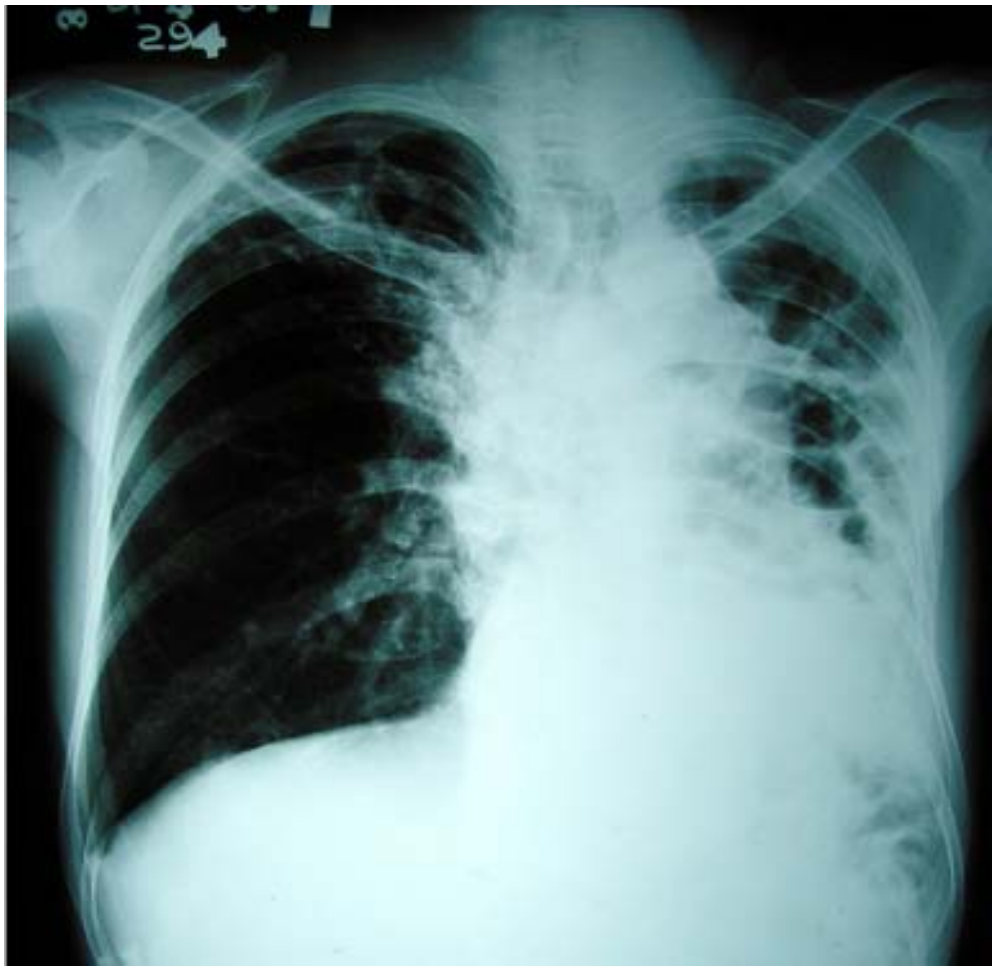
2008 Tuberculosis Report



County of Sacramento

Department of Health and Human Services
Division of Public Health

Table of Contents

Table of Contents

Introduction

Introduction

Tuberculosis (TB) is an airborne disease caused by a group of bacteria referred to as the Mycobacterium tuberculosis (MTB) complex. The five species in this complex are M. tuberculosis, M. bovis, M. africanum, M. canettii, and M. microti. General symptoms may include a prolonged productive cough, blood-tinged sputum, night sweats, fever, fatigue, and weight loss. TB affects several sites most commonly the lungs, but can also affect other parts of the body like the brain, kidneys, or spine. TB bacteria are aerosolized into respiratory droplet nuclei when a person who has TB of the lungs or larynx coughs, sneezes, laughs, or sings. Subsequently, another person inhales the droplet nuclei that are formed. Individuals who become infected but do not become ill are considered to have latent TB infection (LTBI) and cannot transmit the infection to others. LTBI is evidenced by a positive tuberculin skin test (TST) or a positive blood test using T-cell Inteferon-gamma Release Assay (TIGRA) testing and without evidence of disease after evaluation. Approximately 10% of infected individuals will progress to active disease at some point in their lives. During 2006, there were 97 new cases of TB reported to the County of Sacramento, Division of Public Health. Globally, anti-TB chemotherapy has made a significant impact on lowering the rate of active TB and deaths due to TB. However, many challenges still remain, including the increase in drug resistance.

Purpose

The purpose of this report is to provide the community with an overview and enhanced understanding of TB in Sacramento County including trends, racial disparities, multi-drug resistance, TB among foreign born residents, outbreaks, and the distribution of TB cases.

Report of Verified Cases of TB

In 1993, the Centers for Disease Control and Prevention (CDC), in conjunction with state and local health departments, began using the expanded Report of Verified Case of Tuberculosis (RVCT) to collect information on each case of TB. A TB case is defined as active disease, not old infections or LTBI. In addition to the demographic and clinical features of TB that were previously collected, the RVCT includes information on drug resistance, risk factors for TB, and treatment outcomes. In 1998, CDC implemented the Tuberculosis Information Management System (TIMS) for data entry and transmission of case reports.

