

2017 Annual Tuberculosis Report Fresno County

Fresno County Department of Public Health (FCDPH)
Tuberculosis Control Program



2017 Annual Tuberculosis Report Fresno County

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Community Health Division
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List of Tables

Table 1. Percent of TB Cases by Risk Factor and Nativity in Fresno County – 2011-2017	19
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List of Figures

Figure 1. Annual TB Case Counts in Fresno County – 2005-2017	8
Figure 2. Annual National and State TB Case Rates Compared to Fresno County – 2005-2017*	8
Figure 3. Percent Male vs Female TB Cases in Fresno County – 2013-2017	9
Figure 4. Age Distribution of TB Cases in Fresno County – 2017	9
Figure 5. Nativity of TB Cases in Fresno County – 2013-2017	10
Figure 6. Birth Country for Foreign Born TB Cases in Fresno County – 2017	10
Figure 7. TB Case Rates by Race/Ethnicity in Fresno County – 2010-2017	11
Figure 8. Percent of TB Cases by Race/Ethnicity in Fresno County – 2013-2017	11
Figure 9. Occupational Status of TB Cases in Fresno County – 2013-2017	12
Figure 10. TB Case Rates by Zip Code per 1000 Population in Fresno County – 2017	13
Figure 11. Referral Sources for TB Patients in Fresno County – 2017	14
Figure 12. Infection Location for Extrapulmonary TB in Fresno County – 2013-2017*	15
Figure 13. Initial Drug Resistance as a Percentage of All TB Cases by Year in Fresno County – 2013-2017	16
Figure 14. Rates of MDR-TB* in Fresno County – 2005-2017	17
Figure 15. TB Lineage by Year in Fresno County – 2013-2017	18
Figure 16. Patients with Known *HIV Status in Fresno County – 2011-2017	20
Figure 17. Sputum Culture Conversion Within 60 Days in Fresno County – 2011-2017	21
Figure 18. TB Patients Completing Treatment within 12 Months* in Fresno County – 2011-2017	22
Figure 19. LTBI Patients with 3HP* Treatment Completion in Fresno County – 2015-2017	23
Figure 20. Contacts to AFB Smear+ Cases Examined for TB in Fresno County – 2011-2017	24
Figure 21. AFB Smear+ Contacts Who Started LTBI Treatment in Fresno County – 2011-2017	25
Figure 22. AFB Smear+ Contacts Who Completed LTBI Treatment in Fresno County – 2011-2016	25

List of Abbreviations

3HP – Once-weekly Isoniazid-Rifapentine for 12 Weeks
AFB – Acid-Fast Bacilli
CDC – Centers of Disease Control and Prevention
CDPH – California Department of Public Health
DOT – Direct Observed Therapy
Dx – Diagnosis
EMB – Ethambutol
ETH – Ethionamide
FCDPH – Fresno County Department of Public Health
HIV – Human Immunodeficiency Virus
INH – Isoniazid
LTBI – Latent Tuberculosis Infection
MDR-TB – Multi-Drug-Resistant Tuberculosis
MOX – Moxifloxacin
NHPI – Native Hawaiian Pacific Islander
NTIP – National TB Indicators Project
PZA – Pyrazinamide
RIB – Rifabutin
RIF – Rifampin
RIP – Rifapentine
Rx – Prescription
SM – Streptomycin
TB – Tuberculosis
TNF-Alpha – Tumor Necrosis Factor Alpha
WHO – World Health Organization
XDR-TB – Extensively drug-resistant TB

Table of Contents

List of Tables	2
List of Figures	2
List of Abbreviations.....	3
Tuberculosis Burden Summary.....	5
Globally	5
Nationally	5
California	6
Fresno County.....	7
Tuberculosis Cases and Rates in Fresno County	8
Demographic Characteristics in Fresno County.....	9
Sex and Age.....	9
Nativity	10
Race/Ethnicity	11
Occupational Status in Fresno County.....	12
Geographic Distribution in Fresno County	13
Case Referral by Source in Fresno County	14
Pathology and Organism Characteristics in Fresno County.....	15
Infection Location	15
Drug Resistance.....	16
Multidrug-Resistant TB (MDR-TB).....	17
Genotype.....	18
Contributing Risk Factors and Comorbidities in Fresno County.....	19
Risk Factors	19
HIV Testing.....	20
Treatment Outcomes in Fresno County	21
Sputum Culture Conversion	21
Active TB Treatment Completion.....	22
Latent Tuberculosis (LTBI) Treatment.....	23
Contact Investigation in Fresno County	24
Public Health Strategies to Control, Prevent, and Eliminate Tuberculosis	26
References	27

Tuberculosis Burden Summary

Globally¹

Tuberculosis (TB) remains one of the top 10 causes of death worldwide, and during 2017, around 10 million people developed active TB resulting in 1.2-1.4 million deaths. Globally the TB incident rate (133 cases per 100,000 people) declined in 2017 compared to 2016. However, it should be noted that changes to the annual TB incident rate vary widely by world region and country.

Tuberculosis is a leading killer of people who are HIV infected, and in 2017, around 300,000 people with HIV died from TB. Despite this high number, there has been a 44% reduction in HIV deaths from 2000-2017. During the same time span, the TB mortality rate among HIV-negative people has dropped by 42%.

Worldwide, most TB cases are in adults (90%) that are male (64%). Two-thirds of TB cases originate from eight countries: India, China, Indonesia, the Philippines, Pakistan, Nigeria, Bangladesh, and South Africa.

The World Health Organization (WHO) asserts that multidrug-resistant TB (MDR-TB) is a public health crisis. In 2017, it was estimated there were 558,000 (range, 483, 000–639 ,000) new TB cases with resistance to Rifampicin, of which 82% had MDR-TB. Of the cases with MDR-TB, 8.5% (95% confidence interval, 6.2–11%) were estimated to have extensively drug-resistant TB (XDR-TB).

Nationally²

A total of 9,105 TB cases (a rate of 2.8 cases per 100,000 people) were reported in the United States in 2017. Compared to 2016, in 2017 the case rate decreased by 2.3% and the number of cases decreased by 1.6%. The four states with the highest case count, California, Texas, New York, and Florida, accounted for a little less than half of all TB cases reported in 2017.

Minority populations continue to have the highest rates of TB in the United States. The case rates for TB per 100,000 population in 2017 for Native Hawaiians/Pacific Islanders, Asians, Blacks or African Americans, Hispanics/Latinos, American Indians/Alaska Natives, and Whites is 19.1, 17.7, 4.7, 4.4, 3.9, and 0.5 respectively.

¹ Global tuberculosis report 2018. Geneva: World Health Organization; 2018. Licence: CC BY-NC-SA 3.0 IGO.

² Centers for Disease Control and Prevention (CDC). Reported Tuberculosis in the United States, 2017. Atlanta, GA: US Department of Health and Human Services, CDC; 2018.

Foreign-born people represent 70% of all TB cases in 2017, and other top risk factors for TB infection include: diabetes, alcohol abuse, HIV coinfection, injection drug use, homelessness, and incarceration.

There were 123 MDR-TB cases in 2017, and the number of MDR-TB cases increased by 26 when compared to 2016. The percentage of TB cases that are MDR-TB has been stable for the last 20 years. There were two XDR-TB cases in 2017.

California³

In 2017, a total of 2,057 new TB cases were reported compared to 2059 cases in 2016. California reported 22.6 % of the nation's TB cases in 2017. The previously seen decrease in the TB incident rate in California has slowed over the past decade and flattened during the most recent years. The California TB case rate did not change in 2017 and remains near 5.2 cases per 100,000 people. TB cases were reported in 46 of California's 61 (75%) local health jurisdictions.

Like the United States as a whole, minority populations continue to have the highest rates of TB in California. The case rates for TB per 100,000 population for Whites, Blacks, Hispanics, and Asians/Pacific Islanders is 0.7, 4.2, 4.7, and 19.1 respectively.

Foreign-born people represent 82% of all TB cases and 77% of these cases were born in: Mexico, the Philippines, Vietnam, China, and India. Social and behavioral risk factors identified in 2017 TB cases include: injection drug use, non-injection drug use, alcohol use, homelessness, long-term care facility residency, and correctional facility residency. Medical risk factors identified in 2017 TB cases include: diabetes, TNF-alpha antagonist therapy, end-stage renal disease, HIV, other immunosuppressive conditions, and post-organ transplant.

It is estimated that 2 million Californians have a latent TB infection (LTBI) and are at risk of developing active TB if not properly diagnosed and treated. Most people with LTBI are unaware of their infection. Latent TB treatment is critical because an estimated 80% of active TB cases develop from LTBI.

