Tuberculosis Surveillance Report

Arizona, 2005

Arizona Department of Health Services

Bureau of Epidemiology and Disease Control

Office of Infectious Disease Services

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Purpose of the Report

The Tuberculosis Annual Report is designed to be a source of data regarding tuberculosis (TB) in Arizona for purposes of prevention and control of the disease through interventions, new or changes in policies, rules and statutes, allocation of funds and planning services. The target audience includes government agencies, health care organizations and providers and other interested parties or individuals. The program can provide more detailed information upon request.

TB Surveillance, Prevention, and Control in Arizona

The Arizona Department of Health Services (ADHS) Tuberculosis Control (TBC) Program is assigned the responsibility of monitoring, controlling and preventing infection, disease, and death associated with tuberculosis (TB) statewide through surveillance, data analyses, health education, dissemination of guidelines, consultation, and rule making. Tracking TB disease, completion of therapy, and drug susceptibility results of new TB cases are at the heart of the work of the TB Control program. Other critical functions include monitoring the contacts of cases with active TB. To that end, the program maintains registries to monitor: (1) the occurrence, distribution, characteristics (risk factors), and trends of TB morbidity; (2) completion of therapy; (3) TB drug-resistance patterns; and (4) the follow-up of persons exposed to active TB cases to ensure absence of latent TB infection (LTBI) or medical evaluation and completion of preventive therapy if positive for LTBI.

While the TBC assesses burden of disease/infection, its characteristics and distribution and the risk factors associated with disease, the local health departments (county and tribal) and the Indian Health Service units provide the direct patient care (tests, medical evaluation, therapy, and contact investigations). Local health departments also coordinate with private and other public providers (eg, correctional health) who provide these services t patients with TB disease or LTBI.

The Arizona State Public Health Laboratory provides testing services including AFB smear, culture, identification, and susceptibility testing for clinical mycobacterial samples statewide and serves as a reference laboratory for all isolates suspected to be positive for TB in the state. Starting in 2004, all first time positive isolates at the state laboratory have been forwarded to an outside laboratory for genotyping to allow for epidemiological linking of cases. The State Laboratory also performs drug susceptibility testing on all first time positive isolates. The State Laboratory currently has the capacity to test susceptibility to the following drugs: isonaizid, rifampin, ethambutol, pyrazinamide, capreomycin, ethionamide, ofloxacin, and streptomycin.

We acknowledge with gratitude the efforts of all public and private (clinicians and laboratorians) providers who make this report possible via their consistent and timely reporting of disease and drug susceptibility results.

Incidence of TB

Arizona reported 281 cases of active tuberculosis (TB) in 2005, ranking 13th among reporting states in the U.S. This reflects a 3% increase from the previous year. While the U.S. has seen a 34% decline in the number of TB cases for the past 10 years (1996-2005), Arizona has documented a relatively stable number of cases with a mean of 276 cases and range between 254 and 296 cases in the ten year period. (Table 1 and Figure 1). However, due to a significant increase in population growth in the past 10 years, TB rates in Arizona have decreased from 6.1 cases per 100,000 population in 1996 to 4.6 in 2005.

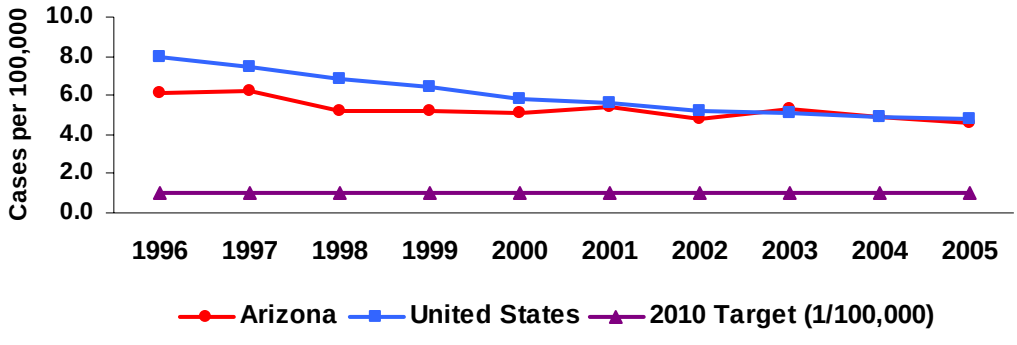
Table 1. Tuberculosis Cases and Case Rates per 100,000 Population, Arizona and United States, 1996 - 2005

