the third highest TB rate in the nation. In response to the national resurgence of TB, the federal government restored funding for TB control and rates of TB have generally been on the decline since then.

Annual TB Cases, 1993-2011
Alameda County



In 2011, there were 131 cases of TB in Alameda County (excluding the city of Berkeley), a 25% decrease from the previous year. There were 2317 TB cases in California, a decrease of 0.5% in TB cases across the state from the previous year, and the lowest number of TB cases ever recorded in the state. In addition to Alameda County, San Joaquin, San Mateo, Santa Clara and the city of Berkeley reported decreases in TB cases. Three Bay Area counties - San Francisco, Contra Costa and Marin - experienced increased numbers of cases.

Alameda County's TB case rate (excluding the city of Berkeley) for 2011 was 9.0 per 100,000 residents, one and one half times the California rate of 5.8, ranking fourth among all jurisdictions in the state. Compared to other Bay Area jurisdictions, the rate in Alameda County ranks lower than San Francisco and Santa Clara counties, but is higher than Contra Costa and Marin counties. The rate in Alameda County is nearly three times the 2011 national rate of 3.4 per 100,000.

While overall decreasing TB trends are observed in Alameda County and California, funding reductions once again threaten TB programs in current strained economic times. The consequence is likely to be delays in diagnosis and treatment resulting in increased TB transmission, with potential risk of marked increases in TB and multi-drug resistance.

TB Cases by Gender

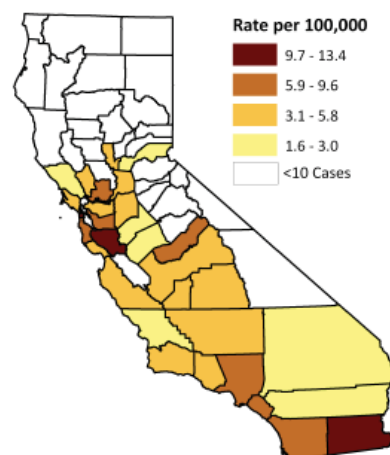
The gender distribution of annual TB cases in Alameda County has remained relatively stable over the past decade, with the majority of cases occurring among males. In 2011, males comprised 61% of TB cases while females made up 38%. The average annual rate among males during 2009-2011 was 12.7 per 100,000, one and one half times the rate of 7.7 among females.

TB Cases by Age Group

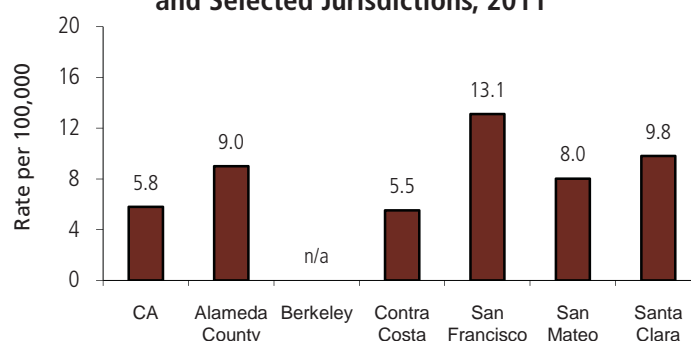
In 2011, the greatest proportion of incident tuberculosis cases occurred among older adults, age 65 years and older (32%), with 87% of TB cases among individuals over the age of 25 years. This is consistent with trends observed across the state with patterns shifting to older age groups. Additionally, individuals ages 65 and over have the greatest risk of having TB with a 2009-2011 average case rate of 26.1 per 100,000.

Cases among young children often indicate a recent transmission of tuberculosis, and thus are of particular concern. In 2011, there were three pediatric (children aged 0-4

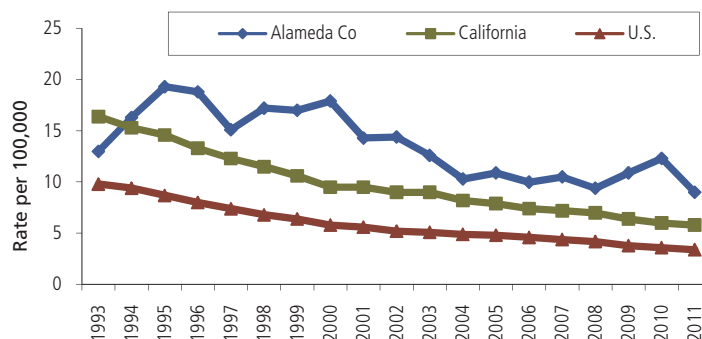
California County TB Case Rates, 2011



TB Case Rates for California and Selected Jurisdictions, 2011



Annual TB Case Rates, 1993-2011 Alameda County, California and U.S.



