Tuberculosis in Alameda County, 2012
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 when the bacteria is released into the air by a person with active TB disease. Transmission can occur when others breathe in the bacteria while in close and prolonged contact with a person with infectious TB. Although TB most often affects the lungs, it can affect any part of the body.

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 disease 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, but can cause serious illness or death if TB disease goes untreated. The treatment regimens can take at least six to nine months, possibly longer if the strain is drug resistant or if the individual is co-infected with other diseases.

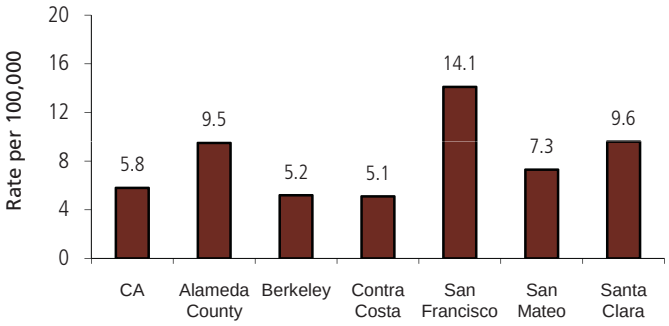
Tuberculosis can infect anyone who lives, works, and breathes in proximity to active cases – regardless of age, sex, race, or socioeconomic status. However, it disproportionately affects the poor, homeless, and other socially marginalized groups who live in overcrowded conditions and/or lack access to healthcare. Poor nutrition, substance abuse, and co-infection with diabetes, cancer, HIV and other conditions that weaken the immune system can increase the risk of developing TB disease. Poverty can limit access to TB health services and essential supports that promote treatment adherence, like having family support in taking medication or transportation to medical appointments.

Approximately one-third of the world's population, or over 2 billion people, are infected with TB, with an estimated 8.7 million new cases of TB and 1.4 million deaths in 2011. Over 90% of TB cases and TB deaths worldwide are concentrated in resource-poor developing nations where multiple risk factors such as war, poverty, overcrowding, malnutrition, and insufficient TB control infrastructure make TB endemic. Increased global trade, travel, and population mobility have contributed to the spread of tuberculosis. Migration from countries with high TB prevalence has led to high rates of TB among foreign-born populations in the United States, California, and Alameda County.

Alameda County TB Cases and Rates

In this report, data for Alameda County excludes the City of Berkeley which is its own health jurisdiction and reports independently. Alameda County's TB case rate for 2012 was 9.5 per 100,000 residents, 1.6 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 higher than Contra Costa, San Mateo and Marin counties, and the City of Berkeley (Figure 1).

Figure 1. TB Case Rates for California and San Francisco Bay Area Jurisdictions, 2012



In 2012, there were 136 tuberculosis cases in Alameda County, a 3.0% increase from the previous year (Figure 2). There were 2,189 TB cases in California, a 5.8% decrease in cases across the state from the previous year. Four Bay Area jurisdictions – Alameda, San Francisco, Marin, and the City of Berkeley - experienced increased numbers of cases, while Contra Costa, San Mateo, and Santa Clara reported decreases in TB cases in 2012. The rate in Alameda County is consistently higher than TB rates for California and the U.S. (Figure 3).

TB Cases by Sex

In 2012, males comprised 54.4% of TB cases while females made up 45.6% (Table 1). The average annual rate among males during 2010-2012 was 12.7 per 100,000, 1.5 times the rate of females (8.5) (Table 2).

TB Cases by Age Group

In 2012, the greatest proportion of incident tuberculosis cases occurred among adults, age 45-64 years (30.9%), with 87% of TB cases among individuals 25 years and older. Additionally, individuals ages 65 years and older had the greatest risk of having TB with a 2010-2012 average case rate of 26.2 per 100,000 (Table 2).

In 2012, there were six pediatric TB cases (children under 15 years), of which three cases occurred in very young children 0-4 years old (Table 1). Cases among very young children often indicate recent local transmission of tuberculosis, and thus are of particular concern.