In California, MDR-TB has remained a small proportion of TB cases (1-2%) during 1993-2017 despite the growth of MDR-TB cases throughout the world. A total of 30 (1.8%) MDR-TB cases were reported in California during 2017. Two Extensively Drug Resistant (XDR-TB) cases were reported in California during 2017 and 24 XDR-TB cases are reported from 1993–2017.

³ Tuberculosis Control Branch, Report on Tuberculosis in California, 2017. California Department of Public Health, Richmond, CA. August 2018.

Fresno County

A total of 62 TB cases (a rate of 6.2 cases per 100,000 people) were reported in Fresno County during 2017. Compared to 2016, in 2017 the case rate increased by 1.6% and the number of cases increased by 3.3%.

In 2017, most TB cases occurred in older adults (average age 52.1 years old), and more TB cases were male than female (56.5% vs. 43.5%). About 75% of TB cases were not employed when they received their diagnosis.

Racial and ethnic disparities continue exist among populations with TB disease in Fresno County. During 2017, rates of TB for Asians/NHPI, Blacks/African Americans, Hispanics/Latinos, and Whites are: 35.9, 0, 4.9, and 0.3 per 100,000 people respectively

Foreign-born people represent well over half of all TB cases in 2017, and 68.6% of these cases arrived from: Mexico, Laos, and India. Social and behavioral risk factors identified in 2017 TB cases include: alcohol and drug abuse, contact with an active TB case, health care work, migrant/seasonal work, and homelessness. Medical risk factors identified in 2017 TB cases include: diabetes, HIV coinfection, immunosuppression, end stage renal disease, a prior TB diagnosis, and incomplete LTBI treatment.

The MDR-TB case rate in 2017 was 0.5 per 100,000 people and is the highest observed in recent years.

Tuberculosis Cases and Rates in Fresno County

Tuberculosis (TB) is a common communicable disease caused by the bacterium *Mycobacterium tuberculosis* and occasionally *Mycobacterium bovis*. It most commonly infects the lungs, but can infect almost any organ system. In 2017, 62 new cases of active TB were diagnosed in Fresno County (6.2 per 100,000 population), a 3.3% increase in the annual number of cases from 2016 (Figures 1-2). Out of the 61 health jurisdictions in California, Fresno County ranked eighth for active TB cases, representing 3% of all California cases in 2017.⁴

Figure 1. Annual TB Case Counts in Fresno County – 2005-2017

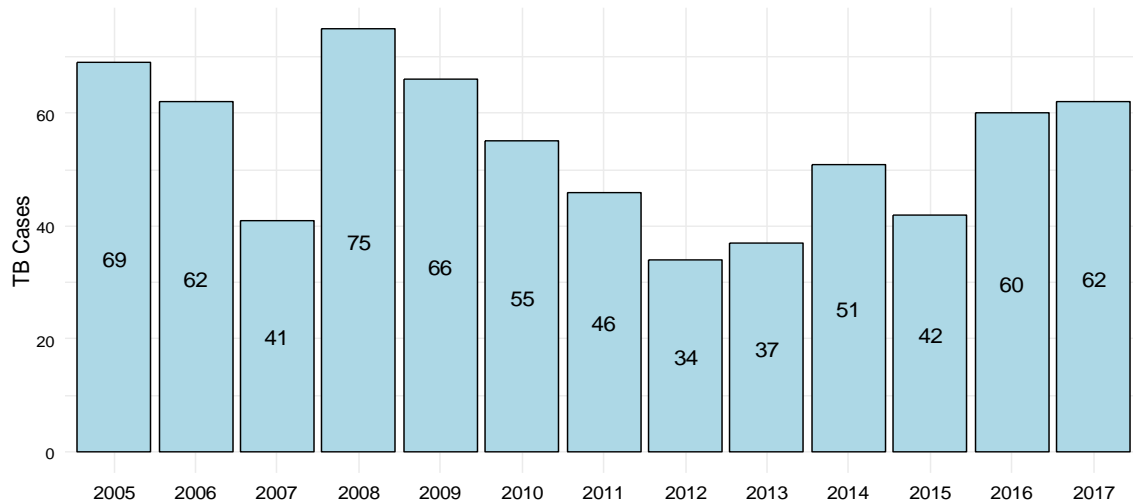
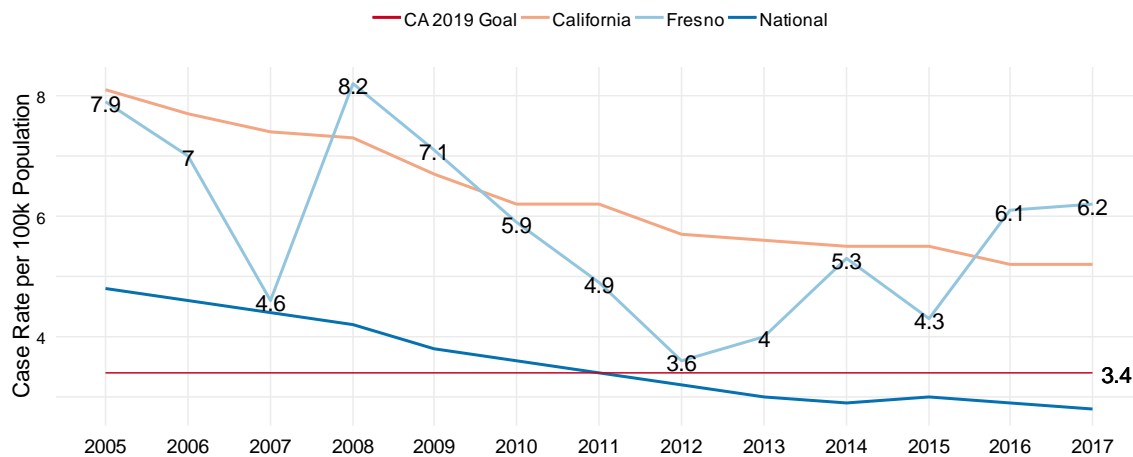


Figure 2. Annual National and State TB Case Rates Compared to Fresno County – 2005-2017*



*Data Sources:
Tuberculosis Control Branch, Report on Tuberculosis in California, 2017. California Department of Public Health, Richmond, CA. August 2018
CDC Division of Tuberculosis Elimination - Reported Tuberculosis in the United States, 2017

⁴ Tuberculosis Control Branch, Report on Tuberculosis in California, 2017. California Department of Public Health, Richmond, CA. August 2018.

Demographic Characteristics in Fresno County

Sex and Age

In 2017, 35 (56.5%) cases were male and 27 (43.5%) were female (Figure 3). Most TB cases in Fresno County occurred in older adults, with 34 (54.8%) cases over the age of 54 during 2017 (Figure 4). Less than 15 TB patients were under the age of five (Figure 4). The average age of TB patients in Fresno County during 2017 was 52.1 years with a range from 0 to 90 years (data not shown).

