County of San Diego
Health and Human Services Agency
Public Health Services

Tuberculosis Control Program
2011 Annual Report

November 2012

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Executive Summary

This report summarizes data for tuberculosis (TB) cases reported in San Diego County. The data are based on the national case report (Report of a Verified Case of Tuberculosis [RVCT]), a standardized form used throughout the U.S., to collect data for the national TB surveillance system (1). For the purposes of public health surveillance, a case of TB is defined on the basis of laboratory and/or clinical evidence of active disease due to *Mycobacterium tuberculosis* complex (1).

Important trends in TB epidemiology in the County are highlighted.

- The annual number of TB cases and TB case rate decreased during 1993-2010, from 469 cases with a case rate of 18.1 per 100,000, to 222 total cases and a case rate of 6.9 cases per 100,000 in 2010. In 2011, the total count increased to 263 cases with a case rate of 8.1 per 100,000, similar to the morbidity in 2008. Review of the increase by demographic characteristic did not suggest a population of concern for recent transmission or importation; however, the next several years will be critical to determine whether 2011 will begin a new trend or the slow decline over the past decade will continue.
- Over the past decade, Hispanics accounted for more than 50% of cases.
- Persons born in Mexico, the Philippines, and Vietnam accounted for more than 50% of all TB cases.
- During 2007-2011, among persons with no history of prior TB, resistance to isoniazid (INH) was 10.8% and there were 11 multidrug-resistant (MDR) TB cases, representing 1.1% of culture-positive cases.
- During 2007-2011, there were no extensively drug-resistant (XDR) TB cases during this period.
- During 2007-2011, a total of 97 (8%) of 1,252 TB patients in San Diego were also coinfected with HIV.
- During 2010-2011, the most common medical risk factor for TB was diabetes, with 119 (25%) of 485 persons diagnosed with TB reporting a prior or concurrent diagnosis of diabetes.
- Overall during 2006-2010, more than 90% of all patients completed therapy. The proportion completing therapy in $\leq$1 year increased from 78% in 2006 to 87% in 2010.
- During 2007-2011 in San Diego County, a total of 92 (9%) of 1,048 culture-positive TB cases had disease caused by *Mycobacterium bovis*.

Technical Notes

Population data were obtained from the following sources:

- For 1985-1989, California Department of Finance County-level estimates, available at: http://www.dof.ca.gov/HTML/DEMOGRAP/Data/DRUdatafiles.asp (accessed July 2007).
- For 1990-1999, San Diego Association of Governments (SANDAG) Revised 1990s Demographic Estimates, issued July 2003.
- For 2000-2010, SANDAG Revised Estimates, received by the County Health and Human Services Agency, Public Health Services, Community Epidemiology, August 2010. The population for 2011 was estimated based on the increase from the 2010 Census to the 2011 California Department of Finance estimate for January 1, 2011, released May 2011.

Drug resistance:

- Resistance to isoniazid (INH) was defined as resistance to at least INH, but isolate may be resistant to other antituberculous drugs.
- Multidrug-resistant TB was defined as resistance to at least INH and rifampin but isolate may be resistant to other antituberculous drugs.

Completion of therapy (Table 8):

- The calculations were based on the CDC algorithm (1). The cohort was defined as cases in persons alive at diagnosis who started treatment. Persons who died during treatment were excluded from the analysis.
- Cases without known initial rifampin resistance comprised the group of "Therapy ≤1 Year Indicated." In addition, cases with meningeal TB and children with miliary disease were excluded from this cohort.
- Cases with initial rifampin resistance, cases with meningeal TB, and children with miliary disease comprised the group of "Therapy >1 Year Indicated."