TB Cases and Average Case Rates, 2009-2011

| | | Number of Cases | Average Case Rate |
|-----------|-----------|-----------------|-------------------|
| Sex | Males | 284 | 12.7 |
| | Females | 189 | 7.7 |
| Age Group | 0-4 yrs | 10 | 3.4 |
| | 5-14 yrs | 10 | 1.8 |
| | 15-24 yrs | 36 | 5.8 |
| | 25-44 yrs | 137 | 10.0 |
| | 45-64 yrs | 130 | 10.9 |
| | 65+ yrs | 132 | 26.1 |

years) cases of TB. This can occur when the child is born in a country with high rates of TB, or from exposure to a foreign-born individual traveling from a country with high TB rates.

Tuberculosis Cases by Race/Ethnicity

As seen nationally and statewide, there are racial/ethnic disparities in tuberculosis rates, with people of color bearing a disproportionate disease burden. In Alameda County, tuberculosis largely and disproportionately affects people of color, many of whom migrate here from resource-poor countries where TB is endemic and/or live in conditions where there are multiple TB risk factors like poverty, overcrowding, malnutrition, or poor healthcare access. In 2011, people of color comprise 93% of TB cases countywide compared to 86% in 1993. The majority of TB cases are among Asians and Pacific Islanders, who made up 7 of every 10 new TB cases in 2011. Latinos accounted for 11% of cases in 2011, while Africans or African Americans and Whites comprised 10% and 7% of tuberculosis cases respectively.

In the period 2009-2011, Asian/Pacific Islanders had the highest average annual case rates (23.8 per 100,000), nearly double the rates among Africans or African Americans (12.2), three times that of Latinos (6.9), and 11 times the rate for Whites whose average annual case rate was 2.1.

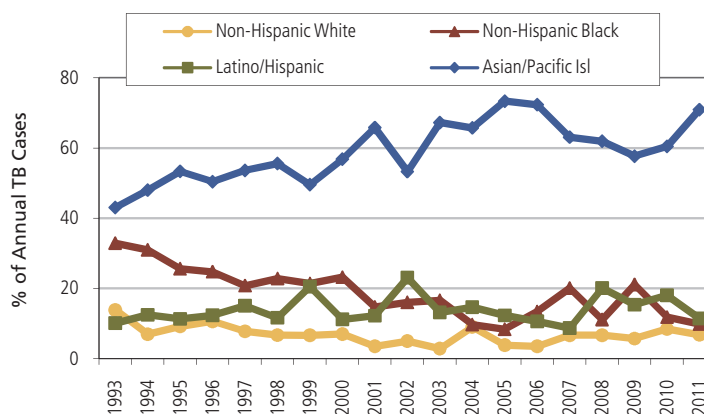
In 2011, the majority of the foreign-born incident cases occurred among Asians/Pacific Islanders (77%) and Latinos (12%). Among the U.S.-born individuals, African Americans have typically accounted for the greatest proportion of cases in past years. However in 2011, Asian/Pacific Islanders made up the largest group of U.S.-born TB cases (44%), followed by Whites (24%), African Americans (20%) and U.S.-born Latinos (8%). This increase in Asian/Pacific Islanders can be attributed to a cluster of cases among a particular subgroup last year, and is not reflective of a growing trend among the U.S.-born cases.

TB Cases by Place of Birth

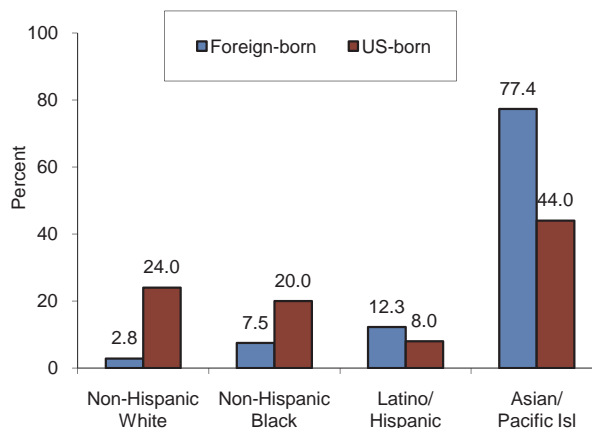
Reflecting high rates of migration and travel from countries with high TB prevalence, foreign-born residents have accounted for an increasing proportion of annual TB cases in Alameda County. In the early 1990s, TB cases were almost evenly split between foreign- and U.S.-born persons. By 2011, almost three quarters (or 72%) of TB cases were among the foreign-born. Individuals most often came from the Philippines, China, Vietnam, Mexico, and India.