Figure 3. Percent Male vs Female TB Cases in Fresno County – 2013-2017

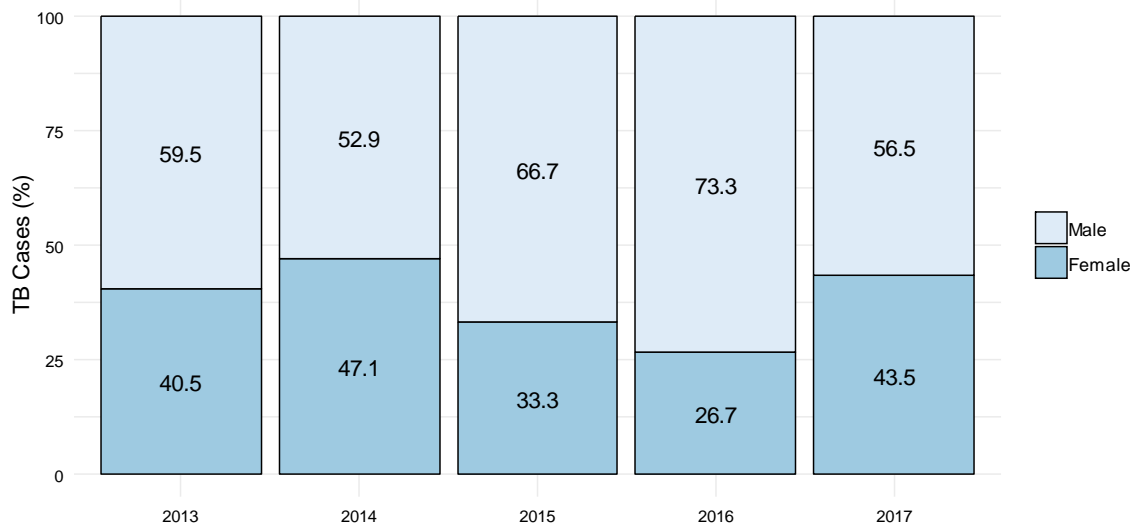
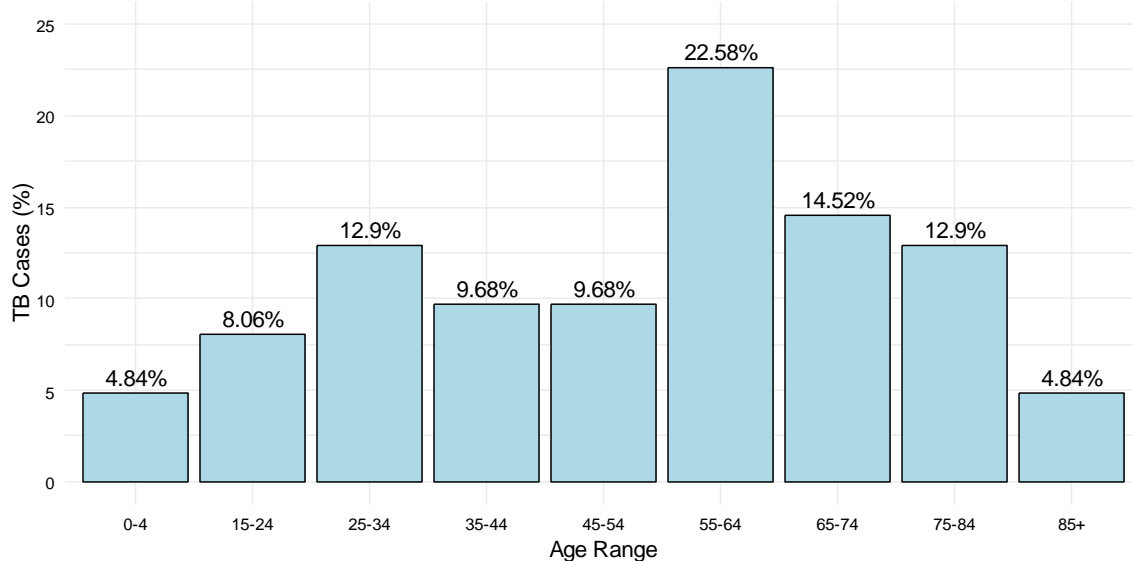


Figure 4. Age Distribution of TB Cases in Fresno County – 2017



Nativity

Similar to prior years, during 2017 a smaller percentage of TB cases were among US-born residents compared to foreign-born people (Figure 5). The top three countries represented by foreign-born TB cases, accounting for 68.6% of all foreign-born cases, are: Mexico, Laos, and India. Other countries represented by 2017 TB cases include: the Philippines, Vietnam Cambodia, Egypt, Honduras, Macau, and Pakistan (Figure 6). Foreign-born TB patients spent an average of 24.4 years in the US prior to their TB diagnosis (data not shown).

Figure 5. Nativity of TB Cases in Fresno County – 2013-2017

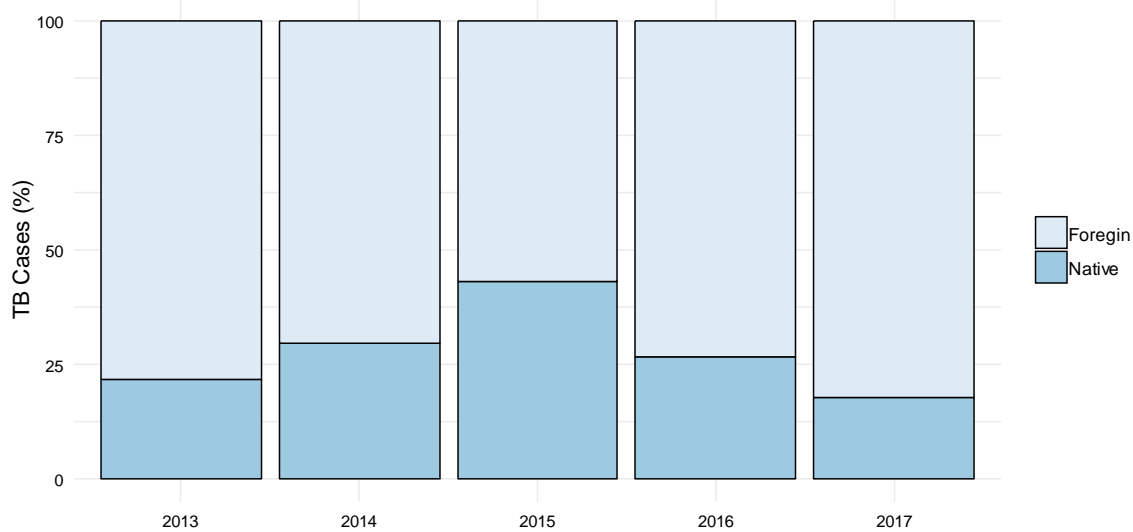
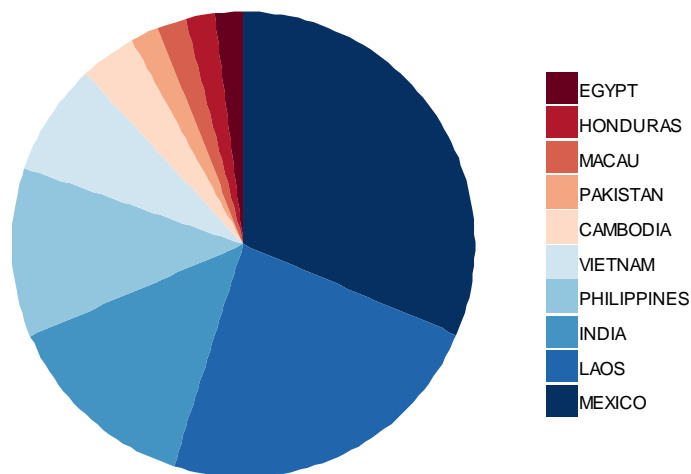


Figure 6. Birth Country for Foreign Born TB Cases in Fresno County – 2017



Race/Ethnicity

Racial and ethnic disparities exist among populations with TB disease in Fresno County (Figure 7 & Figure 8). The crude TB incident rate in Fresno County for 2017 is 6.2 per 100,000 people (Figure 2). That race/ethnicity specific rate for Asians/NHPI, Blacks/African Americans, Hispanics/Latinos, and Whites is: 35.9, 0, 4.9, and 0.3 per 100,000 people respectively (Figure 7).

Figure 7. TB Case Rates by Race/Ethnicity in Fresno County – 2010-2017

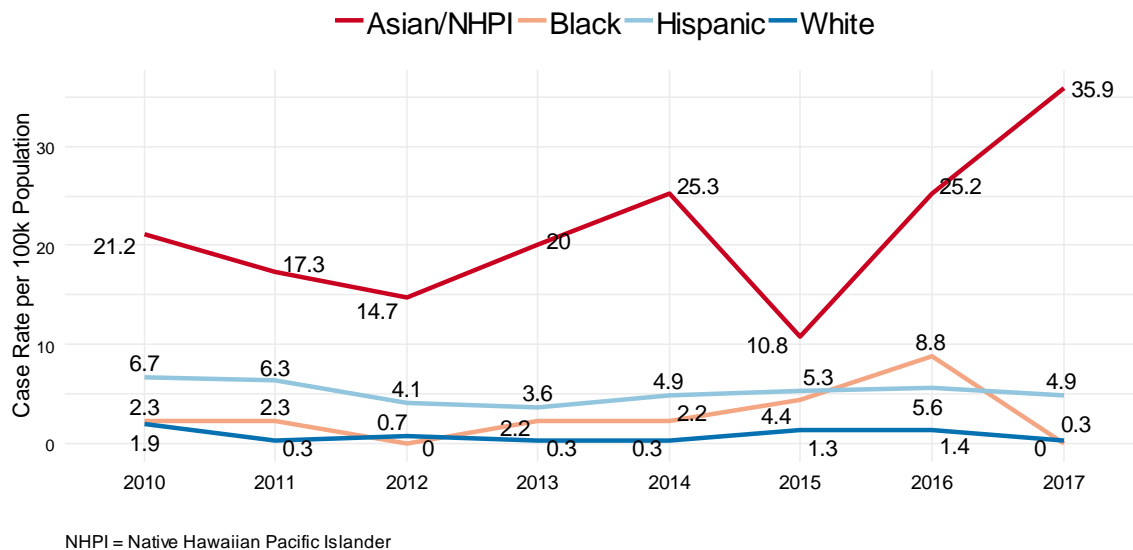
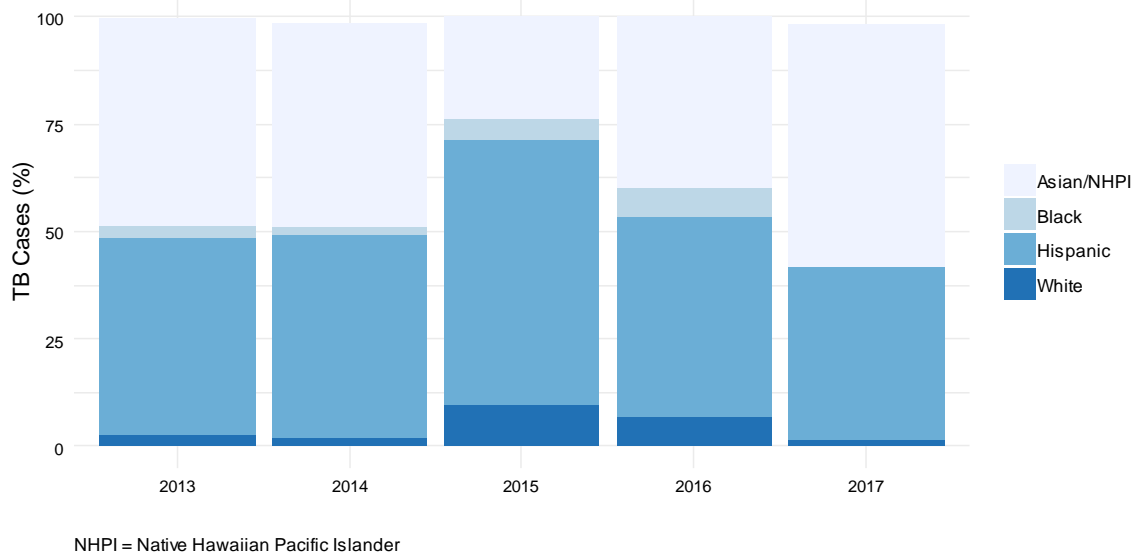