Table 1 – Tuberculosis Cases, Case Rates per 100,000, and Percent Change: San Diego County, 1985-2011

			Percent Change From Previous Year	
Year	Cases	Rate	Cases	Rate
1985	150	7.2	N/A	N/A
1986	148	6.9	-1.3	-4.5
1987	248	11.2	67.6	61.9
1988	195	8.5	-21.4	-24.0
1989	264	11.1	35.4	30.4
1990	329	13.2	24.6	19.2
1991	366	14.5	11.2	9.8
1992	433	16.8	18.3	16.3
1993	469	18.1	8.3	7.4
1994	420	16.1	-10.4	-10.8
1995	438	16.8	4.3	3.9
1996	384	14.7	-12.3	-12.6
1997	332	12.5	-13.5	-14.6
1998	342	12.7	3.0	1.1
1999	299	10.9	-12.6	-14.1
2000	295	10.5	-1.3	-3.5
2001	331	11.6	12.2	10.2
2002	326	11.2	-1.5	-3.4
2003	316	10.6	-3.1	-4.7
2004	320	10.6	1.3	0.0
2005	305	10.0	-4.7	-5.6
2006	315	10.3	3.3	2.4
2007	280	9.0	-11.1	-12.0
2008	264	8.4	-5.7	-7.1
2009	223	7.0	-15.5	-16.7
2010	222	6.9	-0.4	-1.7
2011	263	8.1	18.5	17.6

During 1985-1992, the United States experienced a resurgence in tuberculosis (TB) reflected by increasing annual TB case totals and case rates (1). This resurgence was attributed to multiple factors including decreased funding and weakened public health infrastructure, the HIV/AIDS epidemic, increasing immigration from higher prevalence countries, and transmission in congregate settings such as hospitals, homeless shelters, and correctional facilities. San Diego County also experienced an increase during this time period, although the magnitude of the increase may have been due, in part, to underreporting of TB to the health department prior to 1989.

Increased active surveillance activities with community providers were initiated by the health department's TB Control Program in the early 1990s. The County annual case total and case rate peaked in 1993 at 469 cases (18.1 cases per 100,000). During 1993-1999, the case count decreased by 36% (from 469 to 299 cases) and the case rate, by 43% (from 18.1 to 10.4 per 100,000), reflecting strengthened TB control strategies. The County case count and case rate rose briefly to 331 cases in 2001, but then gradually decreased to 222 total cases and 6.9 cases per 100,000 in 2010. Economic and immigration trends, as well as enhanced screening

prior to immigration among persons establishing permanent residency in the U.S., may have contributed to these local decreases, as also observed nationally (2, 3).

In 2011, the total count increased by 41 cases to 263 cases with a case rate of 8.1 per 100,000, similar to the morbidity in 2008. Increases were seen both among U.S.-born and foreign-born persons. The majority of the increase reflected an increase among persons at least 65 years old, with 43 cases in 2010 and 70 in 2011; however, the increase was generalized across all races/ethnicities. Cases in children remained low, continuing a 4-year trend. The number of cases coinfected with HIV remained fewer than 20 cases per year, 2009-2012. The annual average number of culture-proven cases identified as *M. bovis* during 2007-2011 was 18, and decreased from 20 in 2010 to 18 in 2011. A small increase in cases (n=6) among persons with at least one TB risk factor (e.g, homelessness, drug use, residence in a correctional facility) was also observed. These findings did not suggest a population of concern for recent transmission or importation; however, the next several years will be critical to determine whether 2011 will begin a new trend or the slow decline over the past decade will continue.

Table 2 – Tuberculosis Cases, Percentages, and Case Rates per 100,000 Population by Age Group, San Diego County, 2000-2011

	Total	0 - 4			5 -14			15 - 24			25 - 44			45 - 64			65+		
Year	Cases	No.	(%)	Rate	No.	(%)	Rate	No.	(%)	Rate	No.	(%)	Rate	No.	(%)	Rate	No.	(%)	Rate
2000	295	13	(4)	6.5	14	(5)	3.4	36	(12)	8.4	107	(36)	11.9	69	(23)	12.4	56	(19)	17.8
2001	331	18	(5)	9.6	16	(5)	3.8	45	(14)	10.2	102	(31)	11.2	89	(27)	15.4	61	(18)	19.1
2002	326	10	(3)	5.2	4	(1)	0.9	39	(12)	8.6	130	(40)	14.1	81	(25)	13.4	62	(19)	19.2
2003	316	15	(5)	7.6	11	(3)	2.6	45	(14)	9.7	105	(33)	11.3	97	(31)	15.4	43	(14)	13.1
2004	320	15	(5)	7.4	21	(7)	5.0	44	(14)	9.4	109	(34)	11.7	81	(25)	12.4	50	(16)	15.1
2005	305	14	(5)	6.6	15	(5)	3.6	43	(14)	9.1	89	(29)	9.6	80	(26)	11.7	64	(21)	19.0
2006	315	19	(6)	8.5	13	(4)	3.3	43	(14)	9.0	90	(29)	9.8	82	(26)	11.6	68	(22)	19.8
2007	280	10	(4)	4.4	5	(2)	1.3	51	(18)	10.5	81	(29)	8.9	82	(29)	11.2	51	(18)	14.6
2008	264	5	(2)	2.2	12	(5)	3.0	40	(15)	8.1	79	(30)	8.7	82	(31)	10.9	46	(17)	12.8
2009	223	9	(4)	3.9	9	(4)	2.2	21	(9)	4.2	77	(35)	8.5	55	(25)	7.1	52	(23)	14.1
2010	222	8	(4)	3.5	4	(2)	1.0	25	(11)	5.0	78	(35)	8.6	64	(29)	8.1	43	(19)	11.4
2011	263	7	(3)	3.0	7	(3)	1.7	30	(11)	5.9	68	(26)	7.4	81	(31)	10.1	70	(27)	18.3