Acknowledgments

The Division of Public Health acknowledges Chest Clinic staff for their efforts in tuberculosis (TB) control and patient management. We also acknowledge staff at the State Department of Public Health, Tuberculosis Control Branch (TBCB) for their assistance and guidance in outbreak management.

For comments or questions contact:

County of Sacramento
Epidemiology Services
Division of Public Health
Department of Health and Human Services
7001-A East Parkway
Sacramento CA 95823
(916) 875-5881

Executive Summary

Executive Summary

This report summarizes recent TB data from the Tuberculosis Information Management System for the County of Sacramento.

Case Counts and Rates

- During 2006, there were 97 cases of tuberculosis reported in the County of Sacramento. In 2005, the incidence rate was 10.2 per 100,000 population compare to 6.8 per 100,000 in 2006.
- Of the 397 TB cases diagnosed from 2004-2006, 86.6% (344) were diagnosed with pulmonary TB. Thirty-six percent of those cases were smear positive, thus posing a greater risk of disease transmission.
- For the past ten years, statewide incidence rates for TB have steadily declined, whereas rates in the County of Sacramento have fluctuated due to sporadic local outbreaks among different race/ethnic groups and homeless persons.
- Foreign-born persons and racial/ethnic minority populations continue to be affected disproportionately by TB statewide as well as locally.
- The proportion of cases occurring in children less than 15 years of age continues to decline with only 1% of cases in 2006 less than 15 years compared to 4.8% statewide.

Racial Disparities

- The TB rates among Asians, African Americans, and Hispanics, in 2006, were 16.6, 5.1, and 3.8 times higher than rates among Caucasians, respectively. Asians accounted for 56.7% of cases in 2006.

Burden in Foreign-born

- In 2006, the number of TB cases among foreign-born persons in Sacramento County was 2.6 times higher than that of U.S.-born persons.
- From 2004-2006, 74.7% of TB cases among foreign-born persons occurred in persons from five countries: Laos/Thailand (59), Philippines (49), Vietnam (40), Mexico (39), and India (23).

Drug Resistance

- From 2002-2006, 10 TB cases were multi-drug resistant. All MDR cases were foreign born.
- From 2002-2006, for those cases who had susceptibility testing done, 9.2% were resistant to isoniazid, compared to 10.4% statewide

Executive Summary

Technical Notes

TB Cases

TB cases submitted to the TBCB Registry by January 15, 2007, were counted as cases in 2006. After reporting a case, the final disposition of that case may change and we may decide that a reported case did not have active TB. This case will be deleted from the TB database. Therefore, data is provisional since the total number of TB cases counted in a given year may change, although usually by a very small number of cases. This report incorporates any subsequent changes in the number of cases. In their annual report, the TBCB uses the original number of reported cases, not the revised; therefore the numbers in this report may differ slightly from those reported by TBCB.

Population

Population totals and data by age, sex and race/ethnic group are from the State of California, Department of Finance, Race/Ethnic Population with Age and Sex Detail, 2000–2050. Sacramento, CA, May 2007.

Small Case Numbers

There are different methods for reporting the rates of rare events, we have chosen not to report rates when the total number of TB cases is less than twenty.

Race/Ethnicity

The RVCT has one variable for race and one for ethnicity. If a case is classified as “Hispanic” on the RVCT, then the case is reported as “Hispanic” in this report, regardless of race.

Beginning in 2003, the federal Office of Management and Budget (OMB) reporting mandates required separate reporting of Asian and Pacific Islander/Native Hawaiian races, as well as the opportunity for persons to identify themselves by one or more racial groups. In tables where data on race/ethnicity are presented these persons are combined in the Asian/Pacific Islander race/ethnic group, in order to provide comparability to previous years’ data. No persons reported more than one race category

Drug Resistance

Multi-drug resistance is defined as resistance to both isoniazid and rifampin. Poly-drug resistance is defined as resistance to more than one first line drug, but not resistant to both isoniazid and rifampin. Mono-drug resistance is defined as resistance to one first line drug.

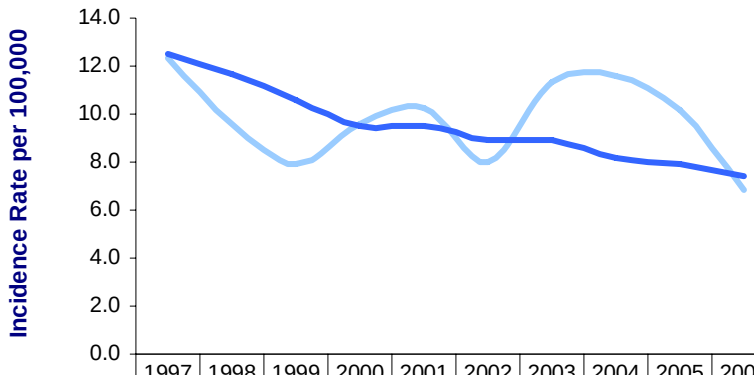
Tuberculosis in Sacramento

TB Incidence

Figure 1 compares incidence rates for the County of Sacramento with statewide incidence rates for the past ten years. While statewide incidence rates have steadily declined, rates for the County of Sacramento have fluctuated due to sporadic local outbreaks and changes in immigration patterns. National, statewide, and local incidence rates declined in 2006. Figure 2 shows the number of cases for the County of Sacramento by year.