	Arizona			United States[a]	
Year	Cases	Population[b]	Rate	Cases	Rate
1996	282	4,586,940	6.1	21,337	8.0
1997	296	4,736,990	6.2	19,851	7.4
1998	254	4,883,342	5.2	18,361	6.8
1999	262	5,023,823	5.2	17,531	6.4
2000	261	5,130,632	5.1	16,377	5.8
2001	289	5,306,966	5.4	15,989	5.6
2002	263	5,456,453	4.8	15,078	5.2
2003	295	5,580,811	5.3	14,871	5.1
2004	272	5,743,834	4.7	14,511	4.9
2005	281	6,044,985	4.6	14,093	4.8

[a]Data from U.S. Department of Health and Human Services, Centers for Disease Control and Prevention, available at: http://www.cdc.gov/nchstp/tb/surv/surv2003/default.htm

[b]Population denominators for 1995-2003 are estimates from the National Center for Health Statistics (http://www.cdc.gov/nchs/about/major/dvs/popbridge/popbridge.htm), with the exception of year 2000, which is taken from the 2000 U.S. Census

Figure 1. Tuberculosis Case Rates per 100,000, Arizona and United States, 1996 - 2005



Age/Gender/Race/Ethnicity

The majority of TB cases (63%) in Arizona in 2005 were in the 25 to 64 year old age group with a mean and median age of 41.4 and 41.0 years, respectively (Figure 2). Of great concern is the percentage of cases among persons under the age of 25 (22%). There were also a significant number of cases in individuals over the age of 65. This group comprised 16% of the total cases. Males accounted for 65% of cases (n=182). The breakdown by race/ethnicity was 62% Hispanic; 19% White, non-Hispanic; 8% Black, non-Hispanic; 7% Asian; and 5% Native American (Figure 3). The highest TB case rate occurred in Asians with 17.2 cases per 100,000 n=20). However, the Asian population in Arizona is small, which translates to a high rate but small number of cases. The TB case rate for Hispanics was 11.4 cases per 100,000 (n=174) (Table 2).

Figure 2. Tuberculosis Cases by Age Group and Gender, Arizona, 2005

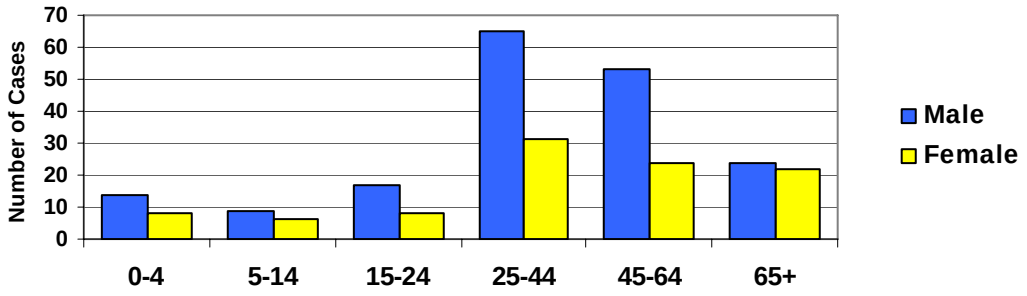


Figure 3. Case Rates and Percentage of Tuberculosis Cases by Race/Ethnicity, Arizona, 2005