As the total number of TB cases in San Diego County declined over the past decade, all broad age groups experienced overall decreases, with some fluctuations. Sustained declines from the 2002-2006 annual average of 27 cases in children less than 15 years old were observed 2007-2011. Similarly, sustained declines from the 2002-2006 annual average of 105 cases in adults aged 25 to 44 years old were observed 2007-2011. Decreases among adults aged 15 to 24 and aged 45 to 64 were most prominent compared with prior years in 2009 and 2010. An increase back to the level of 2008 was observed for the 45 to 64 year old age group in 2011. The case numbers fluctuated among adults 65 years and older, but the case rate showed sustained decreases during 2007 through 2010, compared with the prior 5-year annual average. This group had the largest increase in case total from 2010 to 2011, and remained the group with the highest risk, reflected by a case rate of 18.3 cases per 100,000.

In 2011, children aged 0 to 4 years old accounted for 3% of cases. Although TB disease in young children reflects recent infection, a high proportion of pediatric TB in San Diego County is attributed to *M. bovis* (Table 10 – Demographic and Clinical Characteristics of TB Cases due to *M. bovis*, San Diego County, 2007-2011). The disproportionate burden of TB due to *M. bovis* among children in the County suggests that consumption of unpasteurized dairy products is an important mode of transmission rather than person-to-person transmission via inhalation of aerosolized organisms (the method through which *M. tuberculosis* is spread).

Table 3 – Tuberculosis Cases, Percentages, and Case Rates per 100,000 Population by Race/Ethnicity, San Diego County, 2000-2011

	Total	American Indian			Asian/Pacific Islander			Black			Hispanic			White		
Year	Cases	No.	(%)	Rate	No.	(%)	Rate	No.	(%)	Rate	No.	(%)	Rate	No.	(%)	Rate
2000	295	0	(0)	N/A	102	(35)	39.6	23	(8)	14.9	142	(48)	18.9	28	(9)	1.8
2001	331	1	(0)	N/A	97	(29)	35.3	20	(6)	13.0	164	(50)	21.1	49	(15)	3.2
2002	326	0	(0)	N/A	105	(32)	36.5	27	(8)	17.3	156	(48)	19.4	38	(12)	2.4
2003	316	0	(0)	N/A	92	(29)	30.6	24	(8)	15.2	159	(50)	19.1	41	(13)	2.6
2004	320	1	(0)	N/A	100	(31)	32.6	17	(5)	10.7	177	(55)	20.7	25	(8)	1.6
2005	305	0	(0)	N/A	95	(31)	30.2	19	(6)	11.9	160	(52)	18.3	31	(10)	2.0
2006	315	2	(1)	N/A	98	(31)	31.0	22	(7)	13.6	168	(53)	18.8	25	(8)	1.6
2007	280	0	(0)	N/A	100	(36)	31.1	22	(8)	13.5	144	(51)	15.8	14	(5)	0.9
2008	264	2	(1)	N/A	82	(31)	24.9	16	(6)	9.7	138	(52)	14.7	26	(10)	1.6
2009	223	0	(0)	N/A	75	(34)	22.1	22	(10)	13.2	106	(48)	11.0	20	(9)	1.3
2010	222	0	(0)	N/A	73	(33)	21.0	13	(6)	7.8	116	(52)	11.7	20	(9)	1.3
2011	263	1	(0)	N/A	97	(37)	27.6	13	(5)	7.7	127	(48)	12.8	25	(10)	1.6