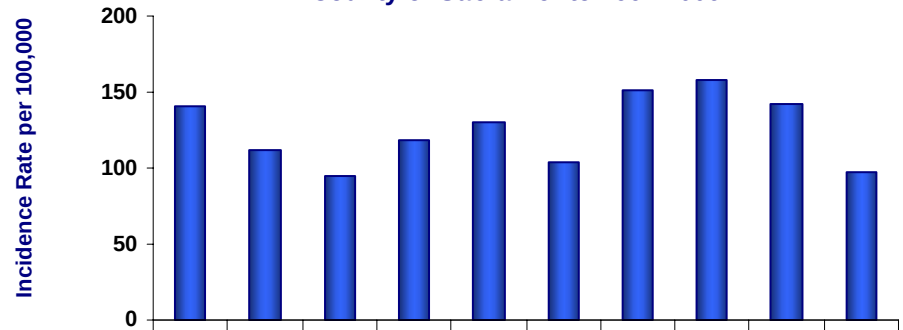
Of the 97 cases reported in 2006, 75 (77.3%) were culture confirmed, one case was smear positive only, and 21 (21.6%) were verified as clinical or provider diagnosed cases. Pulmonary tuberculosis accounted for 82 (84.5%) of cases. Sputum specimens were collect on 81 of the pulmonary tuberculosis patients, with 61 (75.3%) being culture positive, 40 (49.4%) smear positive and 38 (46.9%) both smear and culture positive.

Figure 1. Tuberculosis Incidence Rates
County of Sacramento Vs California, 1997-2006



	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006
Sacramento	12.3	9.6	7.9	9.6	10.2	8.0	11.3	11.6	10.2	6.8
California	12.5	11.7	10.6	9.5	9.5	8.9	8.9	8.2	7.9	7.4

Figure 2. Tuberculosis Cases by Year
County of Sacramento 1997-2006



	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006
TB Cases	141	112	95	118	130	104	151	158	142	97

Tuberculosis by Age Group

Age

From 2002 to 2006, there were 652 TB cases in the County of Sacramento. The greatest proportion of TB cases occurred in individuals aged 45-64 years (36.6%) (Figure 3).

Table 1 shows the average incidence rate per 100,000 by age group from 2002 to 2006. Although the 45-64 year old age group comprise the greatest proportion of TB cases (Figure 4), the highest incidence rate was among individuals 65 years and older.

Table 1. Average Incidence Rate of TB by Age Group, County of Sacramento 2002-2006

Age Group	Rate per 100,000
0-4	4.1
5-14	2.9
15-24	6.5
25-44	9.2
45-64	13.7
65+	18.9

Figure 3. Proportion of Tuberculosis Cases by Age Group County of Sacramento 2002-2006

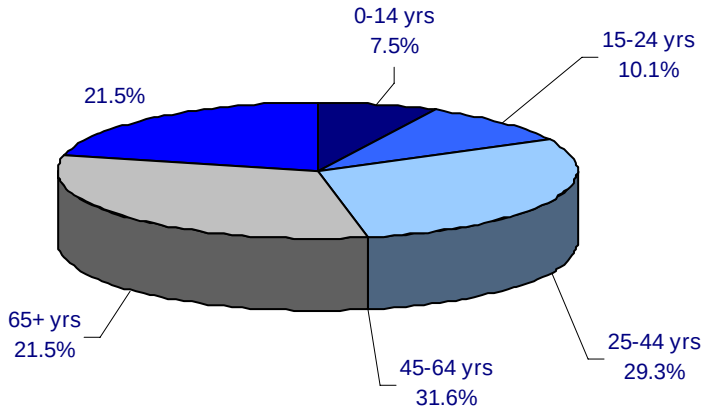
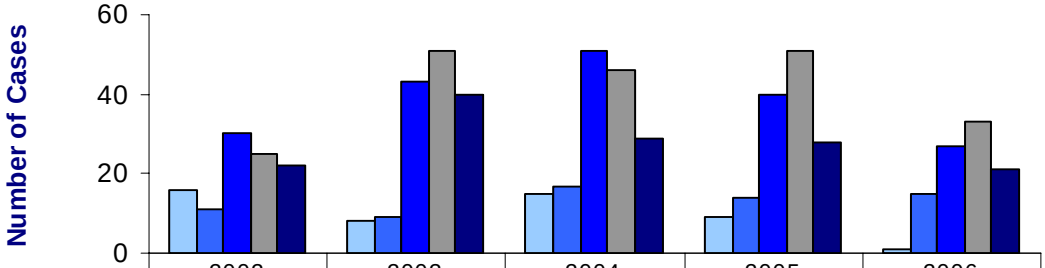


Figure 4. Tuberculosis Cases by Age Group County of Sacramento 2002-2006



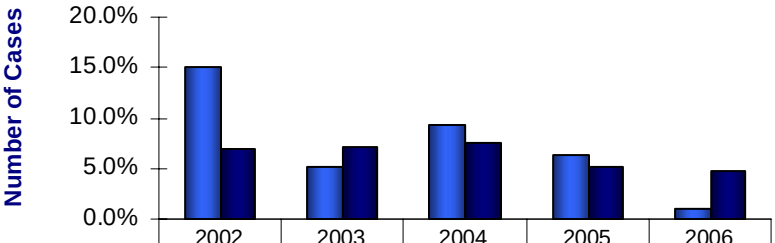
	2002	2003	2004	2005	2006
0-14	16	8	15	9	1
15-24	11	9	17	14	15
25-44	30	43	51	40	27
45-64	25	51	46	51	33
65+	22	40	29	28	21

TB Among Children & TB by Gender

TB Among Children

Since 2002, the proportion of cases occurring in children less than 15 has fluctuated, most likely due to local outbreaks and changes in immigration patters (Figure 5). However, consistent with statewide trends, since 2004 there has been a continuous downward trend in cases occurring in this age group.