Figure 2. Annual TB Cases, 1993-2012 Alameda County

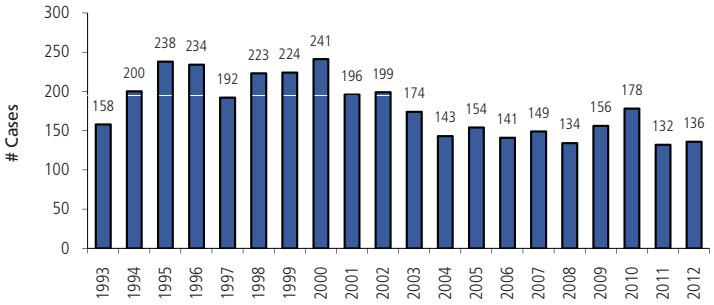


Figure 3. Annual TB Case Rates, 1993-2012 Alameda County, California and U.S.

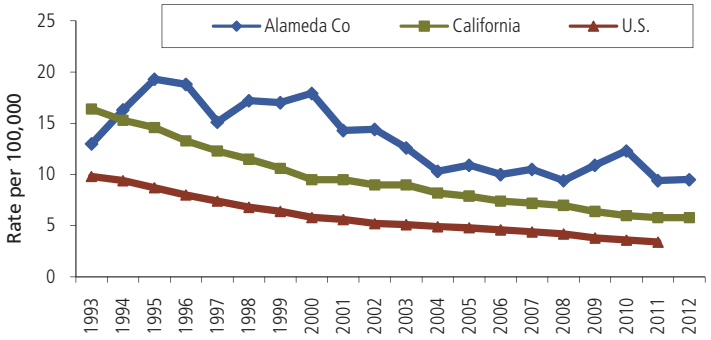


Table 1. Incident TB Cases, 2012 Alameda County

		Number of Cases (n=136)	Percent
Sex	Males	74	54.4
	Females	62	45.6
Age Group	0-4 yrs	3	2.2
	5-14 yrs	3	2.2
	15-24 yrs	12	8.8
	25-44 yrs	39	28.7
	45-64 yrs	42	30.9
	65+ yrs	37	27.2
Race/ Ethnicity	Non-Hispanic Black*	17	12.5
	Asian/PI	90	66.2
	Amer Ind/Native AK	0	0.0
	Latino	18	13.2
	White	11	8.1

Table 2. TB Cases and Average Case Rates 2010-2012, Alameda County

		Number of Cases (n=346)	Average Case Rate per 100,00
Sex	Males	263	12.7
	Females	183	8.5
Age Group	0-4 yrs	9	n/a
	5-14 yrs	13	2.4
	15-24 yrs	41	7.8
	25-44 yrs	127	10.0
	45-64 yrs	132	11.5
	65+ yrs	124	26.2
Race/ Ethnicity	Non-Hispanic Black*	52	10.1
	Asian/PI	294	24.8
	Amer Ind/Native AK	0	n/a
	Latino	65	6.4
	White	35	2.6

Published March 2013.

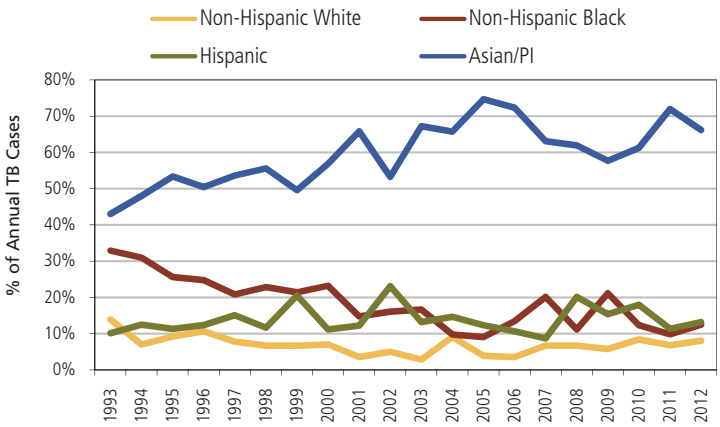
Tuberculosis Cases by Race/Ethnicity

In 2012, people of color comprised 91.9% of TB cases countywide compared to 86.1% in 1993. Of the TB cases in 2012, 66.2% were among Asians/Pacific Islanders (Figure 4). Latinos accounted for 13.2% of cases in 2012, while Non-Hispanic Blacks* and Non-Hispanic Whites comprised 12.5% and 8.1% of tuberculosis cases respectively (Table 1).

In the period 2010-2012, Asian/Pacific Islanders had the highest average annual case rate (24.8 per 100,000), more than double the rate among Non-Hispanic Blacks (10.1), nearly four times that of Latinos (6.4), and nine times the rate for Non-Hispanic Whites whose average annual case rate was 2.6 (Table 2).