Over the past decade, approximately 50% of San Diego County TB cases occurred in Hispanics, and the majority were born in the U.S. or Mexico. During 2008-2011, 36% of Hispanics were U.S.-born and 59% were born in Mexico. Case rates among Hispanics in San Diego County are substantially higher than national and California statewide rates, 5.8 and 5.7 per 100,000, respectively in 2011 (1,4). This likely reflects the effect of San Diego's location along the U.S.-Mexico border. More than 95% of Asians and Pacific Islanders were born outside the U.S. Asians and Pacific Islanders accounted for approximately one-third of cases but had the highest risk, with case rates substantially higher than Hispanics and non-Hispanic whites and blacks. In 2011, blacks accounted for 5% of cases, but the case rate among blacks (7.7 per 100,000) was nearly five times that in whites (1.6 per 100,000). During 2008-2011, more than 50% of cases among blacks were born outside the U.S., primarily in Africa. Case rates among all race/ethnicity groups in San Diego County, however, have decreased over the past decade.

Table 4 – Tuberculosis Cases and Percentages by Top 10 Birth Countries, San Diego County, 2007-2011

	2011		2010		2009		2008		2007	
Birth Country	**No.**	**(%)**	**No.**	**(%)**	**No.**	**(%)**	**No.**	**(%)**	**No.**	**(%)**
Total Cases	263	(100)	222	(100)	223	(100)	264	(100)	280	(100)
Mexico	75	(29)	64	(29)	63	(28)	89	(34)	100	(36)
Philippines	58	(22)	41	(18)	41	(18)	50	(19)	63	(23)
Vietnam	19	(7)	13	(6)	13	(6)	13	(5)	17	(6)
Somalia	3	(1)	3	(1)	3	(1)	5	(2)	8	(3)
India	3	(1)	3	(1)	4	(2)	7	(3)	3	(1)
China	1	(0)	3	(1)	3	(1)	2	(1)	4	(1)
Cambodia	1	(0)	4	(2)	3	(1)	1	(0)	1	(0)
Guatemala	0	(0)	3	(1)	4	(2)	1	(0)	1	(0)
Laos	1	(0)	2	(1)	1	(0)	2	(1)	3	(1)
United States	78	(30)	62	(28)	74	(33)	76	(29)	55	(20)

A notable trend in the epidemiology of TB in the U.S. has been the increase in the proportion of cases occurring in persons born outside of the U.S. Between 1993 and 2009, the percentage of TB cases in the foreign born increased from 30% to 60% (1). However, in San Diego County, the foreign-born have represented a majority of cases throughout that time period with an average annual percentage of 69%. Table 4 displays the top 10 countries of birth during 2007-2011. The top three countries, Mexico, the Philippines, and Vietnam, accounted for more than 50% of all TB cases in the County during this period.

The largest increases among the foreign-born from 2010 to 2011 occurred among persons from Mexico and the Philippines. Among Mexican-born persons, the increase was restricted to persons who reported their first arrival in the U.S. was at least 5 years prior to TB diagnosis; and, persons at least 65 years old accounted for more than 80% of the increase. One of the 2 cases diagnosed within the first year of arrival occurred in a person with a TB B1 notification. Among 2011 cases in persons born in the Philippines, the majority (72%), representing an increase of 13 compared with 2010, reported their first arrival was at least 5 years prior to TB diagnosis. Of the 10 diagnosed within the first year of arrival, 9 were diagnosed in persons with a TB B1 notification upon arrival in the U.S. Four of the nine cases were culture-proven (sputum smear negative, sputum culture positive).

Among cases in foreign-born persons, only 1% occurred in children <15 years old. In contrast, nearly 20% of U.S.-born cases during 2007-2011 occurred in children. However, the annual average number of cases in U.S.-born children decreased from 23 during 2002-2006 to 13 during 2007-2011, with 12 cases in 2011. Of the 26 cases in children 2010-2011, 22 (85%) had at least one parent or guardian born outside the U.S.