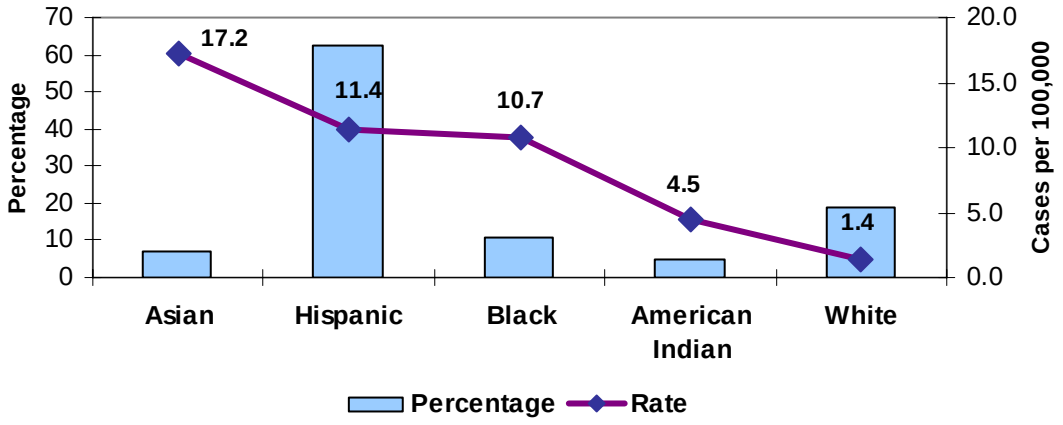


Table 2. Tuberculosis Cases by Ethnicity, Gender and Age Group, Arizona, 2005

Total by Ethnicity	Age Group (years)						Total by Ethnicity		
	< 5	5-14	15-24	25-44	45-64	65+	No.	(%)	Rate[a,b]
American Indian[c]									
Male	0	0	2	1	0	6	9		
Female	0	0	1	0	2	1	4		
Total	0	0	3	1	2	7	13	(4.6)	4.5
Asian									
Male	1	0	0	2	4	2	9		
Female	0	0	0	6	4	1	11		
Total	1	0	0	8	8	3	20	(7.1)	17.2
Black, Not Hispanic									
Male	1	1	5	1	4	2	14		
Female	3	2	0	1	1	0	7		
Total	4	3	5	2	5	2	21	(7.5)	11.2
Hispanic or Latino[d]									
Male	12	8	9	51	31	9	120		
Female	5	3	7	24	6	9	54		
Total	17	11	16	75	37	18	174	(61.9)	11.4
Native Hawaiian[e]									
Male	0	0	0	0	0	0	0		
Female	0	0	0	0	0	0	0		
Total	0	0	0	0	0	0	0	(0.0)	N/A
White, Not Hispanic									
Male	0	0	1	10	14	5	30		
Female	0	1	0	0	11	11	23		
Total	0	1	1	10	25	16	53	(18.9)	1.4
More than one race									
Male	0	0	0	0	0	0	0		
Female	0	0	0	0	0	0	0		
Total	0	0	0	0	0	0	0	(0.0)	N/A
Total by Gender									
Male	14	9	17	65	53	24	182	(64.8)	6.0
Female	8	6	8	31	24	22	99	(35.2)	3.3
Total by Age Group									
No.	22	15	25	96	77	46	281		
(%)	(7.8)	(5.3)	(8.9)	(34.2)	(27.4)	(16.4)		(100.0)	
Rate[a,b]	4.9	1.7	2.9	5.4	6.1	5.9			4.6

[a]Rate per 100,000 population

[b]In order to obtain the 2005 population denominators, the 2000 percentages of population breakdowns (or census shares) were applied to total state and county population estimates for 2005 released by the Department of Economic Security on 2/23/2006.

[c]Includes American Indians and Native Alaskans

[d]Persons of Hispanic or Latino origin may be either Black or White

[e]Includes Native Hawaiians and Pacific Islanders

TB in Children <5 Years of Age

Active TB in young children is indicative of ongoing transmission in the community and more importantly missed opportunities for preventive therapy. This group accounted for 8% (n=22) of all cases. Children <5 years of age had a case rate of 4.9 cases per 100,000 compared to the overall rate of 4.6 cases per 100,000 in Arizona. Nationwide, children <5 had a rate of 2.8 cases per 100,000 and comprised 3.8% of overall cases in 2004, the most recent year for which data is available. Additionally, 77% of pediatric (<5 years) TB cases in 2005 occurred among Hispanics in Arizona (Table 2). Of the 22 pediatric cases, 16 were born in the United States and 6 were foreign born. Mexico was the country of origin for three of the six foreign born pediatric cases.

Site of Infection and Deaths

Pulmonary TB with no additional site of disease accounted for 82.2% of all cases in 2005 (Table 3). Extrapulmonary disease accounted for 12.8% of all cases. Cervical lymphadenopathy with no pulmonary involvement comprised 36.1% of all extrapulmonary cases and 4.6% (n=13) of total cases. There were eleven deaths documented in 2005 due to tuberculosis.

Table 3. Tuberculosis Cases by Form of Disease and Vital Status at Diagnosis, Arizona, 2005

Form of Disease	Alive at Diagnosis		Diagnosis After Death		Total Cases		
	No.	(%)	No.	(%)	No.	(%)	(%)
Pulmonary[a]	229	(99.1)	2	(0.9)	231	(100.0)	(82.2)
Extrapulmonary[b]	35	(97.2)	1	(2.8)	36	(100.0)	(12.8)
Persons with Both Pulmonary and Extrapulmonary Disease	12	(85.7)	2	(14.3)	14	(100.0)	(5.0)
Total Cases (%)	276	(98.2)	5	(1.8)	281	(100.0)	(100.0)

[a]Includes cases with pulmonary listed as major site of disease and no additional site of disease

[b]Includes cases with pleural, lymphatic, bone and/or joint, meningeal, peritoneal, or other site, excluding pulmonary, listed as the major site of disease