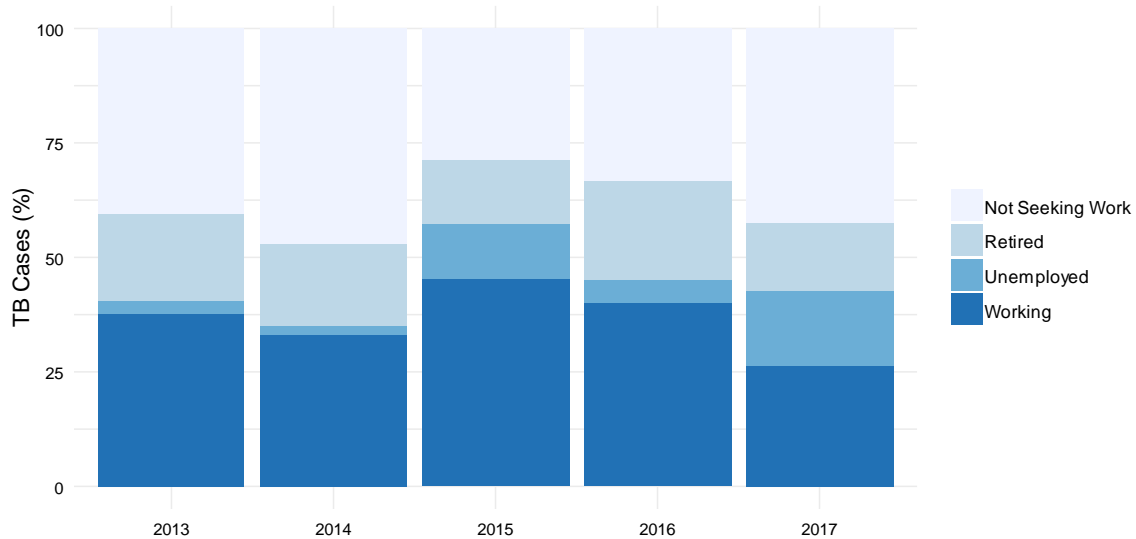
Figure 8. Percent of TB Cases by Race/Ethnicity in Fresno County – 2013-2017



Occupational Status in Fresno County

Figure 9 shows the occupational status of those with TB disease in Fresno County during 2017. Most cases, 45 (73.8%), were not employed because they were: not seeking work, retired, or unemployed. Those with a TB diagnosis who were employed represent 16 (26.2%) of cases. One case in 2017 had an unknown occupational status.

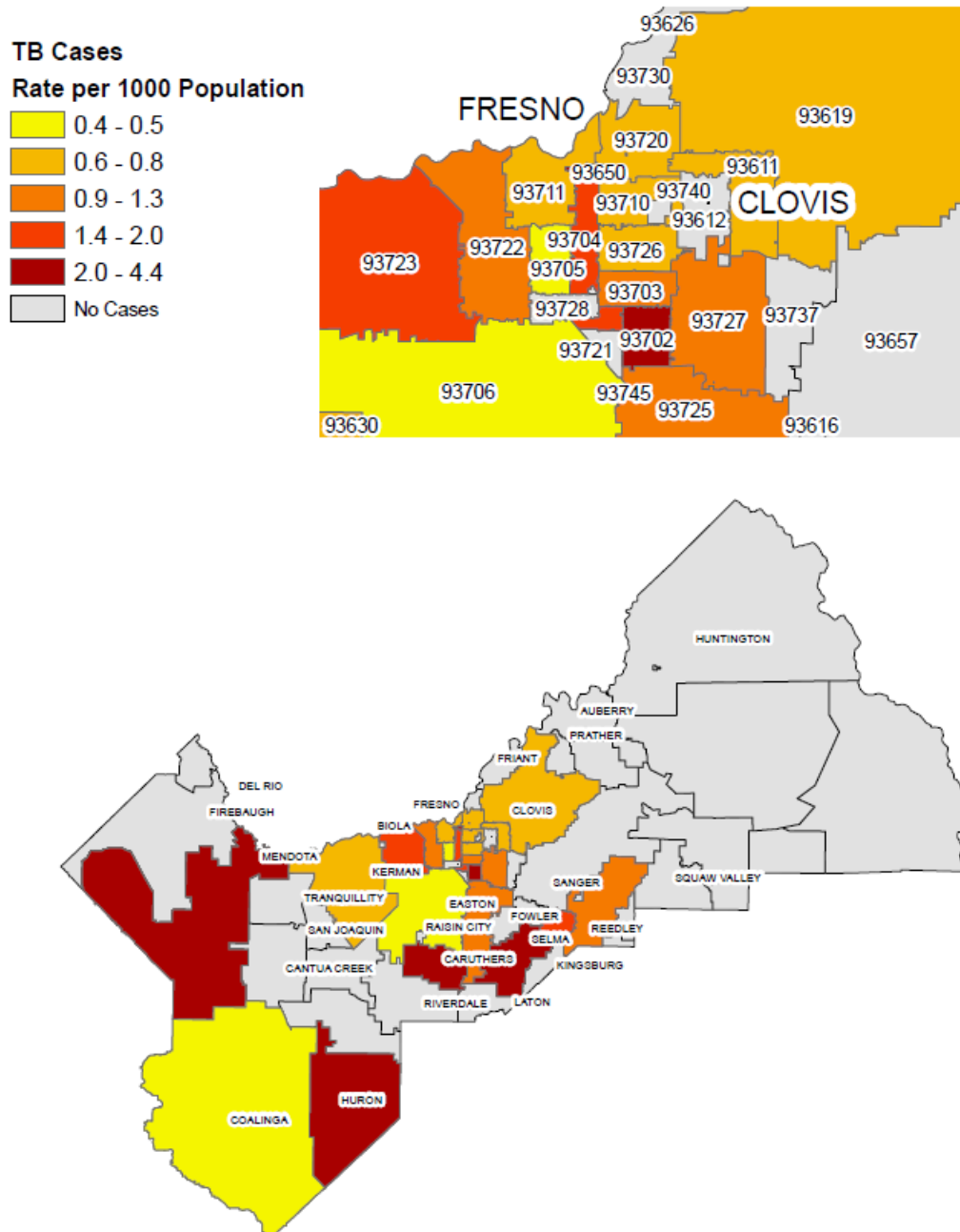
Figure 9. Occupational Status of TB Cases in Fresno County – 2013-2017



Geographic Distribution in Fresno County

Figure 10 shows the geographic distribution of TB cases within Fresno County by zip code. During 2017, the highest rates of TB were located in zip codes: 93650, 93662, 93702, 93640, and 93609 (Figure 10).