Table 5 – Tuberculosis Cases and Percentages by Case Verification Criterion by Site of Disease, San Diego County, 2000-2011

		Pulmonary				Extrapulmonary			
		Positive Culture	Positive Smear*	Clinical Case	Provider Diagnosis	Positive Culture	Positive Smear*	Clinical Case	Provider Diagnosis
Year	Total Cases	No. (%)	No. (%)	No. (%)	No. (%)	No. (%)	No. (%)	No. (%)	No. (%)
2000	295	221 (93)	0 (0)	11 (5)	6 (3)	41 (72)	0 (0)	16 (28)	0 (0)
2001	331	232 (86)	0 (0)	26 (10)	11 (4)	43 (69)	0 (0)	15 (24)	4 (6)
2002	326	230 (91)	0 (0)	6 (2)	16 (6)	51 (69)	0 (0)	15 (20)	8 (11)
2003	316	213 (88)	1 (0)	9 (4)	18 (7)	46 (61)	1 (1)	20 (27)	8 (11)
2004	320	235 (90)	0 (0)	17 (6)	10 (4)	36 (62)	0 (0)	13 (22)	9 (16)
2005	305	204 (85)	0 (0)	17 (7)	18 (8)	45 (68)	0 (0)	16 (24)	5 (8)
2006	315	219 (88)	0 (0)	12 (5)	18 (7)	43 (65)	0 (0)	18 (27)	5 (8)
2007	280	213 (91)	0 (0)	8 (3)	12 (5)	34 (72)	1 (2)	8 (17)	4 (9)
2008	264	192 (91)	0 (0)	12 (6)	6 (3)	34 (63)	0 (0)	11 (20)	9 (17)
2009	223	151 (84)	0 (0)	12 (7)	16 (9)	25 (57)	0 (0)	12 (27)	7 (16)
2010	222	156 (85)	3 (2)	19 (10)	5 (3)	27 (69)	0 (0)	10 (26)	2 (5)
2011	263	193 (87)	1 (0)	23 (10)	4 (2)	23 (55)	1 (2)	15 (36)	3 (7)

*Positive Smear category includes 2 cases in 2010 and 2011 where a nucleic acid amplification test (i.e., NAA) was done and positive, but the mycobacterial culture was negative or could not be completed.

TB cases are confirmed according to CDC guidelines (1). The majority of TB cases are confirmed via culture. In 2011, 87% of pulmonary cases were confirmed via culture compared with 55% of cases with only extrapulmonary disease. Since culture is the standard for diagnosis, few cases are confirmed by the identification of acid fast bacilli on sputum or other body fluid or tissue smear, in the absence of culture being performed (i.e., Verification by Positive Smear). In 2010, the addition of a field to collect nucleic acid amplification (NAA) testing in the national TB case report enabled cases that do have a positive NAA, but the mycobacterial culture was negative or not done, to be identified on this basis, rather than as a clinical or provider diagnosis case. In 2011, 36% of extrapulmonary cases were confirmed using the clinical case definition and 7% were categorized as Provider Diagnosis. This last category is comprised of clinical cases with negative tuberculin skin tests or interferon-gamma release assays (e.g., QuantiFERON®-Gold In Tube or T-SPOT®.*TB*test), but a characteristic clinical course.

Table 6A – Tuberculosis Cases and Percentages by Resistance to Isoniazid or Multidrug Resistance in Persons with No Previous History of TB, by Birth Country, San Diego County, 2007-2011

	Resistance to Isoniazid						Resistance to Isoniazid and Rifampin					
	Total Cases		U.S.-born		Foreign-born		Total Cases		U.S.-born		Foreign-born	
Year	No.	(%)	No.	(%)	No.	(%)	No.	(%)	No.	(%)	No.	(%)
2007	26	(11.2)	6	(14.6)	20	(10.4)	3	(1.3)	1	(2.4)	2	(1.0)
2008	24	(11.4)	8	(13.8)	16	(10.5)	2	(1.0)	1	(1.7)	1	(0.7)
2009	15	(8.8)	1	(1.9)	14	(12.0)	2	(1.2)	1	(1.9)	1	(0.9)
2010	14	(7.9)	3	(6.5)	11	(8.4)	1	(0.6)	0	(0.0)	1	(0.8)
2011	27	(13.8)	7	(13.5)	20	(13.9)	3	(1.5)	1	(1.9)	2	(1.4)
2007-2011	106	(10.8)	25	(10.0)	81	(11.0)	11	(1.1)	4	(1.6)	7	(1.0)