Risk Factors

Table 4. Tuberculosis Cases by Selected Risk Factors, Arizona, 2000 - 2005

	2000		2001		2002		2003		2004		2005	
	No.	(%)	No.	(%)	No.	(%)	No.	(%)	No.	(%)	No.	(%)
Occupation												
Correctional Facility Worker	0	(0.0)	0	(0.0)	0	(0.0)	0	(0.0)	0	(0.0)	0	(0.0)
Health Care Worker	6	(2.3)	5	(1.7)	3	(1.1)	3	(1.0)	7	(2.6)	1	(0.4)
Migrant Farm Worker	9	(3.4)	6	(2.1)	8	(3.0)	4	(1.4)	10	(3.7)	5	(1.8)
Reported Behaviors												
Injecting Drug Use[a]	11	(4.2)	11	(3.8)	10	(3.8)	5	(1.7)	7	(2.6)	10	(3.6)
Non-injecting Drug Use[a]	20	(7.7)	22	(7.6)	27	(10.3)	24	(8.1)	31	(11.4)	19	(7.0)
Excess Alcohol Use[a]	46	(17.6)	61	(21.1)	41	(15.6)	57	(19.3)	48	(17.6)	28	(10.3)
Type of Residence												
Long Term Care Facility[b]	7	(2.7)	12	(4.2)	7	(2.7)	5	(1.7)	9	(3.3)	7	(2.5)
Correctional Facility[b]	21	(8.0)	16	(5.5)	19	(7.2)	39	(13.2)	36	(13.2)	40	(14.2)
Homeless[a]	39	(14.9)	45	(15.6)	32	(12.2)	36	(12.2)	20	(7.4)	22	(7.8)
Country of Birth												
Foreign Born[c]	147	(56.3)	134	(46.4)	137	(52.1)	172	(58.3)	156	(57.4)	172	(61.2)
Underlying Disease												
HIV infection, All Ages[d]	18	(6.9)	12	(4.2)	18	(6.8)	17	(5.8)	23	(8.5)	19	(6.8)
HIV infection, 25-44 Years Old[d]	13	(14.3)	8	(8.9)	12	(14.0)	13	(14.6)	19	(18.3)	12	(12.5)
Total Cases	261		289		263		295		272		281	

[a]Within one year prior to diagnosis of tuberculosis.

[b]Residence at time of diagnosis.

[c]Includes persons born outside the United States and its territories.

[d]Tuberculosis cases with a reported positive HIV test result. The percent positive represents HIV co-infection among all verified TB cases, including those not tested for HIV infection.

i) Foreign-Born Cases

Per Table 4, in 2005, the single most important risk factor (among those widely used nationwide) associated with TB was birth outside the U.S. (61.2% of all cases). When considering foreign born cases only, the majority (68%) were from Mexico (Figure 4). Over the last ten years there is an increasing trend in percentage of foreign born individuals in relation to overall number of cases in Arizona (Figure 5).

Figure 4. Country of Origin for Foreign-born TB Cases, Arizona, 2005

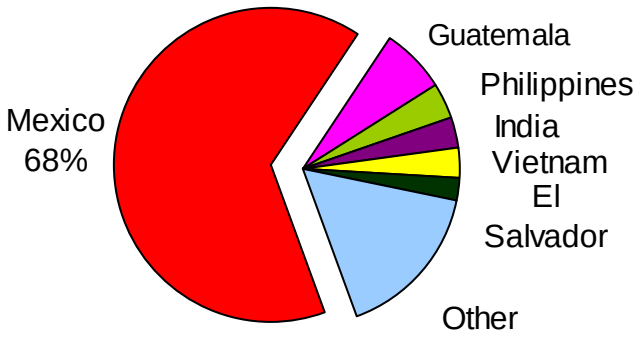
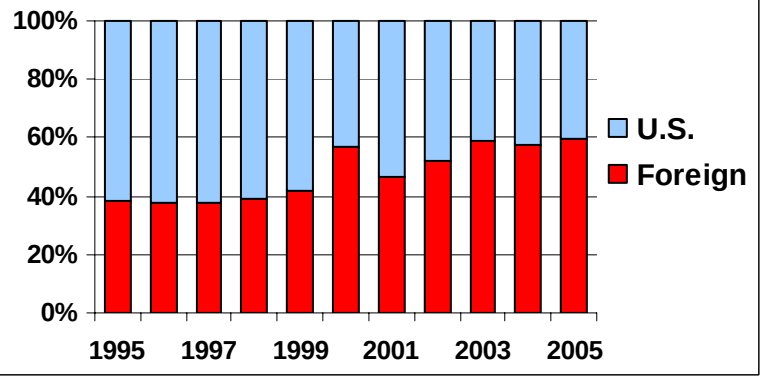