Figure 5. Proportion of Tuberculosis Cases Among Children Less Than 15 years of Age County of Sacramento Vs. California, 2002-2006

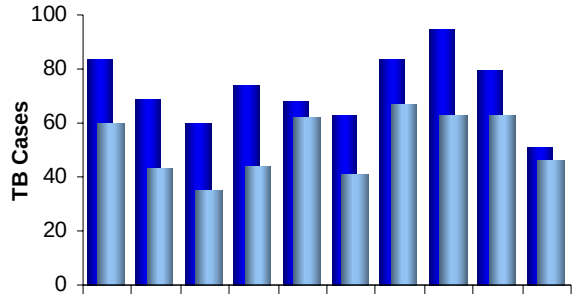


	2002	2003	2004	2005	2006
Sacramento	15.0%	5.2%	9.4%	6.3%	1.0%
California	7.0%	7.2%	7.5%	5.2%	4.8%

Gender

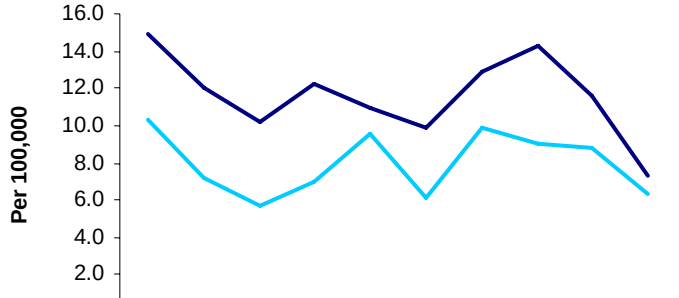
Figure 6 shows the number of TB cases by gender from 1997-2006. Typically, males have a higher incidence of TB than females. It appears the incidence rate among males and females in the County of Sacramento is becoming similar. (Figure 7). However, gender aspects of TB has been a neglected research area, more data is needed.

Figure 6. Tuberculosis Cases by Gender, County of Sacramento 1997-2006



	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006
Male	84	69	60	74	68	63	84	95	79	51
Female	60	43	35	44	62	41	67	63	63	46

Figure 7. TB Incidence Rates by Gender County of Sacramento 1997-2006



	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006
Male	14.9	12.0	10.2	12.3	11.0	9.9	12.9	14.2	11.6	7.3
Female	10.3	7.2	5.7	7.0	9.6	6.2	9.9	9.1	8.9	6.3

Tuberculosis by Race/Ethnicity

Race/Ethnicity

In 2006, Asian/Pacific Islanders made up the highest proportion (56.7%) of TB cases in the County of Sacramento (Figure 8), followed by Hispanics (18.6%), African Americans (13.4%) and Caucasians (11.3%).

While incidence rates among all ethnic groups have declined, the rates among Asians, African Americans, and Hispanics are 16.6, 5.1, and 3.8 times higher than their Caucasian counterparts (Figure 9).

Figure 8. Proportion of Tuberculosis Cases by Race/Ethnicity
County of Sacramento, 2006

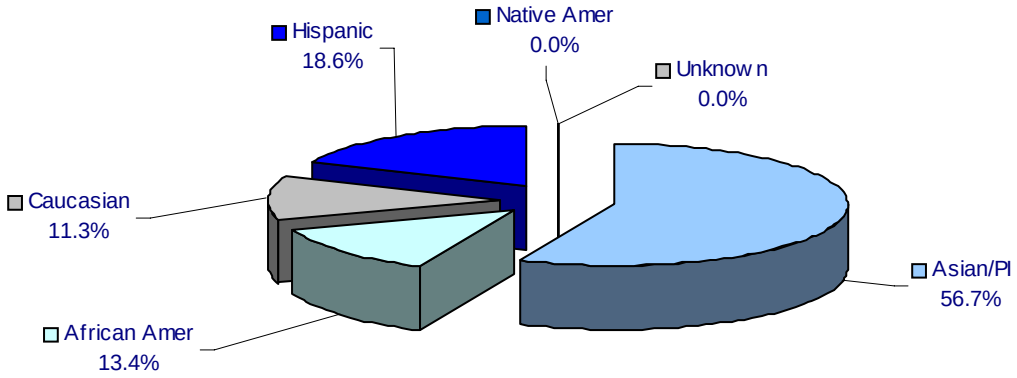
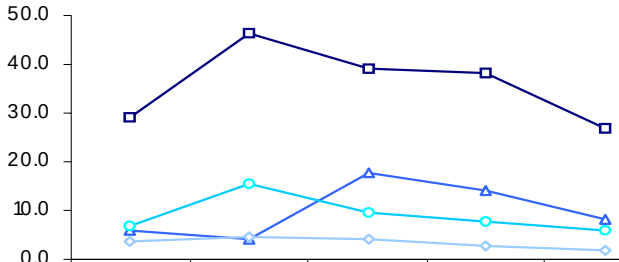


Figure 9. TB Incidence Rates by Race /Ethnicity
County of Sacramento 2002-2006



	2002	2003	2004	2005	2006
Asian/PI	29.2	46.5	39.0	38.0	26.6
African Amer	5.9	3.9	17.6	14.3	8.1
Caucasian	3.6	4.4	4.1	2.9	16
Hispanic	6.8	15.5	9.6	7.8	6.1

Note: For 2002 African Americans and Hisppanics had less than 20 cases. For 2003, African Americans had less than 20 cases. For 2006, African Americans, Caucasians, and Hispanics had less 20 cases. As a result, these rates may not be reliable.