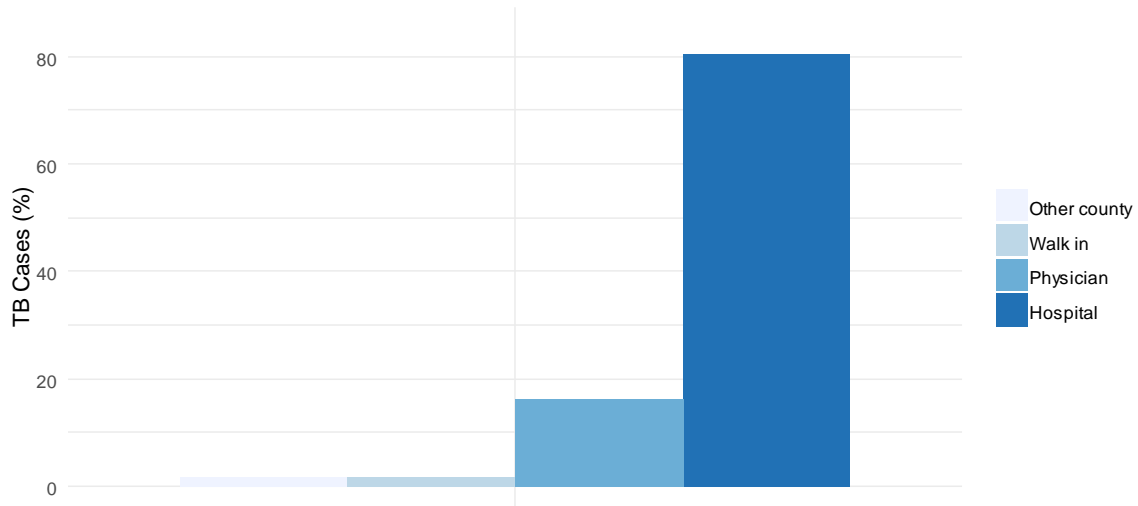
Figure 10. TB Case Rates by Zip Code per 1000 Population in Fresno County – 2017
Fresno and Clovis Metropolitan Areas



Case Referral by Source in Fresno County

Cases of TB were referred to the Fresno County Department of Public Health from different sources. Most TB cases (>80%) are referred by hospitals followed by: physicians, walk-ins, and neighboring counties (Figure 11).

Figure 11. Referral Sources for TB Patients in Fresno County – 2017

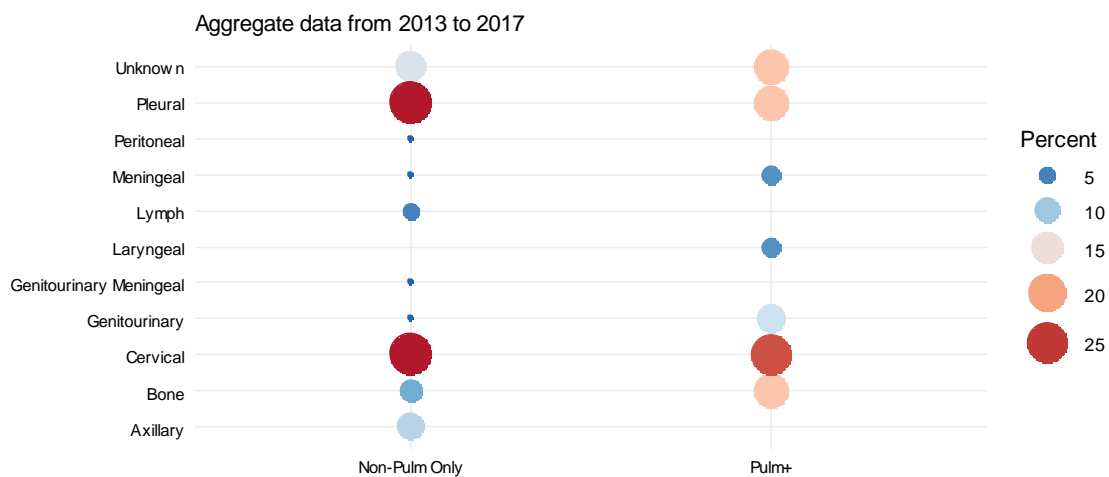


Pathology and Organism Characteristics in Fresno County

Infection Location

During 2017, 50 (80.6%) patients had lung involvement, of which 48 (77.4%) had lung involvement only (Data not shown). Pulmonary infection combined with infection in meningeal and cervical lymph nodes occurred in less than 15 patients (Data not shown). Extrapulmonary infections also occurred in less than 15 patients and were found in: bone, cervical, lymph, and pleural tissues. Figure 12 shows the distribution of extrapulmonary TB infections using aggregate data from 2013 to 2017.

Figure 12. Infection Location for Extrapulmonary TB in Fresno County – 2013-2017*

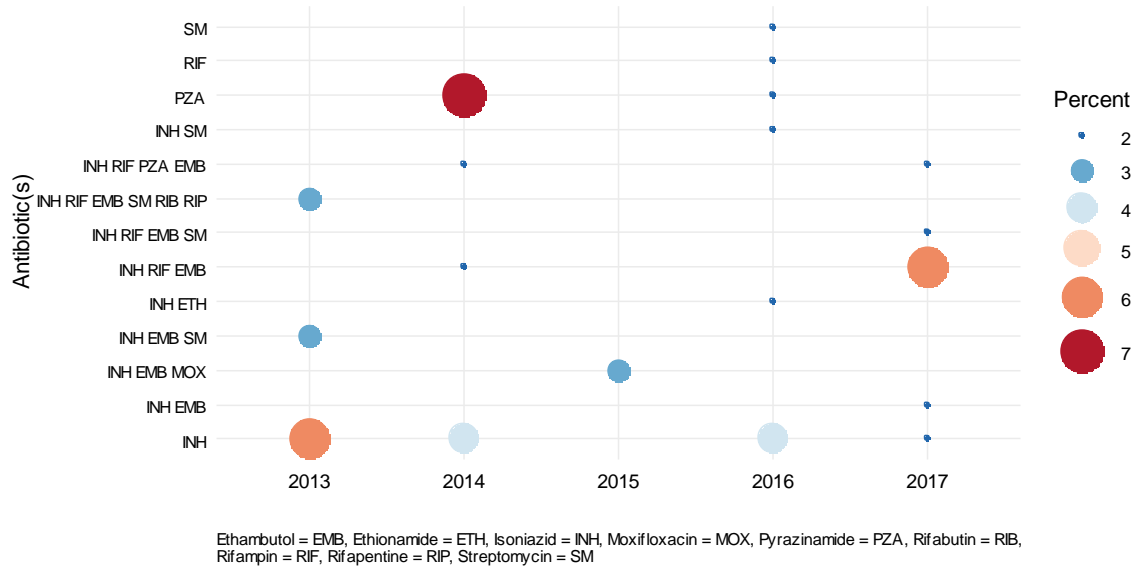


*Pulm+ infections occur in both the lung and other tissues, while Non-Pulm Only infections occur outside the lung.

Drug Resistance

Culture positive results were obtained from 49 (79.0%) of the 62 TB patients, and drug susceptibility results are available for all culture positive cases. Among culture positive cases, no drug resistance was observed in 42 cases (86%), while the remaining cases showed resistance to one or more antibiotics including: Isoniazid, Rifabutin, Ethambutol, Streptomycin, and Pyrazinamide. The initial drug resistance profile of TB cases from 2013-2017 is shown in Figure 13.

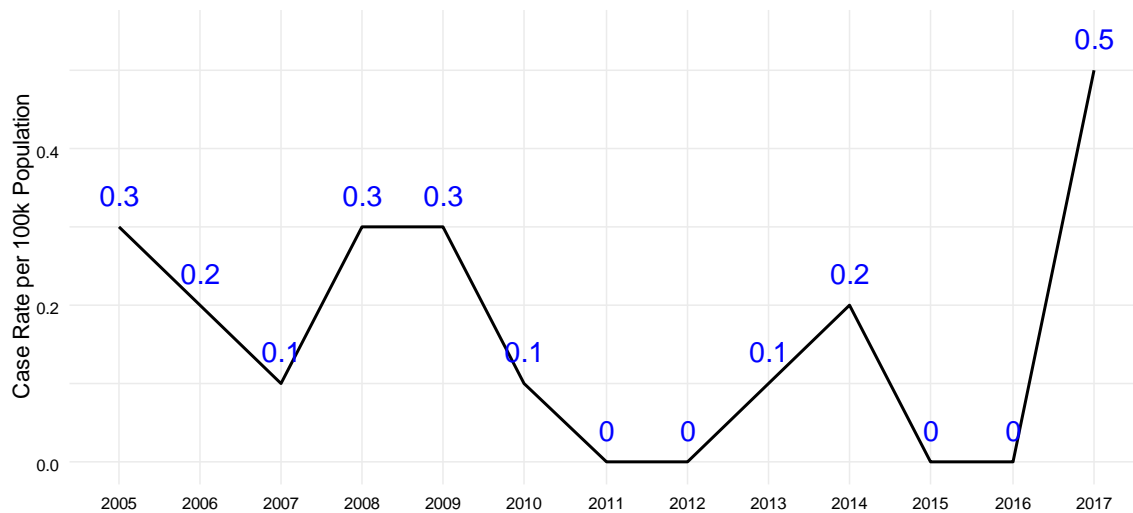
Figure 13. Initial Drug Resistance as a Percentage of All TB Cases by Year in Fresno County – 2013-2017



Multidrug-Resistant TB (MDR-TB)

Multidrug-resistant TB (MDR-TB) is resistant to the strongest two primary anti-tuberculosis medications (Isoniazid and Rifampin), and extensively drug resistant TB (XDR-TB) organisms are resistant to these medications plus at least two of the principal secondary medications. Patients with XDR-TB have few treatment options because the drugs most effective against TB are ineffective against their disease. In 2017, the rate for MDR-TB per 100,000 population was 0.5, the highest rate observed in recent years (Figure 14). There were no XDR-TB cases in Fresno County during 2017.