Figure 5. Percentage of TB Cases in Foreign-Born Persons, Arizona, 1995 - 2005

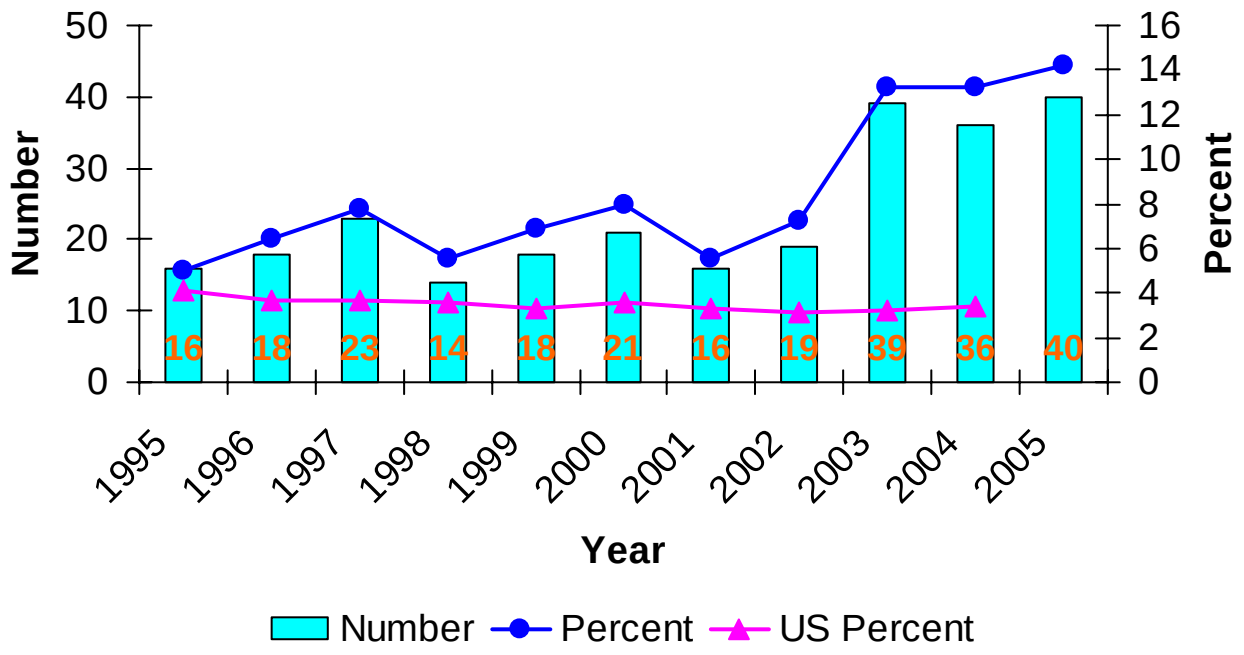


ii) Correctional Facilities and Related Risk Factors

Other individuals at higher risk of exposure to *M. tuberculosis* are those in correctional facilities, those with a history of drug/alcohol abuse, or those with a history of homelessness (Table 4). Arizona had the highest percentage (14.2%) of its total cases in correctional facilities nationally in 2005 (Figure 6). Routine evaluation for TB of all inmates during intake allows for diagnosis of both latent and active infection in this population. Cases were identified in local jails (n=10), state (n=5) and federal prisons/US Immigrations and Customs Enforcement (ICE) (n=12) and private facilities (n=13). The mean age of those diagnosed with TB in a correctional facility in 2005 was 36.4 years and 98% (n=39) were male. Eighty-three percent (n=33) of the correctional TB cases were foreign born with Mexico being reported as the country of origin by

58% (n=23) of the foreign-born patients. New inmate TB screening requirements in correctional facilities were implemented in 2004 to address the problem of tuberculosis in this setting. Additionally, the program has been working closely with correctional health staff on TB education and regulation implementation.

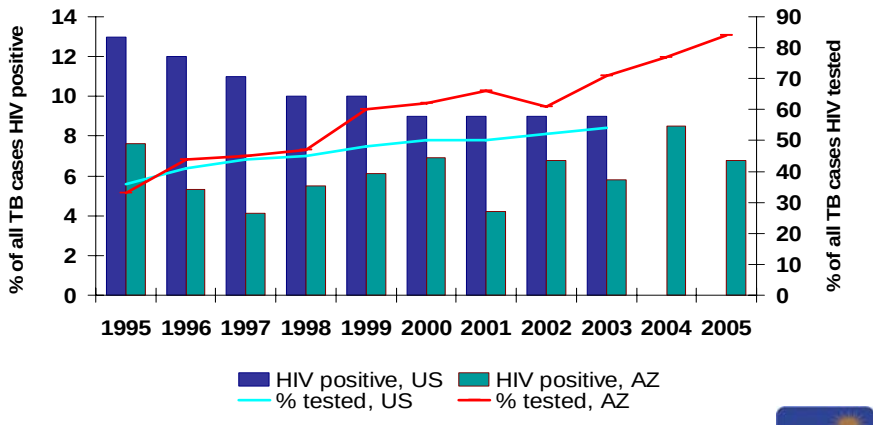
Figure 6. Number and Percent of TB Cases Diagnosed in Correctional Facilities, Arizona and the U.S., 1995-2005*