In 2012, the majority of the foreign-born incident cases occurred among Asian/Pacific Islanders (78.4%) and Latinos (11.7%). Among U.S.-born cases, the largest number occurred in Non-Hispanic Blacks (40.0%), followed by Non-Hispanic Whites (28.0%), U.S.-born Latinos (20.0%), and Asian/Pacific Islanders (12.0%) (Figure 5).

Figure 4. Annual Percent of TB Cases by Race/Ethnicity, Alameda County, 1993-2012



TB Cases by Place of Birth

Foreign-born residents account 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 2012, 82% of TB cases occurred among the foreign-born. The most frequently reported countries of birth were the Philippines, China, India, Vietnam, and Mexico (Figure 6).

The average annual case rate in 2010-2012 for foreign-born individuals in Alameda County was 26.8 per 100,000 residents, over eight times the rate for individuals born in the United States (3.1).

Figure 5. TB Cases by Place of Birth and Race/Ethnicity, Alameda County, 2012

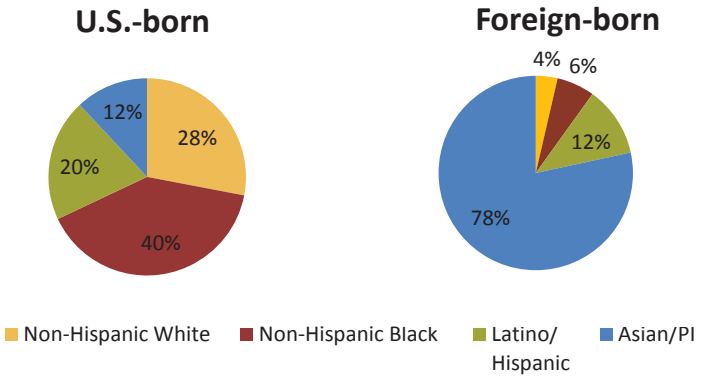
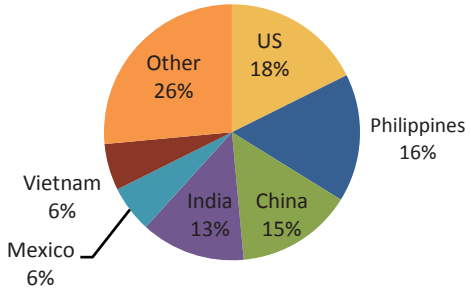