Table 6B – Tuberculosis Cases and Percentages by Resistance to Isoniazid or Multidrug Resistance in Persons with a Previous History of TB, San Diego County, 2007-2011

	Resistance to Isoniazid						Resistance to Isoniazid and Rifampin					
	Total Cases		U.S.-born		Foreign-born		Total Cases		U.S.-born		Foreign-born	
Year	No.	(%)	No.	(%)	No.	(%)	No.	(%)	No.	(%)	No.	(%)
2007	2	(18.2)	0	(0.0)	2	(22.2)	1	(9.1)	0	(0.0)	1	(11.1)
2008	3	(20.0)	0	(0.0)	3	(23.1)	1	(6.7)	0	(0.0)	1	(7.7)
2009	1	(16.7)	0	(0.0)	1	(33.3)	1	(16.7)	0	(0.0)	1	(33.3)
2010	1	(16.7)	0	(0.0)	1	(20.0)	0	(0.0)	0	(0.0)	0	(0.0)
2011	5	(25.0)	2	(40.0)	3	(20.0)	0	(0.0)	0	(0.0)	0	(0.0)
2007-2011	12	(20.7)	2	(15.4)	10	(22.2)	3	(5.2)	0	(0.0)	3	(6.7)

TB may become resistant to medications if treatment is inadequate because of patient nonadherence or medical provider error. Resistant TB is more difficult and costly to treat, especially multidrug-resistant (MDR) TB, defined as resistance to both isoniazid (INH) and rifampin, the two most effective first-line drugs. Studies have noted that MDR TB has a lower cure rate and a higher mortality rate, although this has not been the case in San Diego. Extensively drug-resistant TB (XDR TB) is a relatively rare type of MDR TB also resistant to two classes of second-line medications: fluoroquinolones and at least one of the three injectable drugs (amikacin, kanamycin, or capreomycin). Table 6A shows drug resistance for initial TB isolates among persons with no prior history of TB. These persons were presumably infected with the drug-resistant organism. During 2007-2011, overall resistance to INH was 10.8% and there were 11 MDR TB cases, representing 1.1% of culture-positive cases. For the 5-year period average, persons born outside the U.S. had similar rates of INH drug-resistant TB and MDR TB, compared with U.S.-born persons. Of the 7 persons with MDR TB born outside the U.S., 2 were from Mexico, 3 were from the Philippines, and 2 were from other countries (1 Asia, 1 Africa). Genotypes of the isolates from the 4 U.S.-born patients and 1 from Asia were strains observed in isolates of Mexican-born patients, and all 5 patients had a travel history to Mexico. The median age of the 11 MDR TB patients was 50 years old, and the youngest was a teenager. Table 6B shows drug resistance among persons with a prior history of TB. Their drug resistant TB often reflects resistance acquired during treatment of their prior TB episode. During 2007-2011, resistance to INH among persons with prior TB was twice that among persons with no prior TB episode. MDR TB rates were nearly five times higher among persons with prior TB compared with those with no prior episode. All 3 patients were from the Philippines. There were no prior TB cases with MDR TB identified among U.S.-born persons. Also, during this period, there were no XDR TB cases.

Table 7 – Demographic and Clinical Characteristics of TB Cases with HIV Coinfection, San Diego County, 2007-2011 (N=97)

Characteristic	No.	(%)
Agegroup		
15-24	4	(4)
25-44	55	(57)
45-64	34	(35)
65+	4	(4)
Race/ethnicity		
Black, non-Hispanic	7	(7)
Hispanic	81	(84)
White, non-Hispanic	5	(5)
Other	4	(4)
Birth Country		
Mexico	59	(61)
United States	28	(29)
Other[¶]	10	(10)
TB Risk Factors		
Injecting Drug Use*	4	(4)
Non-injecting Drug Use*	18	(19)
Correctional Inmate**	10	(10)
Homeless*	5	(5)
At least one risk factor	27	(28)
Clinical Presentation		
Pulmonary TB	83	(86)
Sputum-smear positive	46	(57)
Extrapulmonary TB (only)	14	(14)
Culture-positive	85	(88)
M. bovis	18	(21)
Isoniazid Resistance	8	(9)
Multidrug-resistance	0	(0)