iii) TB/HIV

Co-infection with HIV in individuals with TB is a major concern due to the fact that immune system suppression by HIV can impact the body's ability to fight TB. Individuals with co-infection have higher mortality and are susceptible to increased drug resistance leading to longer and more complex treatment regimens. HIV testing results were available for 84% of cases in 2005 (Figure 7). Of these, 19 (6.8% of total) cases of active TB had documented HIV co-infection (Table 4). Twelve of the 19 cases were in individuals between the ages 25 and 44 reflecting 12.5% of cases in this age group. Additionally 2 cases of co-infection occurred in individuals in correctional facilities.

Figure 7. HIV Co-infection of TB Cases, Arizona and US, 1995-2005



Contacts

Controlling spread of TB through contact investigations is an important piece in TB control and prevention. Contacts are identified through investigations after a sputum AFB-smear positive case is identified. Individuals who are shedding TB in their sputum provide a higher risk of exposure to close contacts. These contacts are identified and evaluated for TB exposure and treated if warranted. In 2003, the last year for which data is finalized, 83% (101/121) of sputum AFB-smear positive cases had contacts identified. The average number of contacts identified per sputum AFB-smear positive case was 35.3 (4272/121) which reflects a four fold increase compared to the previous year. This could be attributed to expanded contact investigations performed in correctional facilities and in schools. Preliminary data for 2004 and 2005 show an average of 3.4 (349/104) and 3.3 (337/101) contacts identified per case, respectively (Tables 5 and 6).

Table 5. Number of Contacts to AFB Sputum Smear Positive TB Cases, Arizona, 2000-2005.

	2001		2002		2003		2004*		2005*	
	No.	(%)	No.	(%)	No.	(%)	No.	(%)	No.	(%)
Cases with Contacts	95	(87)	104	(86)	101	(83)	62	(60)	43	(43)
Cases without Contacts	14	(13)	17	(14)	20	(20)	42	(40)	58	(57)
Total AFB-Smear Positive Cases	109		121		121		104		101	

* Preliminary data

Table 6. Evaluation of Contacts to Sputum AFB-Smear Positive TB Cases, Arizona, 2000-2005.

	2001		2002		2003		2004*		2005*	
	No.	(%)	No.	(%)	No.	(%)	No.	(%)	No.	(%)
Contacts Evaluated	826	(81)	872	(82)	2637	(62)	310	(89)	326	(97)
Contacts not Evaluated	197	(19)	197	(18)	1635	(38)	39	(11)	11	(3)
Total Contacts to AFB-Smear Positive Cases	1023		1069		4272		349		337	

* Preliminary data

Location

Four of Arizona's 15 counties accounted for 92.0% of the state's TB cases. Maricopa County, which includes Phoenix, the fifth largest U.S city, led the state with 169 cases (60.1%). Pima County, a U.S.-Mexico border county that includes Tucson, Arizona's second largest urban area, had 33 cases (11.7%). Yuma County, the border county on the western side of Arizona had 32 cases (11.3%). Pinal County, which contains Arizona's two largest state prison facilities, four private prisons, Immigration and Customs Enforcement Service Processing Center (ICE-SPC), and a county jail, had 25 cases (8.8%). Correctional facilities In Pinal County diagnosed 22 of the 25 reported cases (88%). There were no TB cases reported in 3 counties in 2005, and Greenlee County has not reported a TB case in six years (Figure 8). Even though Gila and La Paz counties had high rates in 2005, it is important to note that they should not be considered reliable given their small populations.