Tuberculosis: US-Born Cases

US-Born

In 1993, 38.4% of TB cases in the County of Sacramento occurred in U.S. -born persons compared to 26.8% in 2006. The greatest proportion of cases among U.S.-born persons from 2004-2006 occurred in individuals who were African American or Caucasian (46.2% and 35.0% respectively) (Figure 10). Table 2 shows the number of U.S.-born cases by race/ethnicity, sex, and age group in Sacramento from 2002-2006.

Figure 10. Proportion of U.S.-Born Tuberculosis Cases by Race/Ethnicity County of Sacramento, 2004-2006

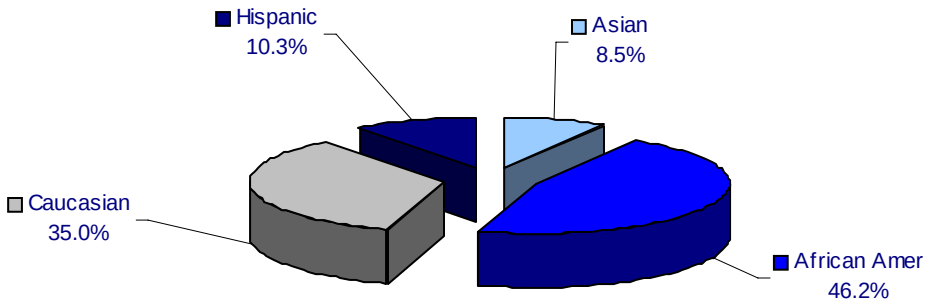


Table 2. Tuberculosis Cases in US Born Persons by Race/Ethnicity, Sex, and Age Group, County of Sacramento 2002-2006

Total	2002 n=24	2003 n=36	2004 n=44	2005 n=47	2006 n=26	Total n=178
Gender						
Male	18	27	27	31	13	116
Female	6	9	17	17	13	62
Race/Ethnicity						
Asian	5	4	5	2	3	19
African American	5	7	19	20	13	64
Caucasian	11	19	16	18	7	71
Hispanic	3	6	3	6	3	21
Age Group						
0-4	4	2	1	4	0	11
5-14	4	0	5	3	0	12
15-24	1	2	2	3	5	13
25-44	5	6	13	10	6	41
45-64	6	20	17	22	11	78
65+	4	6	5	4	4	23

Tuberculosis: Foreign-Born Cases

Foreign-Born

The proportion of TB cases that occurred in foreign-born persons increased statewide and locally. In 1993, 62.8% of cases statewide were foreign-born compared to 76.8% in 2006. In the County of Sacramento 61.6% of cases in 1993 were foreign-born compared to 72.2% in 2006, a 17.2% increase.

Among foreign-born TB cases from 2004-2006, Asians accounted for 71.1% of cases (Figure 7). Table 3 shows foreign-born cases by race/ethnicity, sex, and age group in Sacramento from 2004-2006.

Figure 11. Proportion of Foreign-Born Tuberculosis Cases by Race/Ethnicity Sacramento County, 2004-2006

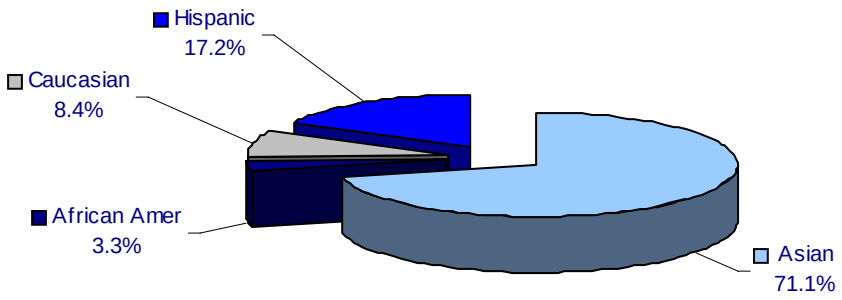


Table 3. Tuberculosis Cases in Foreign-Born Persons by Race/ Ethicity, Gender, and Age Group, County of Sacramento 2002-2006

Total	2002 n=75	2003 n=110	2004 n=111	2005 n=92	2006 n=70	Total n=458
Gender						
Male	42	54	65	46	37	244
Female	33	56	46	46	33	214
Race/Ethnicity						
Asian	45	80	70	72	52	319
African American	3	3	7	2	0	15
Caucasian	14	11	13	2	4	44
Hispanic	12	16	21	6	4	59
Age Group						
0-4	4	0	5	0	0	9
5-14	3	6	4	2	1	16
15-24	9	7	15	11	10	52
25-44	25	35	35	29	21	145
45-64	19	31	28	27	21	126
65+	15	31	24	23	17	110

Tuberculosis: Foreign-Born Cases

Foreign-Born

From 2004-2006, the top five countries of origin of foreign-born persons with TB were Laos/ Thailand, Philippines, Vietnam, Mexico, and India (Figure 12). The average number of foreign-born TB cases who have been in the U.S. for less than one year increased 38.0% from 2004-2006 when compared to the average number of foreign-born cases from 2001-2003 (Figure 13) Table 5 shows the number of years in the U.S. at the time of diagnosis for foreign-born persons with TB. by selected countries of origin.