The average annual case rate in 2009-2011 for foreign-born individuals in Alameda County was 26.2 per 100,000 resi-

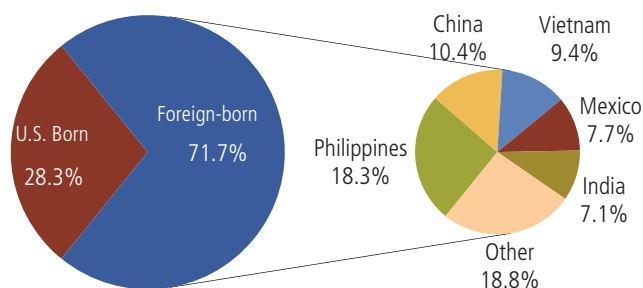
Annual Percent of TB Cases by Race/Ethnicity, 1993-2011



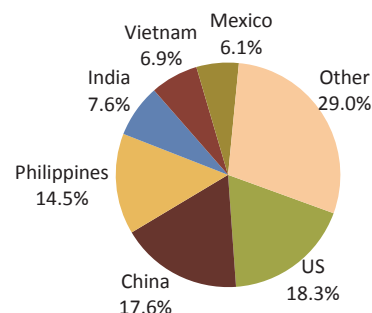
TB Cases by Place of Birth and Race/Ethnicity, 2011



Cumulative TB Cases by Place of Birth Alameda County, 1993-2011



Incident TB Cases by Place of Birth Alameda County, 2011



dents, over eight times the rate for individuals with TB born in the United States (3.1).

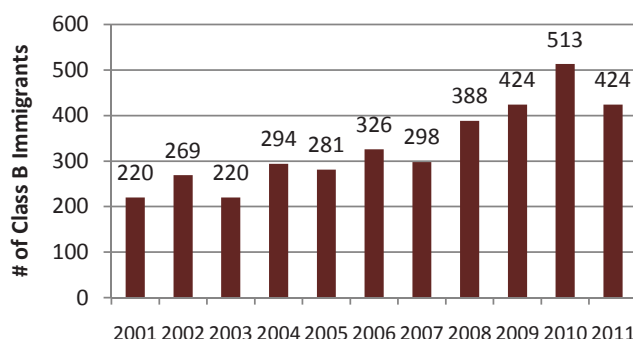
In 2011, 82% of TB cases were among foreign-born. An analysis of the time between arrival in the U.S. and diagnosis of active disease revealed that over half of individuals had been in the U.S. 15 or more years before progression from latent infection to active disease.

B1/B2 Immigrants to Alameda County

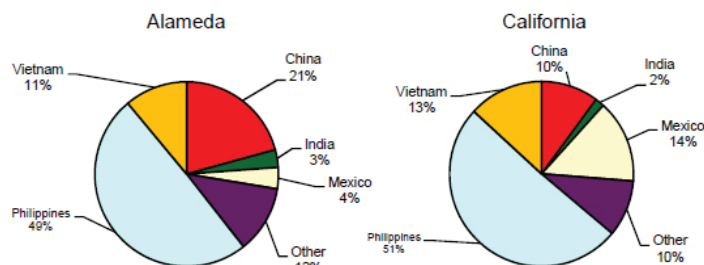
Alameda County continues to experience a steady flow of B1/B2 Immigrants coming into the county. Documented immigrants and refugees from countries with high rates of TB undergo a tuberculosis screening before obtaining a visa to enter the United States in accordance with the 2007 Technical Instructions for overseas screening. The state or local health jurisdiction is notified of the arrival of each person with an A, B1, or B2 status, and the immigrant or refugee is advised to report to their local health department.

In 2011, 424 Class B immigrants were reported to Alameda County by the federal Division of Global Migration and Quarantine, a decrease from the 513 Class B immigrants in the previous year. Alameda County differs from the state in its class B immigrants with a smaller proportion arriving from Mexico, and a larger proportion arriving from China. Alameda County comprises 4% of the state's population, but received 7% of California's Class B immigrants in 2011.