Figure 14. Rates of MDR-TB* in Fresno County – 2005-2017

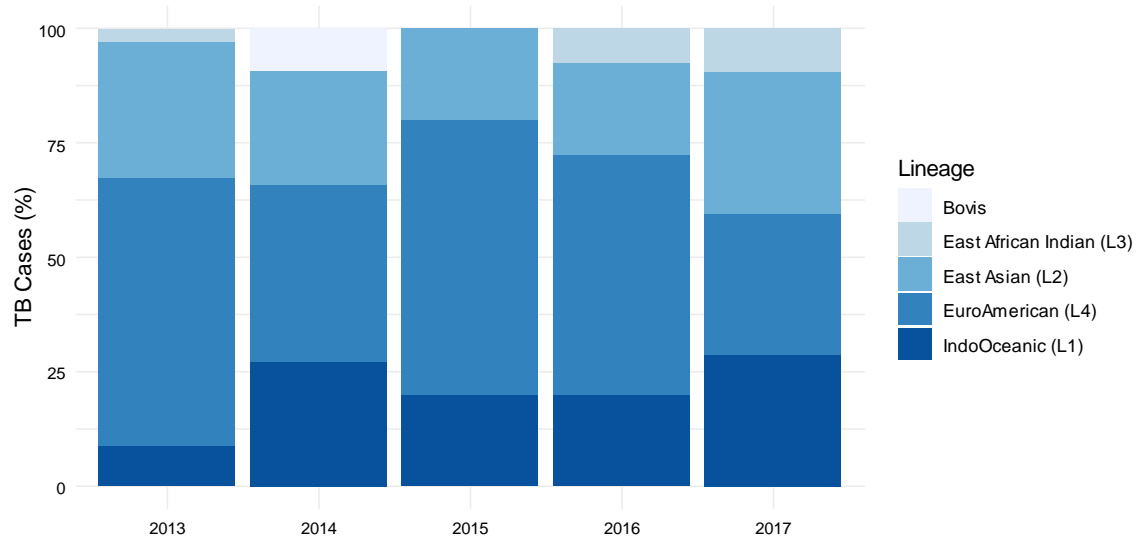


*Multidrug-resistant TB (MDR-TB) is resistant to the strongest two primary anti-tuberculosis medications (Isoniazid and Rifampin).

Genotype

The TB program can use genetic links between TB cases to investigate and stop common sources of transmission. Figure 15 shows the proportion of each lineage in TB cases sent for genotyping from 2013-2017. During 2017, 42 (67.7%) cases were genotyped and composed of five lineages: Bovis, East African Indian, East Asian, EuroAmerican, and IndoOceanic.

Figure 15. TB Lineage by Year in Fresno County – 2013-2017



Contributing Risk Factors and Comorbidities in Fresno County

Risk Factors

During 2017, 59 (95.2%) of the 62 TB cases had at least one or more underlying factor that increased risk for TB infection or progression of infection to disease whether it be occupational, social, or medical. The proportion of TB cases by risk factor and nativity from 2011 to 2017 is in Table 1.

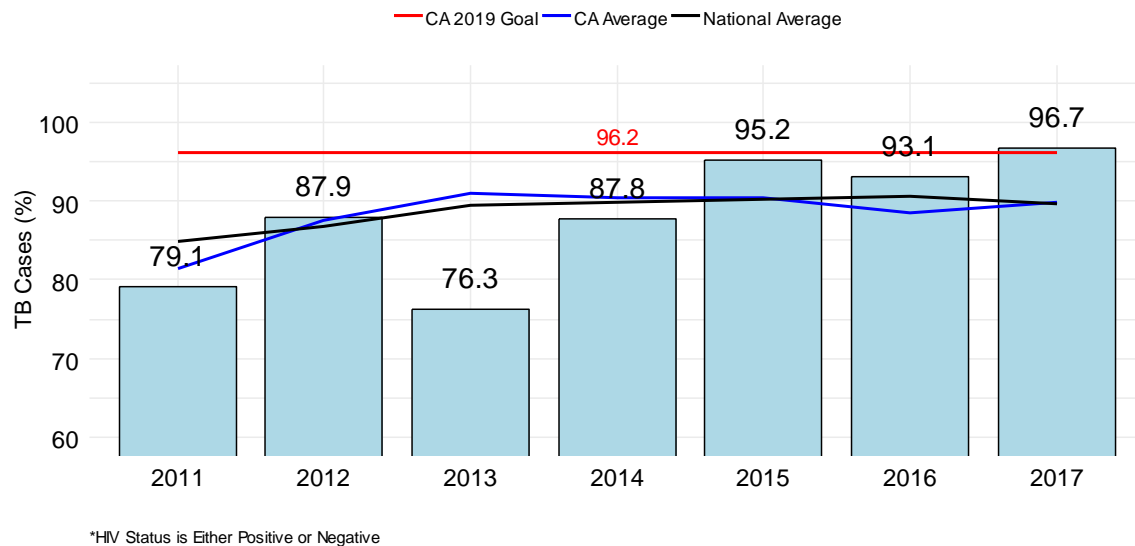
Table 1. Percent of TB Cases by Risk Factor and Nativity in Fresno County – 2011-2017

Risk Factor	Foreign Born %	US Born %
Alcohol Abuse	12.8	11.2
Correctional Facility Employee	0.4	0
Correctional Facility Resident	0.8	0
Diabetes	32.5	13.5
End Stage Renal Disease	2.1	2.2
Health Care Worker	0	0
HIV Positive	3.7	4.5
Homeless	4.9	9
Immunosuppression	2.9	1.1
Infectious Contact	2.5	27
Injection Drugs	0.4	2.2
Long Term Care Facility Resident	1.2	6.7
LTBI Incomplete Rx	2.9	3.4
MDR Contact	0	2.2
Migrant/Seasonal Worker	17.3	1.1
Missed Contact	0	0
Non-Injection Drugs	3.7	12.4
Post Organ Transplant	0.8	0
Previous TB Dx	2.5	4.5
TNF Antagonist Rx	0	0

HIV Testing

Of the 62 TB patients in 2017, 61 were eligible for HIV testing and of the eligible patients 59 (96.7%) completed testing (Figure 16)⁵. Cases of TB are excluded from testing when they are very young or very old and do not have risk factors for HIV.

Figure 16. Patients with Known *HIV Status in Fresno County – 2011-2017



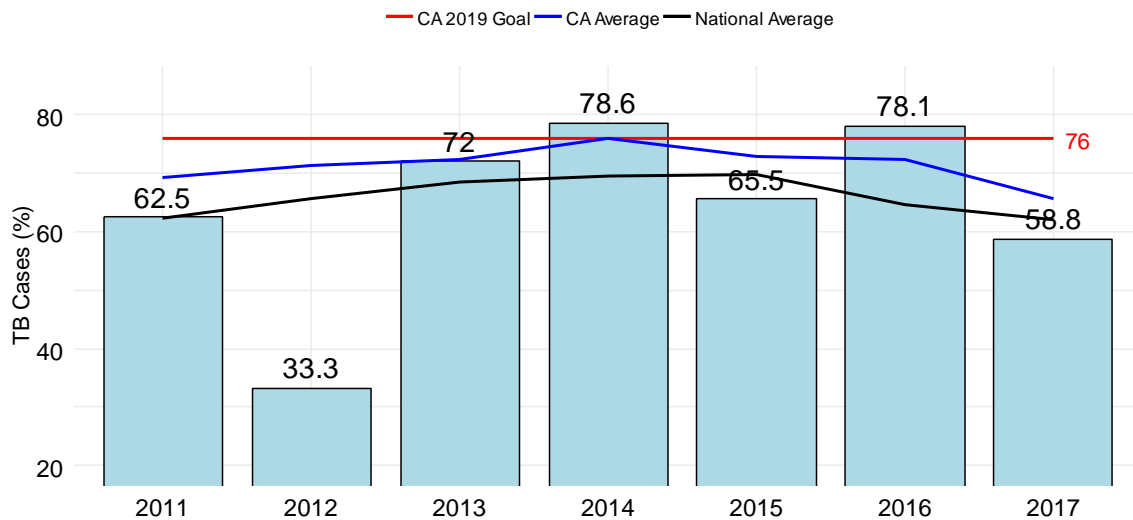
⁵ National Tuberculosis Indicators Project (NTIP) Division of Tuberculosis Elimination
National Center for HIV/AIDS, Viral Hepatitis, STD, and TB Prevention
Centers for Disease Control and Prevention, Atlanta, Georgia, USA 30329

Treatment Outcomes in Fresno County

Sputum Culture Conversion

Of the 62 cases of TB in Fresno County during 2017, 34 had positive sputum culture results at the time of treatment initiation. After 60 days of treatment, 20 (58.8%) patients had sputum-culture negative results indicating they were no longer contagious for TB (Figure 17)⁶.