Figure 12. Proportion of Foreign Born TB Cases by Selected Country of Origin County of Sacramento, 2004-2006

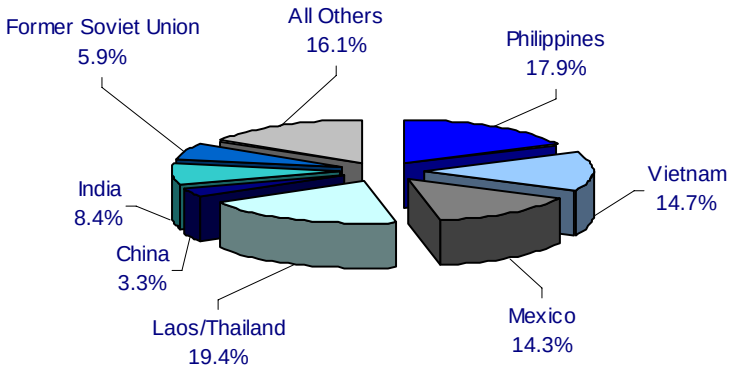
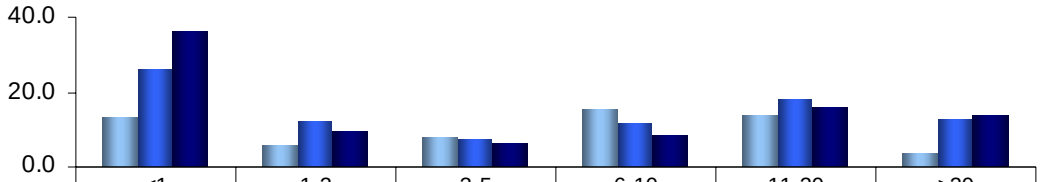


Table 4. Tuberculosis Among Foreign Born Cases by Number of Years in the U.S. and Selected Country of Origin, County of Sacramento 2004-2006

Total	Total n=273	<1 n=109	1-2 n=29	3-5 n=20	6-10 n=25	11-20 n=48	>20 n=42
Laos/Thailand	53	20	0	1	3	15	14
Philippines	49	23	4	5	3	7	7
Vietnam	40	19	2	1	3	7	8
Mexio	39	13	10	7	4	3	2
India	23	8	4	1	5	4	1
Former Soviet Union	13	8	3	0	2	0	0
China	9	3	0	0	1	2	3
All Others	47	15	6	5	4	10	7

Figure 13. Tuberculosis Among Foreign Born by Number of Years in the U.S. Three Year Average, County of Sacramento, 1998-2006



	<1	1-2	3-5	6-10	11-20	>20
Aver 1998-2000	13.3	6.0	8.0	15.7	14.0	4.0
Aver 2001-2003	26.3	12.3	7.3	11.7	18.0	13.0
Aver 2004-2006	36.3	9.7	6.7	8.3	16.0	14.0

Tuberculosis Outbreak

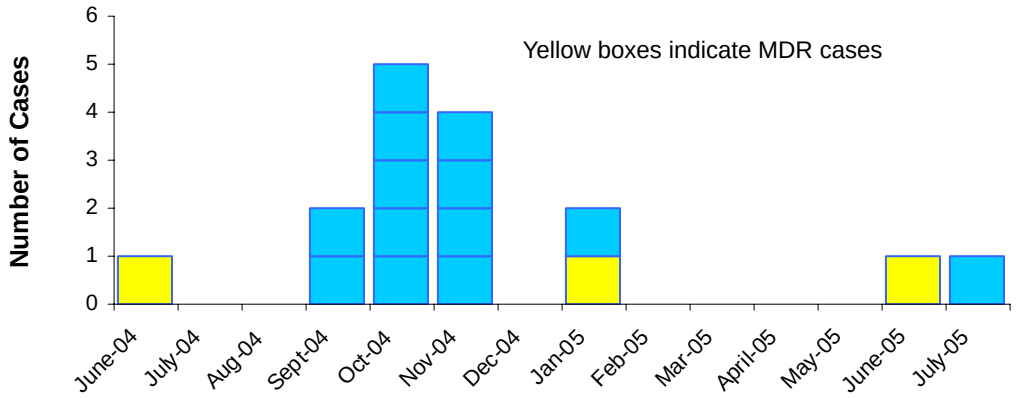
Outbreak of Tuberculosis in Newly Arrived Hmong Refugees

From June 2004 through January 2005, the U.S. Department of State resettled over 9,000 Hmong refugees from Wat Tham Krabok (WTK), a refugee camp in central Thailand, into the United States. About one-third, or 3,106, of the refugees were resettled in California, including 938 in the County of Sacramento. By July 2005, 16 newly arrived Hmong refugees in the County of Sacramento had been diagnosed with tuberculosis (Figure 14). All cases were diagnosed within a month of their arrival in the United States. Of the 16 cases, five were culture positive. Three of those cases were multi-drug resistant. The peak number of cases occurred from September-December, 2004. Ages for all cases ranged from 4-72 years of age (Table 5). There was no evidence of transmission in the U.S. from these cases.