Class B1 and B2 Immigrants to Alameda County, 2001-2011



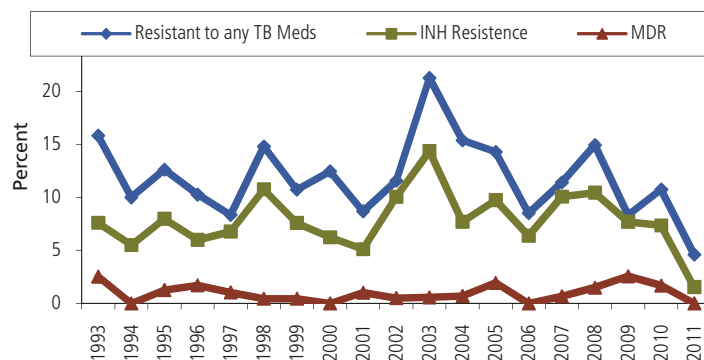
B notification arrivers by Country of Origin, 2011



TB Drug Resistance

Drug resistance can occur when the bacteria become resistant in a person where TB was inadequately or inappropriately treated, or can be acquired directly from someone with a drug resistant strain of TB. Individuals with drug resistant TB undergo longer and more complicated courses of treatment. Six (4.5%) of the 131 TB cases in 2011 were resistant to at least one of the anti-tuberculosis medications. Multi-drug resistance (MDR) is TB resistant to both Isoniazid and Rifampin, the two most potent anti-TB medications. Although none of the cases in 2011 were MDR cases, there have been a total of 33 MDR cases since 1993. Of these, 93% occurred among foreign-born individuals.

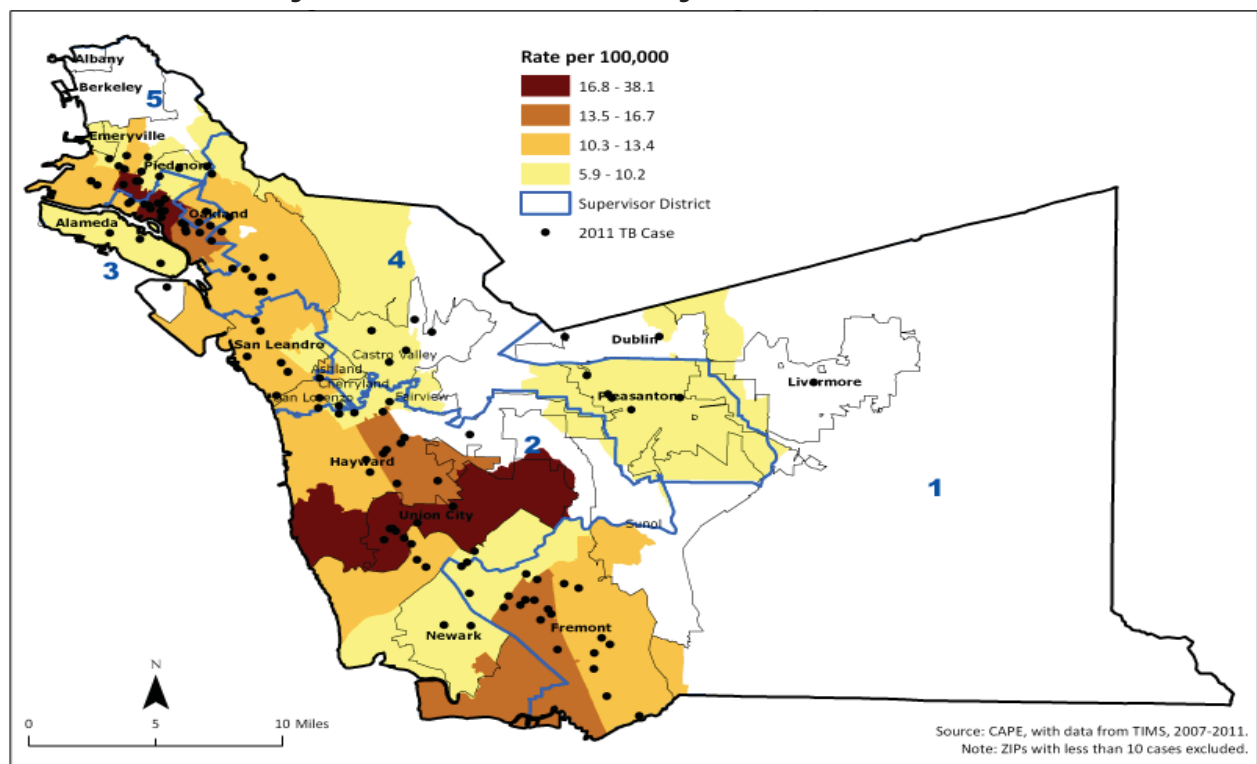
Percent TB Cases Resistant to any TB Meds, INH and MDR Resistance, Alameda County, 1993-2011



Other Characteristics of TB Cases

TB bacteria can cause disease in the lungs (pulmonary TB) or in other parts of the body (extra-pulmonary TB) such as lymph nodes, bones and joints, and the brain or spinal cord. While the majority (68%) of the TB cases reported in 2011 were pulmonary cases, 27% were extra-pulmonary, and 5% were both pulmonary and extra-pulmonary.