[¶]2 South/Central America, 3 Caribbean, 1 Africa, 4 Asia
*In year prior to TB diagnosis; **At TB diagnosis

The percentage of TB patients in San Diego that had known HIV status at TB diagnosis increased from 71% in 2007 to 81%, 2010-2011. During 2007-2011, a total of 97 (8%) of 1,252 TB patients in San Diego were coinfected with HIV. More than 90% of coinfected cases occurred in persons aged 25-64 years old, 84% were Hispanic, and 61% were born in Mexico. Most (86%) were diagnosed with pulmonary TB, with or without extrapulmonary involvement, and 57% of these patients had an elevated infectious potential based on a positive sputum smear for acid fast bacilli. Drug resistance was not notably higher than among all TB patients; however, 21% of culture-positive patients had TB due to *M. bovis*. Disease due to *M. bovis* is most commonly attributed to consumption of unpasteurized dairy products (see Table 2 – Tuberculosis Cases, Percentages, and Case Rates per 100,000 Population by Age Group, San Diego County, 2000-2011 and Table 10 – Demographic and Clinical Characteristics of TB Cases due to *M. bovis*, San Diego County, 2007-2011), although it may occur by person-to-person transmission via inhalation of aerosolized organisms. A detailed analysis of TB patients in San Diego coinfected with HIV was recently published (5).

Table 8 – Tuberculosis Cases and Percentages by Completion of Tuberculosis Therapy (COT), San Diego County, 2006-2010

	Therapy ≤1 Year Indicated*			Therapy >1 Year Indicated**		All Cases	
Year	No.	COT≤1 year(%)	COT(%)	No.	COT (%)	No.	COT(%)
2006	270	(78)	(93)	11	(91)	281	(93)
2007	256	(75)	(91)	8	(100)	264	(91)
2008	236	(79)	(92)	7	(100)	243	(93)
2009	199	(82)	(92)	5	(100)	204	(92)
2010	189	(87)	(96)	5	(100)	194	(96)

*Excludes cases with meningeal TB, children with disseminated TB, and cases with rifampin-resistant TB.
** Cases with meningeal TB, children with disseminated TB, and cases with rifampin-resistant TB.

A key objective of TB control programs is to ensure that patients complete appropriate therapy. This strategy limits relapse and assists in reducing transmission and risk for the development of drug resistance. The Centers for Disease Control and Prevention (CDC) has a performance measure of timely completion of therapy for persons whose initial TB presentation indicated ≤1 year of TB treatment was sufficient (1). The usual TB treatment duration is 6 months for drug-susceptible TB, but may be longer in the setting of extensive disease, poor clinical response, or development of drug side effects (6).

Each annual case cohort is followed for 2 years for ascertainment of treatment outcome data. Overall, during 2006-2010, more than 90% of patients completed therapy. Among those eligible for the evaluation of timely completion, the percentage completing therapy in ≤1 year increased from 78% in 2006 to 87% in 2010. Annual reviews have confirmed that the majority of patients with delayed completion had clinically indicated reasons for extension of treatment, primarily medication intolerance or extensive disease/delayed treatment response.

Table 9 – Tuberculosis Cases and Percentages by TB Risk Factor, San Diego County, 2007-2011

TB Risk Factor	Year											
	2007-2011		2007		2008		2009		2010		2011	
	No.	(%)	No.	(%)	No.	(%)	No.	(%)	No.	(%)	No.	(%)
Long-term Care Resident at Diagnosis	16	(1)	2	(1)	8	(3)	1	(0)	3	(1)	2	(1)
Correctional Inmate at Diagnosis	124	(10)	25	(9)	30	(11)	20	(9)	29	(13)	20	(8)
Homeless*	55	(4)	13	(5)	10	(4)	8	(4)	10	(5)	14	(5)
Health Care Worker**	42	(3)	12	(4)	5	(2)	7	(3)	9	(4)	9	(3)
Migrant Worker**	10	(1)	4	(1)	0	(0)	2	(1)	1	(0)	3	(1)
Injecting Drug Use*	20	(2)	6	(2)	7	(3)	2	(1)	1	(0)	4	(2)
Non-injecting Drug*	129	(10)	30	(11)	32	(12)	20	(9)	26	(12)	21	(8)
Excess Alcohol Use*	167	(13)	42	(15)	39	(15)	25	(11)	28	(13)	33	(13)
At Least One Drug Use Risk Factor	226	(18)	60	(21)	55	(21)	32	(14)	37	(17)	42	(16)
At Least One Risk Factor	337	(27)	76	(27)	76	(29)	55	(25)	62	(28)	68	(26)