Table 5. Tuberculosis Cases Among Hmong Refugees by Sex and Age Group County of Sacramento, 2004-2005

Total	**0-4** n=1	**5-14** n=3	**15-24** n=2	**25-44** n=3	**45-64** n=3	**65+** n=4	**Total** n=16
Male	0	1	1	2	0	3	7
Female	1	2	1	1	3	1	9

Figure 14. Epidemic Curve of Hmong Refugee Cases County of Sacramento 2004-2005



Tuberculosis Outbreak

Cluster of Tuberculosis among Mien Refugee

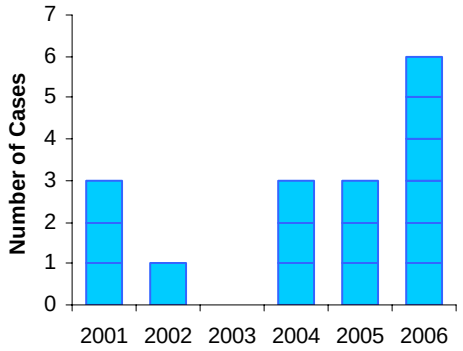
The Mien (Iu Mien) ethnic group is native to Laos, Thailand, and Vietnam. Mien arrivals in the United States peaked in the 1980s as a large group of Mien, who had been relocated to Thai camps in the aftermath of the Indochina Wars, were assigned refugee status and re-settled to the U.S. along with Hmong refugees in similar circumstances. Mien population data are not available, but an estimated 12,000 Mien currently live in the County of Sacramento. While there are some cultural similarities to the Hmong, the Mien are a distinct group, and speak a different language (Iu Mien).

In March 2006, a cluster of 11 tuberculosis cases was identified in Mien communities in Sacramento, starting in 2001. Further investigation identified five more cases for a total of 16 cases in 15 persons (one case had two episodes of TB, with diagnosis dates between January 2001 and December 2006 (Figure 15). Of the 16 cases 12 were culture positive with seven isolates available for genotyping. All seven isolates had matching genotype data. Cases ranged in age from 15-79 years (Table 6). Three cases were U.S. born; the remaining cases were born in Laos or Thailand. Of the foreign born cases, the average length of stay in the U.S. ranged from 9-26 years with an average of 17 years. The last case in this cluster was diagnosed in November of 2006. No new cases have been identified with the same genotype.

Table 6. TB Among Mien by Gender and Age County of Sacramento 2001-2006

Age	Gender		Total
	Female	Male	
0-4	0	0	0
5-14	0	0	0
15-24	2	7	9
25-44	1	2	3
45-64	1	3	4
65+	2	4	6
Total	6	16	22

Figure 15. Epidemic Curve of Mien Outbreak Cases, County of Sacramento 2001-2006



Tuberculosis Among the Homeless

Tuberculosis Among the Homeless

The number of TB cases that occurred among homeless persons in the County of Sacramento has fluctuated over the past 10 years. Three-year averages from 1998-2006 show an increase in the number of cases among the homeless (Figure 15). Without knowledge of the true number of homeless persons, we were unable to determine if the rate of TB among the homeless increased.

From 2004-2006, 11.8% of TB cases in the County of Sacramento were homeless (Figure 16). In comparison, from 2003-2005, 11.0% of TB cases in the County of Sacramento were homeless, whereas, statewide 6.5% of cases were homeless for the same period.

Figure 16. TB Among Homeless, Three Year Average Number of Cases, County of Sacramento 1998-2006

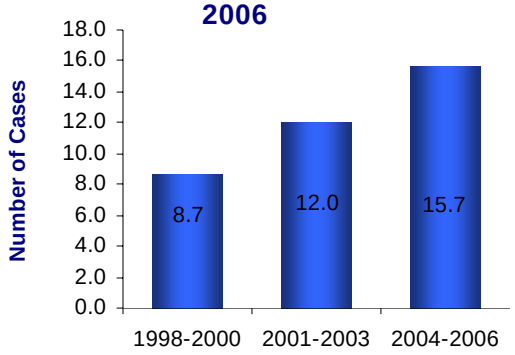
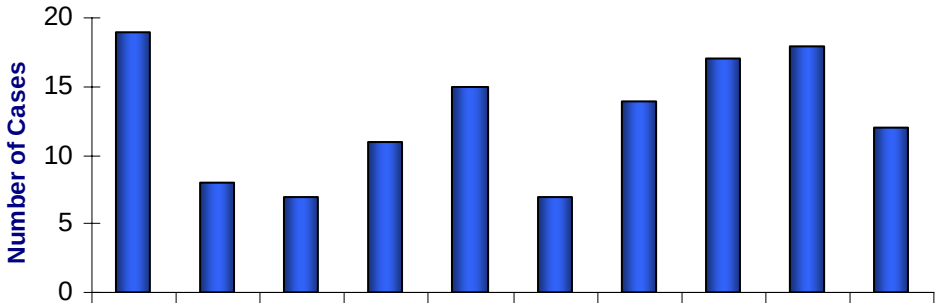