Alameda County TB Cases and Rates by ZIP, 2007-2011



In the 12 months prior to their TB diagnosis, 7% of the 2011 cases had used alcohol excessively in the past year. Six (5%) had used non-injection drugs, with one case reporting injection drug use. Two percent had been in a long-term care facility within one year of diagnosis, 2% reported having been in correctional facilities in the previous year. These additional risk factors typically impacted U.S.-born TB cases over the foreign-born cases. While 3% of TB cases in 2011 reported being homeless, many became displaced from their housing as a result of their TB diagnosis, and the TB program assisted in providing housing for more than a dozen cases.

Directly observed therapy (DOT) is an approach where a trained healthcare worker or other designated individual watches the ingestion of every prescribed dose of medication. It is a proven strategy that has the effect of reducing the numbers of new TB infections each year and has been associated with the decrease of development of drug resistant strains of TB. In Alameda County, 85% of cases who meet criteria for DOT were on directly observed therapy.

The largest proportion of 2011 TB cases were among residents of Oakland (43%). In the south county, the cities of Fremont and Hayward reported the greatest number of cases, with 21%, and 12% respectively. The east county (Dublin, Pleasanton, and Livermore) comprised 7% collectively. The areas in the county with the highest rates are in Oakland's downtown, Chinatown, and San Antonio neighborhoods.

TB Control Program in Action!

In its efforts to prevent and reduce TB transmission throughout the county, the Alameda County TB Control Program prioritizes work in three core areas:

- 1) Identifying and treating persons who have active TB and ensuring treatment completion, with the provision of directly observed therapy for higher-risk subgroups such as the highly infectious, multi-drug resistant, co-infected, or homeless;
- 2) Finding, conducting TB testing and evaluating persons who might have been exposed to active TB cases to identify secondary cases, then treating persons with confirmed latent or active TB; and
- 3) Conducting targeted testing among other subgroups who are especially vulnerable to TB (e.g., newly arrived immigrants with B notifications from countries with high TB rates).

In addition to these core areas, the TB Control Program is working at individual, community, and policy levels to improve outcomes in terms of tuberculosis and overall health and health equity by:

- Reaching out to healthcare providers, hospitals, schools, correctional facilities, and various local organizations to educate the community about tuberculosis;
- Working with vulnerable clients to ensure they are linked to essential resources that support treatment

adherence, like medical insurance, food, housing, and transportation;

- Forging partnerships with community service providers to make sure clients, upon treatment completion, are transitioned into necessary ongoing support, such as a permanent medical home, housing assistance, or drug rehabilitation;
- Collaborating with the Office of AIDS to appropriately manage patients co-infected with HIV by connecting them to critical services like Medi-Cal or housing assistance;
- Finding permanent medical homes for patients with co-morbidities, in need of preventative services, or for patients who request assistance;
- Advocating at state and federal levels for maintenance and expansion of current levels of funding for TB screening, treatment and infrastructure; and
- Ensuring that tuberculosis is included and appropriately addressed in federal healthcare policies, such as the Affordable Care Act.

Beyond the TB Control Program, the Alameda County Public Health Department (ACPHD) is taking action to address economic and social conditions that are root causes

of tuberculosis and overall health inequities. ACPHD is involved in a national Place Matters (PM) initiative, working collaboratively with multiple sectors to advance health equity through community-centered local policy focused in five key areas, including: 1) economics, 2) education, 3) housing, 4) criminal justice, and 5) land use and transportation. Specifically supporting tuberculosis control:

- The PM Economics workgroup is developing a County banking policy that will expand access to non-predatory financial services in underserved neighborhoods and ensure that the bank that Alameda County does business with gives back to underinvested communities. By helping to protect income and build wealth at individual and community levels, this policy would address poverty – a major TB risk factor that drives up rates of infection and progression to disease.
- The PM Housing workgroup is helping the City of Oakland to transform code enforcement services to proactively address substandard housing conditions that threaten public health and safety. Resulting improvements in housing conditions could help to reduce vulnerability to major public health problems – like tuberculosis, asthma, and lead poisoning – and support better treatment adherence among vulnerable subgroups in unstable, unhealthy housing situations.



Acknowledgments

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Data Sources

For information on TB in California
<http://www.cdph.ca.gov/data/statistics/Pages/TuberculosisDiseaseData.aspx>