Figure 6. Incident TB Cases by Place of Birth Alameda County, 2012

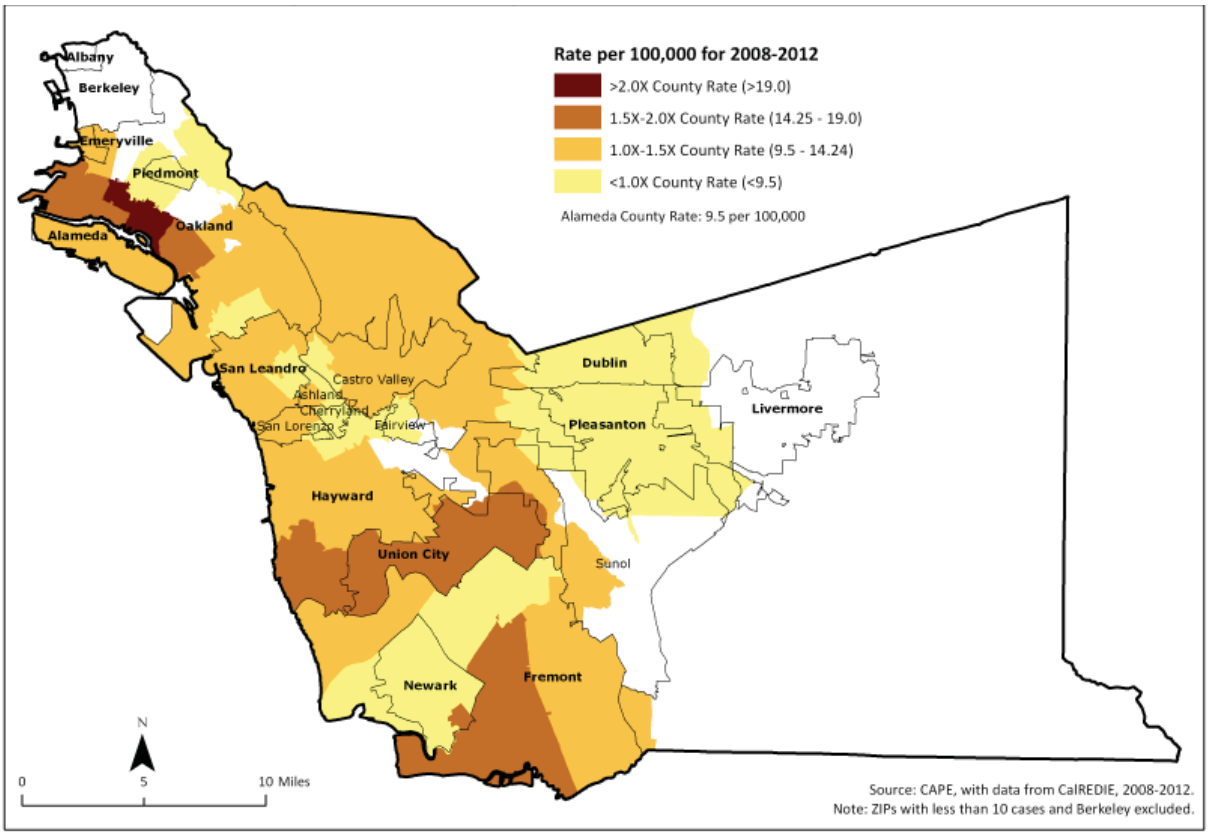


Other Characteristics of TB Cases

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 (61.8%) of the TB cases reported in 2012 were pulmonary cases, 31.6% were extra-pulmonary, and 5.9% were both pulmonary and extra-pulmonary. Of the 92 pulmonary cases, 45 (48.9%) were smear-positive and 32 (34.8%) had evidence of cavitary disease, both of which indicate a high level of infectiousness.

*For purposes of this report, Non-Hispanic Black refers to both immigrant Non-Hispanic Africans and Non-Hispanic African Americans.

Figure 7. Alameda County TB Rates by ZIP, 2008-2012



In the 12 months prior to their TB diagnosis, five (3.7%) of the 2012 cases had used alcohol excessively, four (2.9%) had used non-injection drugs, and two (1.5%) reported injection drug use. Three (2.2%) had been in a long-term care facility within one year prior to diagnosis, and two (1.5%) reported having been in correctional facilities. While three (2.2%) TB cases in 2012 had been homeless in the year prior to their TB diagnosis, others became displaced from their housing as a result of their diagnosis, and the TB program assisted in providing housing for a dozen individuals in 2012.

Seven (5.1%) of the 136 cases were known to be co-infected with with HIV/AIDS. HIV is the most important risk factor for progression from latent TB infection to TB disease, and TB is the leading cause of death among HIV-infected individuals.

Directly observed therapy (DOT) is a strategy where a trained healthcare worker or other designated individual watches the ingestion of every prescribed dose of medication. Patients who are highly infectious or at risk for drug resistance or failure to adhere to treatment are assigned an outreach worker who observes them ingest each dose of medication. DOT has been proven to reduce the numbers of new TB infections each year and has been associated with the decreased development of drug resistant strains of TB. In 2012, 78 (57.4%) of cases received DOT for all or some portion of their treatment. For many other TB patients, therapy is self-administered throughout the course of treatment.

More than one-third of 2012 TB cases were among Oakland residents. In the south county, the cities of Fremont and Hayward reported the greatest proportion of cases, with 15.4%, and 14.0% respectively. The east county (Dublin, Pleasanton, and Livermore) comprised 8.1% collectively. The areas in the county with the highest average annual rates for 2008-2012 are in Oakland's downtown, Fruitvale, and San Antonio neighborhoods (Figure 7).

TB Drug Resistance

Drug resistance can occur when the bacteria become resistant in a person whose TB disease 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. Thirteen (9.6%) of the 136 TB cases in 2012 were resistant to at least one of the anti-tuberculosis medications (Figure 8). Multi-drug resistant (MDR) TB is resistant to at least Isoniazid (INH) and Rifampin, the two most potent anti-TB medications. One MDR TB case was identified in 2012, and 34 MDR TB cases have been reported in Alameda County since 1993. Of these, 94% occurred among foreign-born individuals.

Published March 2013.