*In year prior to diagnosis

**Occupation within 2 years prior to TB diagnosis, except 2010-2011, due to a change in the national case report question, now collecting primary occupation within year prior to TB diagnosis.

The national TB case report collects information about population risk factors for TB infection and disease. Among persons reported with TB during 2007-2011, the most commonly identified risks included diagnosis of TB as a correctional inmate (10%), and homelessness (4%), non-injecting drug use (10%), and excessive alcohol use (13%) in the year prior to TB diagnosis. Eighteen percent had at least one drug use risk factor, and 27% of patients had at least one TB risk factor.

Starting in 2010, several medical risk factors were added to the national case report. During 2010-2011, the most common medical risk factor was diabetes, with 119 (25%) of 485 persons diagnosed with TB reporting a prior or concurrent diagnosis of diabetes. A total of 151 (31%) reported at least one medical risk factor, including diabetes, end stage renal disease, organ transplantation, tumor necrosis factor antagonist therapy, or immunosuppression other than HIV. This number increased to 180 (37%) when persons with HIV coinfection as their only TB medical risk factor were included.

Table 10 – Demographic and Clinical Characteristics of TB Cases due to *Mycobacterium bovis*, San Diego County, 2007-2011 (N=92)

	No.	(%)
Agegroup		
0-4	4	(4)
5-14	9	(10)
15-24	9	(10)
25-44	24	(26)
45-64	28	(30)
65+	18	(20)
Race/ethnicity		
Asian/Pacific Islander	0	(0)
Black	0	(0)
Hispanic	91	(99)
White	1	(1)
Birth Country*		
US	28	(31)
Mexico	63	(68)
Clinical Presentation		
Pulmonary TB alone	26	(28)
Pulmonary + Extrapulmonary	24	(26)
Extrapulmonary TB (only)	42	(46)
Cervical Lymphadenopathy	12	(29)
Peritoneal	12	(29)
HIV coinfection	18	(20)
Isoniazid Resistance	2	(2)

**1 patient born in Chile*

Disease due to *M. bovis* is usually contracted through the consumption of unpasteurized dairy products. Person-to-person transmission via inhalation of aerosolized organisms (the method through which *M. tuberculosis* is spread) is also believed to occur. TB due to *M. bovis* is more frequently identified among County TB cases, using biochemical techniques, compared with the national average of approximately 1%, estimated using genotyping techniques (7). During 2007-2011 in San Diego County, a total of 92 (9%) of 1,048 culture-positive TB cases had disease caused by *M. bovis*. More than half occurred among the 25 to 64 year old age groups; however, 14% occurred among children less than 15 years old. Among persons with culture-proven TB, 8% of adults and 57% of children less than 15 years old had TB due to *M. bovis*. Nearly all cases due to *M. bovis* were Hispanic and 68% were born in Mexico.

Pulmonary TB was a less frequent presentation (54%) than among all culture-confirmed cases (85%). The most common extrapulmonary presentations were cervical lymphadenopathy and peritoneal TB. Resistance to isoniazid was lower than among all TB cases, and no multidrug-resistant (MDR) TB cases occurred. Of the 2 cases with resistance to isoniazid, both had isolates susceptible to rifampin, ethambutol, a fluoroquinolone and injectable drug (amikacin). All cases had isolates resistant to pyrazinamide, the natural resistance pattern associated with *M. bovis*. Because of pyrazinamide resistance, the standard treatment duration of 6 months for drug-susceptible TB is usually extended to 9 months since pyrazinamide is a critical first-line drug in the "short course" TB treatment regimen (6). An analysis of cases in San Diego County due to *M. bovis* compared with those due to *M. tuberculosis* was recently published (8).

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