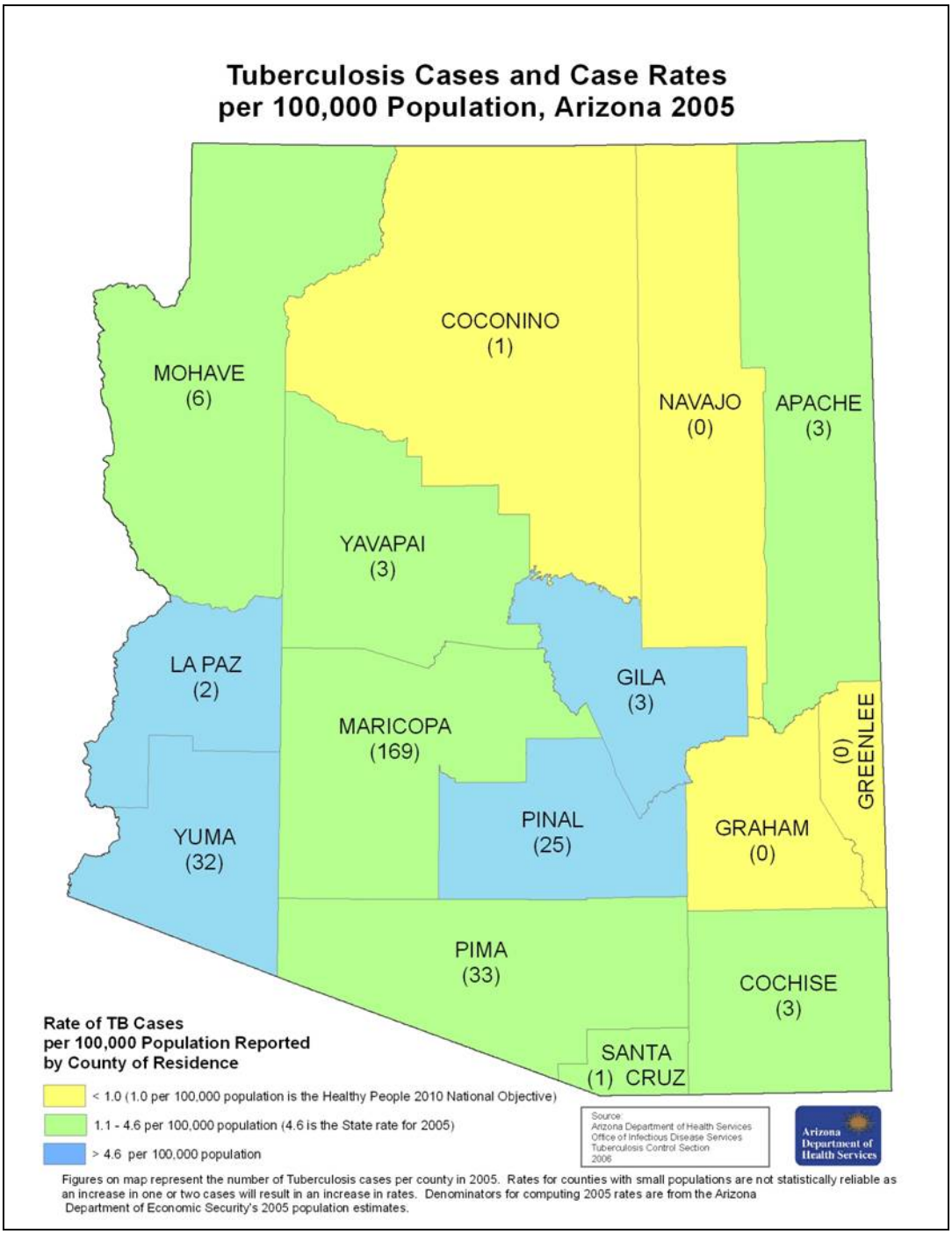


Figure 8. Tuberculosis Cases (in parentheses) and Case Rates per 100,000 by County, Arizona, 2005.

Completion of Therapy

Directly observed therapy (DOT) is the preferred method of administration for TB medication. In DOT, public health field workers observe the patient take his/her medications to ensure compliance. Due to the length of time to complete treatment for TB the most recent finalized data is for 2003. In 2003, 86% of cases had either DOT or a combination of DOT and self-administered treatment (Table 7).

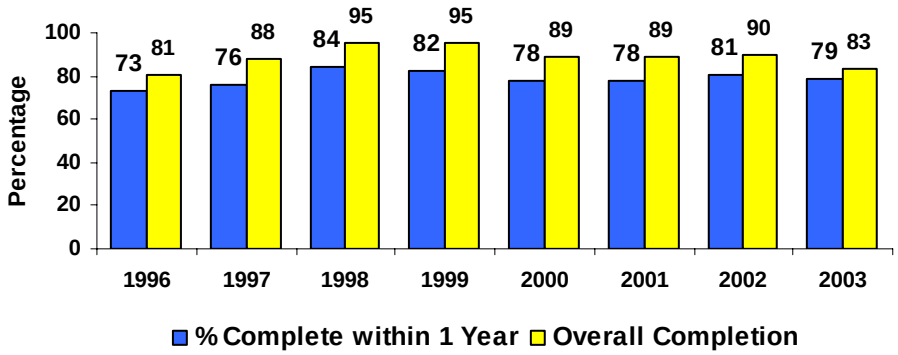
Table 7. Use of Directly Observed Therapy (DOT), Arizona, 1999-2003

	1999		2000		2001		2002		2003	
	No.	%	No.	%	No.	%	No.	%	No.	%
DOT	163	(65)	157	(64)	186	(67)	169	(67)	210	(77)
Both DOT and Self-Administered	33	(13)	40	(16)	40	(14)	34	(14)	24	(9)
Self-Administered Only	53	(21)	50	(20)	51	(18)	38	(15)	31	(11)
Unknown	0	(0)	0	(0)	1	(0)	0	(0)	1	(<1)
Not Available	0	(0)	0	(0)	1	(0)	10	(4)	7	(3)
Total[a]	249	(100)	247	(100)	279	(100)	251	(100)	273	(100)

[a]Includes persons alive at diagnosis with an initial drug regimen of one or more drugs.