Figure 17. Sputum Culture Conversion Within 60 Days in Fresno County – 2011-2017

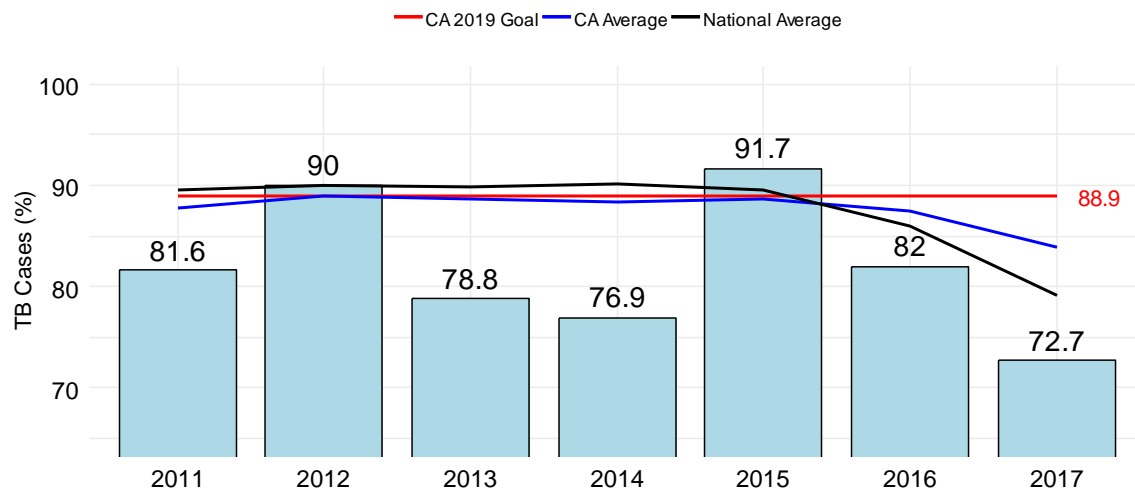


⁶ National Tuberculosis Indicators Project (NTIP) Division of Tuberculosis Elimination
National Center for HIV/AIDS, Viral Hepatitis, STD, and TB Prevention
Centers for Disease Control and Prevention, Atlanta, Georgia, USA 30329

Active TB Treatment Completion

Out of the 62 TB patients, 53 (85.4%) were eligible to complete treatment. Patients became ineligible to complete therapy if they died before treatment completion, had to stop treatment due to medication side effects, or moved outside Fresno County. As of the publication of this report, 40 (75.5%) of the eligible patients have finished treatment and 13 (24.5%) have not. During 2017, 44 (71%) of the 62 TB patients were eligible to complete their treatment within a 12 month period as defined by CDC criteria from the National Tuberculosis Indicators Project (NTIP)⁷. Examples of ineligible patients include those with rifampin-resistant TB, meningeal TB, TB in the skeletal system, TB in the central nervous system, and children less than 15 years old with disseminated TB. Patients who moved out of the U.S within 366 days of initiating treatment are also ineligible to complete treatment within 12 months. Of those 44 patients, 32 (72.7%) completed their treatment within the 12 month period (Figure 18)⁷. The remaining 12 (27.3%) TB patients: completed treatment after 12 months 7 (5.9%), 4 (9.1%) refused therapy, and 1 (2.3%) had an adverse treatment event. Despite being eligible to complete TB treatment within 12 months per criteria established by the CDC⁷, 5 of those who finished treatment after 12 months had disease that was difficult to treat due to miliary TB, disseminated TB, and Rifampin intolerance. Delays or intermittent interruptions in treatment can result from factors such as: MDR-TB, patient non-compliance, underlying health conditions, and adverse effects of medication.

Figure 18. TB Patients Completing Treatment within 12 Months* in Fresno County – 2011-2017



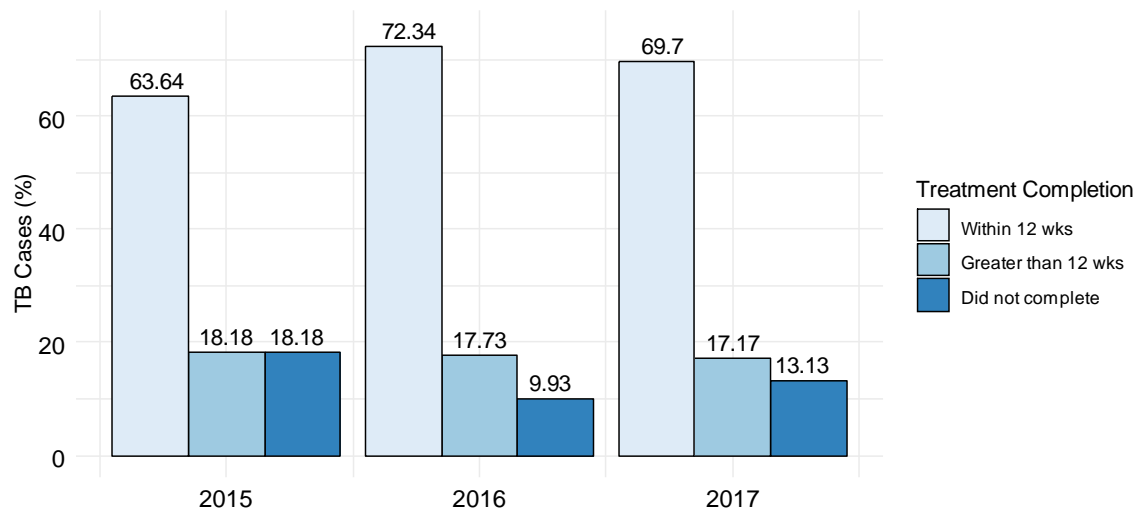
*For patients with TB in which 12 months or less of treatment was indicated per NTIP criteria.

⁷ National Tuberculosis Indicators Project (NTIP) Division of Tuberculosis Elimination
National Center for HIV/AIDS, Viral Hepatitis, STD, and TB Prevention
Centers for Disease Control and Prevention, Atlanta, Georgia, USA 30329

Latent Tuberculosis (LTBI) Treatment

Someone with latent tuberculosis (LTBI) has a TB infection, but their immune system suppresses the TB bacteria so they are asymptomatic. Without treatment, those with LTBI are at risk for developing active TB in the future. In California, about 80% of active TB case result from patients with untreated LTBI⁸. Once-weekly isoniazid-rifapentine for 12 weeks (3HP) is a common therapy for LTBI used by the Fresno County TB Program. In 2017, 108 patients began 3HP treatment, but only 99 were eligible to finish treatment. Patients became ineligible to continue 3HP treatment if they were switched to an alternative TB therapy or completed therapy through another medical provider. Of those eligible LTBI cases, 86 (86.9%) completed 3HP therapy and 69 (69.7%) completed therapy within 12 weeks (Figure 19). Patients receive other LTBI therapy when 3HP is not recommended or they do not tolerate 3HP treatment well.