Figure 17. Number of TB Cases Among the Homeless and Proportion of Homeless Cases Among All TB Cases County of Sacramento County, 1997-2006



	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006
Number of Cases	19	8	7	11	15	7	14	17	18	12
Percent of Total Cases	13.5%	7.5%	6.7%	8.3%	13.6%	6.3%	9.3%	10.4%	13.8%	12.4%

Tuberculosis Among the Homeless

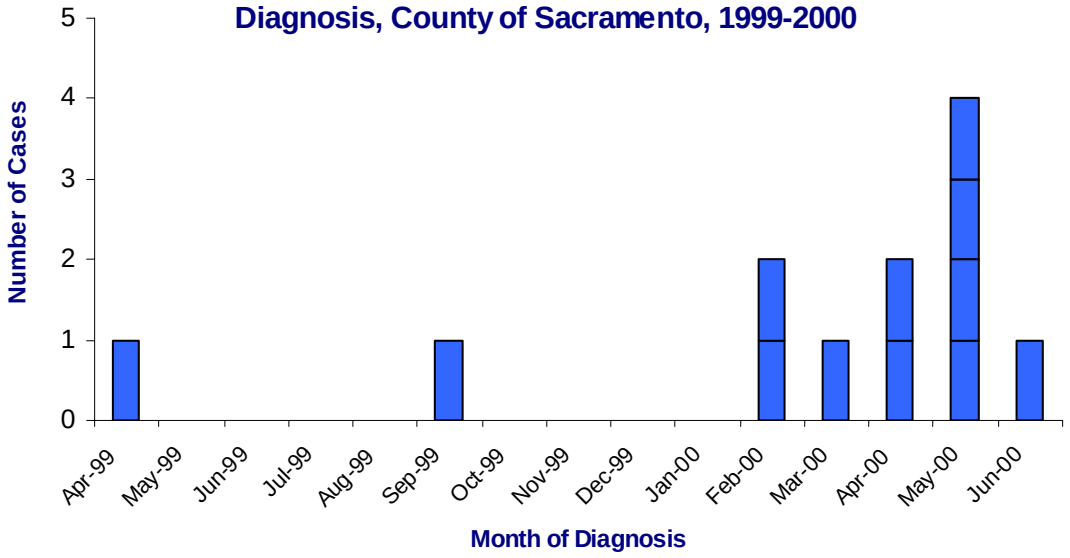
The majority of homeless TB cases in Sacramento occurred among Caucasian and African American males age 45-64 years of age (Table 7).

In early 2000, a cluster of TB cases was identified among the homeless community in Sacramento County, all with matching DNA fingerprints, suggesting a single source. Intensive investigative efforts were undertaken to identify new cases and contacts. From April of 1999, through June of 2000, 12 TB cases with matching DNA fingerprints were identified, 11 were homeless individuals and one was a shelter volunteer (Figure 17). As a result of this investigation, in February 2001, mandatory screening by chest x-ray and proof of TB clearance to access homeless services was initiated. From February 2001 through 2006, 34 cases of TB were identified.

Table 7. TB Among Homeless Persons by Gender, Race/Ethnicity and Age, County of Sacramento 2004-2006

Total	**2004-2006** n=47
Gender	
Male	34
Female	13
Race/Ethnicity	
Asian	0
African American	20
Caucasian	22
Hispanic	5
Age Group	
0-4	0
5-14	0
15-24	1
25-44	15
45-64	29
65+	2

Figure 18. Epidemic Curve of Homeless TB Cases by Month of Diagnosis, County of Sacramento, 1999-2000



Tuberculosis Drug Resistance

Drug Resistance

From 2002-2006, 10 cases were multi-drug resistant (MDR). All MDR cases were foreign born. During that same time period, for those cases who had susceptibility testing done, 9.2% were resistant to isoniazid (Tables 8 and 9)

Table 8. Drug Resistant TB by Year County of Sacramento 2002-2006

Year	Multi Drug Resistant	Poly Drug Resistant	Mono Drug Resistant
2002	1	0	5
2003	1	1	12
2004	5	0	2
2005	3	0	8
2006	0	1	7
Total	10	2	34

Table 9. Tuberculosis Cases by Resistance to First Line Drugs, County of Sacramento 2002-2006

Year	No. of Tested	Isoniazid		Rifampin		Pyrazinamide		Ethambutol	
		No.	%	No.	%	No.	%	No.	%
2002	52	5	9.6	1	1.9	1	1.9	0	0.0
2003	88	10	11.4	1	1.1	2	2.3	2	2.3
2004	79	6	7.6	6	7.6	0	0.0	3	3.8
2005	86	8	9.3	3	3.5	3	3.5	2	2.3
2006	75	6	8.0	0	0.0	1	1.3	1	1.3
Total	380	35	9.2	11	2.9	7	1.8	8	2.1

County of Sacramento
Board of Supervisors
Roger Dickinson, District 1
Jimmie R. Yee, District 2
Susan Peters, District 3
Roberta MacGlashan, District 4
Don Nottoli, District 5

Terry Schutten, County Executive

www.saccounty.net

Department of
Health & Human Services
Lynn Frank, Director

County Health Officer
Glennah Trochet, M.D.

www.scph.com

Epidemiology Program Manager
Cassius Lockett, Ph.D., MS

Prepared by
Alix Gillam, MPH