The usual treatment for pulmonary TB in Arizona is six months of therapy starting with the standard 4 drugs of isoniazid, rifampin, pyrazinamide, and ethambutol. A goal of 90% completion of therapy within one year has been set by CDC. In 2003, 79% of cases completed treatment within one year and 83% of cases completed therapy overall (Figure 9). Completion of therapy within one year was 56.4% among inmates, 80% among homeless cases, and 79% in non-correctional cases. These highlight the challenges to ensure completion of therapy among inmates and also the successes with the homeless persons with TB in Maricopa County. In 2003, 8% (n=21) of cases in therapy died before completion of therapy. State and local programs are working to improve completion of therapy performance.

Figure 7. Completion of Tuberculosis Therapy, Arizona, 1996 - 2003



Note: Completed in one year or less excludes persons resistant to RIF and children <15 years with meningeal, bone or joint or miliary disease

Drug Susceptibility

Initial drug susceptibility testing was obtained on 94.7% (196/207) of culture-proven TB cases in Arizona in 2005. INH resistance occurred among 20 cases, or 9.6% of culture confirmed cases. Foreign-born individuals accounted for 65% of the drug resistant cases. One multi-drug resistant case was identified in 2005. All multi-drug resistant cases since 2000 have occurred among foreign-born persons (Table 8).

Table 8. Tuberculosis Cases Resistant to INH and Other Anti-TB Drugs, Arizona, 2000 - 2005

Year	Cases	Culture Confirmed	Drug Sensitivity Testing		INH Resistant[a]		MDR[b]		Other Resistance[c]		Total Resistance[d]	
			No.	(%)	No.	(%)	No.	(%)	No.	(%)	No.	(%)
2000	261	228	221	(96.9)	17	(7.7)	3	(1.4)	19	(8.6)	36	(16.3)
2001	289	228	226	(99.1)	12	(5.3)	3	(1.3)	18	(8.0)	30	(13.3)
2002	263	212	209	(98.6)	11	(5.3)	1	(0.5)	24	(11.5)	35	(16.7)
2003	295	228	227	(99.6)	14	(6.2)	2	(0.9)	19	(8.4)	33	(14.5)
2004	272	206	204	(99.0)	20	(9.8)	2	(1.0)	23	(11.3)	43	(21.1)
2005	281	207	196	(94.7)	20	(9.6)	1	(<1)	20	(9.6)	41	(19.8)

[a]Isolates may also be resistant to other drugs, including rifampim, includes initial and final susceptibility results

[b]Resistant to at least isoniazid and rifampin, includes initial and final susceptibility results

[c]Other patterns of drug resistance excluding INH resistance

[d]Isolates with resistance to any first or second line TB drug

International Referral and Case Management

The Arizona TB Control Programs coordinate with international referral agencies to ensure continuity of care for individuals with TB or suspected of having TB who migrate to or from the United States. CureTB facilitates the referral process with Mexican health officials. TBNet facilitates the referral process for all other countries. An important tool that is used to track some of these migrating patients (to/from Mexico) and their health care needs is the Binational Health Card. In 2005, Arizona TB programs referred approximately 85 individuals to CureTB or TBNet.

Class B1/B2 Referrals

Individuals immigrating to the United States are evaluated for TB as part of the admission process. An immigrant found to have active TB that is not infectious is classified as a Class B1. Those with a chest x-ray that suggests a history of TB disease that is not currently active are classified as Class B2. The state of residence for those that are suspected of having TB infection is notified of all class B1 and B2 individuals identified. These referrals are then forwarded to the appropriate county so that further evaluation and treatment for infection may be pursued. In 2005, ADHS received 102 class B notifications that were forwarded to counties for follow up.

"Meet and Greet" Program

The goal of the Arizona "Meet and Greet" program is to ensure continuity of care for individuals being treated for TB who are being deported to Mexico. "Meet and Greets" require coordination between the Arizona Department of Health Services (ADHS) TB Control Program, ADHS Office of Border Health, Sonoran Health Officials, Immigration and Customs Enforcement (ICE), local health departments, and the correctional facility or detention center that is housing the individual. The Department initiated nine "Meet and Greets" in 2005 and five were successfully completed.

The *Tuberculosis Surveillance Report* is published annually by the Arizona Department of Health Services, Tuberculosis Control Section. All data are provisional. Report finalized on 6/29/2006 based on data available 6/12/2006.