Figure 19. LTBI Patients with 3HP* Treatment Completion in Fresno County – 2015-2017



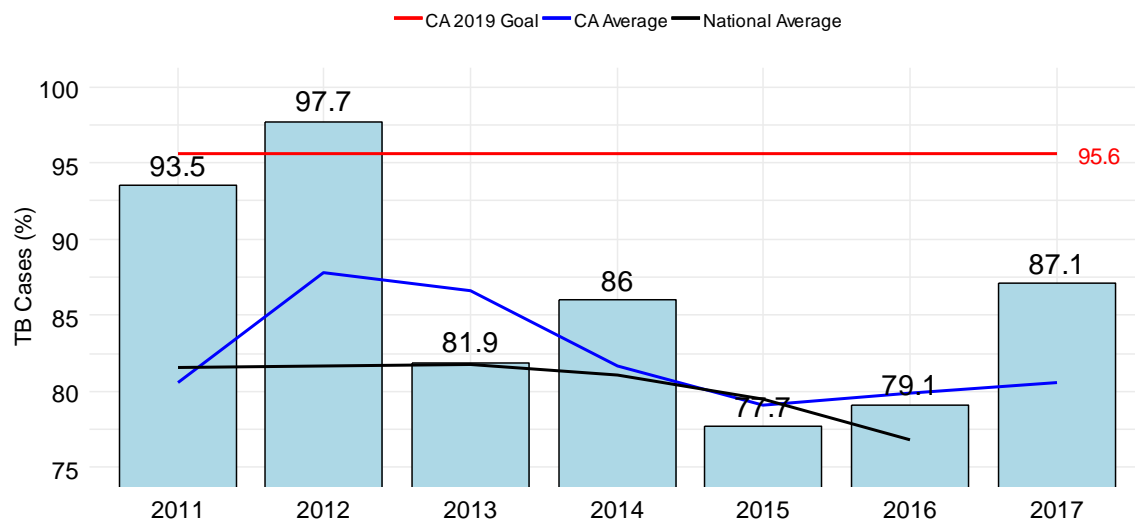
*3HP treatment consists of a once weekly dose of Isoniazid and Rifapentine for 12 weeks.

⁸ Tuberculosis Control Branch, Report on Tuberculosis in California, 2017. California Department of Public Health, Richmond, CA. August 2018.

Contact Investigation in Fresno County

During 2017, 24 (38.7%) of the 62 TB cases were AFB smear-positive and 100% of these cases had contacts elicited for investigation. Out of the 675 AFB smear-positive contacts elicited, 588 (87.1%) of these contacts were examined for TB infection (Figure 20)⁹. Out of those examined in 2017, 81 (13.8%) were discovered to have LTBI infection and 56 (69.1%) of these patients began treatment (Figure 21)⁹. Treatment completion for the AFB Smear+ contacts with LTBI is available for years prior to 2017 (Figure 22)⁹.

Figure 20. Contacts to AFB Smear+ Cases Examined for TB in Fresno County – 2011-2017



⁹ National Tuberculosis Indicators Project (NTIP) Division of Tuberculosis Elimination
National Center for HIV/AIDS, Viral Hepatitis, STD, and TB Prevention
Centers for Disease Control and Prevention, Atlanta, Georgia, USA 30329

Figure 21. AFB Smear+ Contacts Who Started LTBI Treatment in Fresno County – 2011-2017

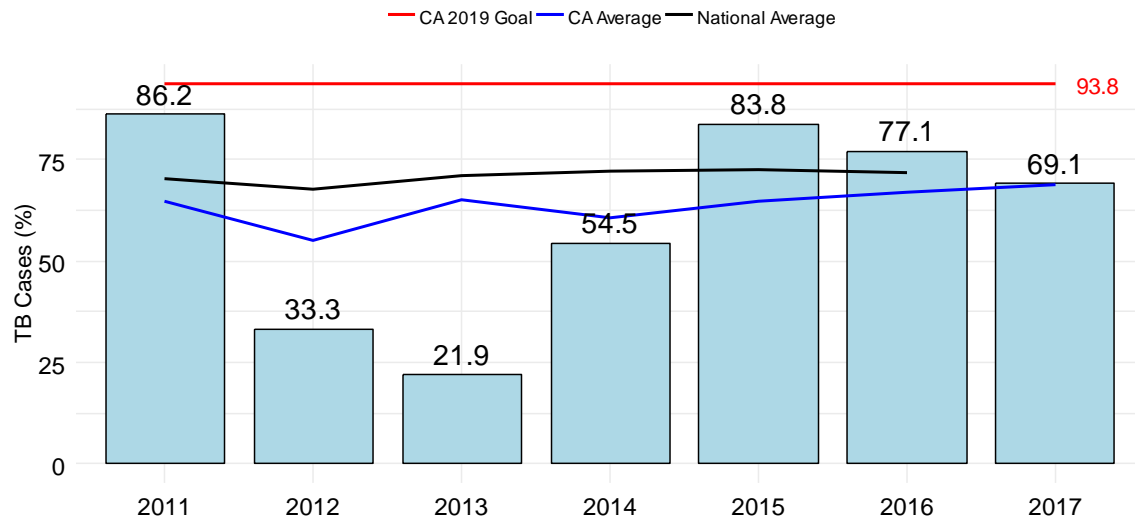
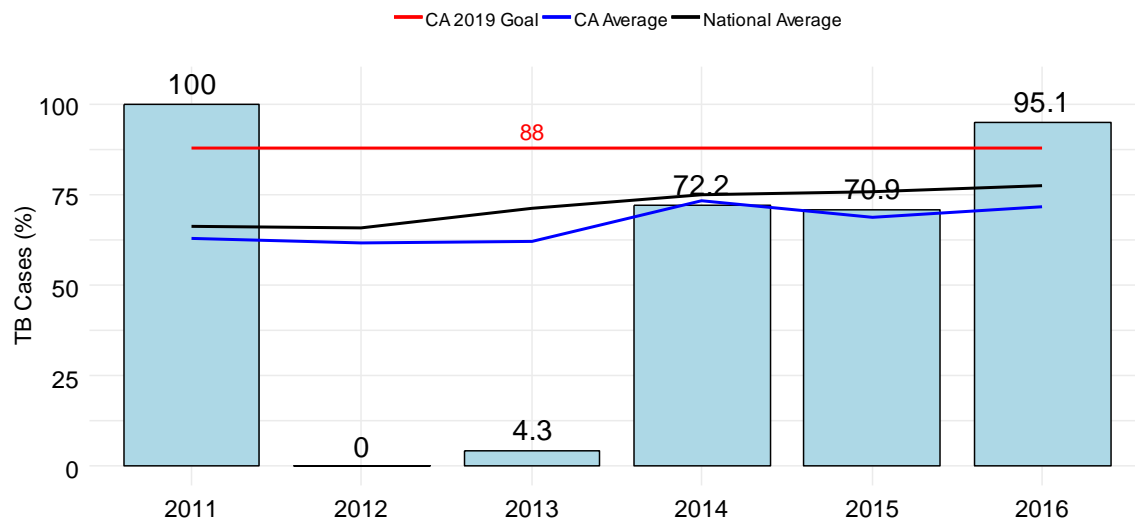


Figure 22. AFB Smear+ Contacts Who Completed LTBI Treatment in Fresno County – 2011-2016



Public Health Strategies to Control, Prevent, and Eliminate Tuberculosis

In 2017, the Fresno County Health Department's TB Control Program provided treatment, contact investigation, and follow-up for all the 62 newly diagnosed active TB cases. The TB program staff continued to simultaneously provide care for patients diagnosed prior to 2017 who had not yet completed treatment (standard treatment regimens are 6-12 months; drug resistant TB patients may be treated for two years and all treated require at least monthly visits). To ensure TB medication is taken correctly, department staff visit pulmonary TB patients daily to observe them take their medications; this is also known as Direct Observed Therapy (DOT).

Strategies to Control, Prevent, and Eliminate Tuberculosis Include:

- 1- Finding and adequately treating people that have active disease.
- 2- Identifying individuals who have been exposed to someone with TB disease, evaluating them for LTBI or active TB disease, and treating them if they have either of these.
- 3- Screening individuals for TB infection that are known to be at higher risk for infection with TB or at higher risk for developing TB disease if infected.
- 4- Applying control measures in high risk settings.

The Fresno County Health Department (FCDPH) Chest Clinic Program identifies and treats TB disease, identifies and evaluates exposures to TB and offers treatment if needed, screens certain high risk populations, and assists the public with the application of control measures in high risk environments. Title 17 of California Code of Regulations requires that notification be given to the county health department of all diagnosed or suspected cases of tuberculosis by telephone or fax within one working day of identification. California Health and Safety Code 121362 also require that providers treating people with active TB report to the local health officer any pertinent information the health officer requests.

Additional Information Available

If you have any questions regarding TB infection, the disease, or the control of TB in Fresno County please contact our Community Liaison Nurse at 559-600-3413.

References

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National Tuberculosis Indicators Project (NTIP) Division of Tuberculosis Elimination
National Center for HIV/AIDS, Viral Hepatitis, STD, and TB Prevention
Centers for Disease Control and Prevention, Atlanta, Georgia, USA 30329

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