New Immigrants to Alameda County

Before obtaining a visa to enter the United States, documented immigrants and refugees from countries with high rates of TB undergo a pre-departure tuberculosis screening in accordance with the Centers for Disease Control and Prevention (CDC) 2007 Technical Instructions, a policy supported by Alameda County Public Health Department. The state or local health jurisdiction is notified of the arrival of each immigrant or refugee classified overseas with a TB condition requiring follow-up TB evaluation upon arrival in the U.S., and the individual is advised to report to their local health department.

In 2012, 470 new arrivers requiring TB evaluation were reported to Alameda County by the CDC's Division of Global Migration and Quarantine (Figure 9). Alameda County comprised 4% of the state's population, but received approximately 7% of California's new arrivers in 2012 who required follow-up TB evaluation. Alameda County differs from the state with a smaller proportion of individuals coming from Mexico, and a larger proportion arriving from China (Figure 10).

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 persons who have active TB and ensuring treatment completion, with the provision of DOT for higher-risk subgroups such as the highly infectious, multi-drug resistant, HIV co-infected, or homeless;

2) Finding, testing and evaluating persons who might have been exposed to active TB cases to identify secondary cases, then facilitating and linking to care those 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 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

Figure 8. Percent TB Cases Resistant to any TB Meds, INH, and MDR Resistance, Alameda County, 1993-2012

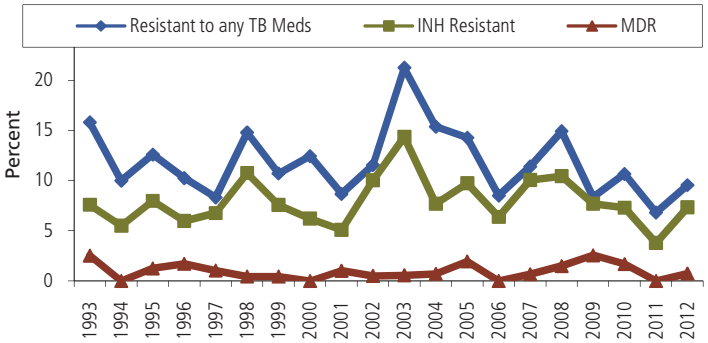


Figure 9. New Arrivers Requiring TB Evaluation Alameda County, 2001-2012

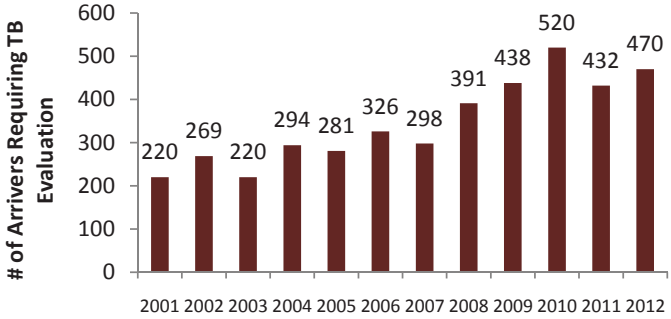
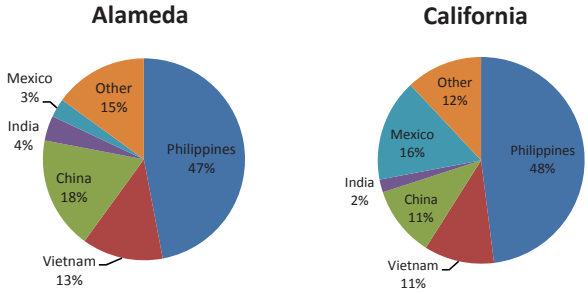


Figure 10. New Arrivers Requiring TB Evaluation by Country of Origin, 2012



adherence, such as 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 HIV care providers 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.

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 TB 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 continuing to develop 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. Alameda County helped the City of Oakland update its Linked Banking Ordinance to include requirements that banks disclose detailed lending data, including any ties to predatory financial services located in Oakland. 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. Alameda County researched new models of code enforcement that are more focused on preventing conditions that harm health and presented findings to Oakland City staff and a Building Services Improvement Taskforce. On September 29, 2012 the Oakland City Council's Community and Economic Development Committee approved the Task Force's recommendations to move forward with piloting this model. Resulting improvements in housing conditions could help to reduce vulnerability to major public health problems – like TB, asthma, and lead poisoning – and support better treatment adherence among vulnerable subgroups in unstable, unhealthy housing situations.

Acknowledgments

This brief was produced by the Alameda County Public Health Department (ACPHD)

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Data Sources

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

Published March 2013.