# Tuberculosis Surveillance Report

## Arizona, 2012

Arizona Department of Health Services

Bureau of Epidemiology and Disease Control Services

Office of Disease and Integration Services

May 2013

**Executive Summary**

The Arizona Department of Health Services (ADHS) TB Control Program (the Department) conducts surveillance, data analysis, program evaluation, and consultation for Arizona's local health departments which provide direct patient care for TB patients. This 2012 Tuberculosis (TB) Annual Surveillance Report provides descriptive data for TB in Arizona.

- In 2012, there were 211 cases of active TB disease reported in Arizona. The 2012 TB case rate in Arizona was 3.3 per 100,000 population compared to 3.2 per 100,000 nationally. Four of Arizona's fifteen counties Maricopa, Pinal, Pima and Yuma comprised 90.9% (192/211) of active TB cases reported. Maricopa County, the most highly populated county in Arizona, reported 51.2% (108/211) of the state's cases.

- Risk factors identified for Arizona TB cases included:
    - 70.6% (149/211) of the TB cases reported a country of birth other than the U.S.
    - 26.5% (56/211) of the TB cases were diagnosed while a resident in a correctional facility.
    - 17.1% (36/211) of the TB cases had diabetes mellitus.
    - 5.2% (11/211) of the TB cases were reported with HIV co-infection.

- Drug susceptibility testing was reported for 98.2% (165/168) of the culture positive TB cases.
    - 7.9% (13/165) reported isoniazid (INH) resistance.
    - No cases of multi-drug resistance TB were reported.

- Completion of treatment has been a major concern of the Department. The latest year for which completion of treatment data is available is 2010. The Department saw improvement for completion of treatment of both correctional and non-correctional TB cases.
    - Completion of treatment within twelve months for non-correctional TB cases was 90.7% (176/194) in 2010. Overall completion of treatment for non-correctional facility cases was 96.0% (193/201) compared to 85.3% (151/177) in 2009.
    - Completion of treatment within twelve months for correctional TB cases was 59.1% (13/22) compared to 39.4% (13/33) in 2009. In 2010, there were a total of 61 correctional facility TB cases and 67.2% (41/61) were lost to follow-up due to repatriation, transfer to a facility out of Arizona or a community release.

- Continuity of care for active TB cases who return to their home country is achieved with international referrals via CureTB and TBNet. These agencies provide assistance to TB cases for medical follow-ups and continuation of treatment. The Department coordinates Meet and Greets through the Ports of Entry of Nogales and San Luis for cases returning to Mexico. These Meet and Greets are coordinated with several outside agencies as well as the Department. In 2012, six meet and greets were arranged.

**The Arizona Department of Health Services Tuberculosis Control Program**

The Department has overall responsibility for surveillance, management, and evaluation of TB activities in Arizona. The Department provides epidemiological, technical, medical, nursing, and programmatic consultative services regarding TB prevention and control to health care providers, local and tribal health departments (LHDs) TB control programs, and health care facilities. Through collaboration with the Arizona State Public Health Laboratory (ASPHL), the Department ensures appropriate laboratory testing for specimens and monitors drug-resistance patterns in the state.

Arizona is comprised of fifteen counties and twenty-one federally recognized tribes. The LHDs provide all direct patient care for TB control activities. The LHDs coordinate with medical providers and correctional health staff members within their jurisdiction to provide TB control services.

The Arizona State Public Health Laboratory provides testing services including acid-fast bacillus (AFB) smear, culture, identification, and drug susceptibility testing for clinical mycobacterial samples statewide. The laboratory serves as a reference laboratory for all isolates suspected to be positive for TB and performs drug susceptibility testing for all first–time positive isolates. The laboratory also sends isolates to the CDC contract lab in California for genotyping of all positive culture isolates.

This report provides information about Arizona's reported TB cases in 2012 and completion of treatment for 2010. The latest year for completion of treatment information is available is 2010 due to length of time needed to successfully complete TB treatment.

**Figure 1. TB Cases and Case Rates in Arizona and Nationally, 2002-2012**

In 2012, Arizona's LHDs reported 211 cases of active TB with a case rate of 3.3 per 100,000. This represents an 8.2% decrease in number of cases and 17.0% decrease in case rate compared to 2011. In the United States, a total of 9,951 TB cases were reported in 2012 with a case rate of 3.2 per 100,000. This was the lowest rate recorded in the U.S. since 1953.

Pulmonary TB disease was diagnosed in 77.7% (164/211) of the cases. Extrapulmonary disease represented 12.8% (27/211) of the cases. The diagnosis of both pulmonary and extrapulmonary disease was reported in 9.5% (20/211) of the cases.

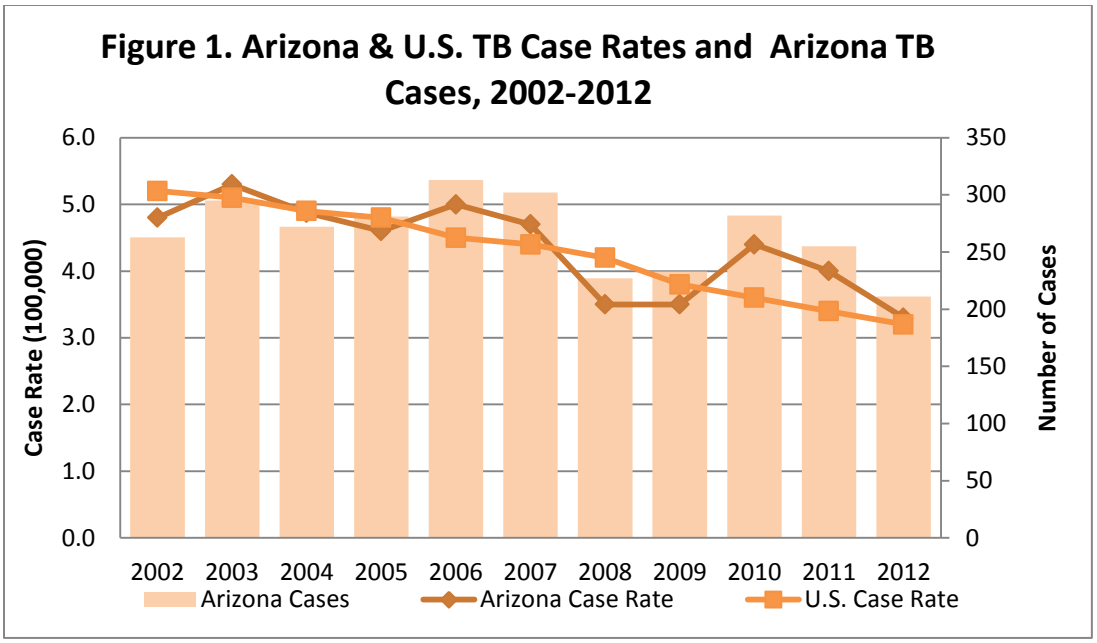



**Figure 2. TB Cases Rates by Selected Population Groups, Arizona, 2012.** In 2012, the TB case rate among foreign-born individuals was 17.1 per 100,000. The case rate among U.S. –born persons was 1.1 per 100,000. Among U.S. –born Non-Hispanic blacks, the rate was 2.2 per 100,000. TB case rates among children less than five years of age was 0.7 per 100,000.

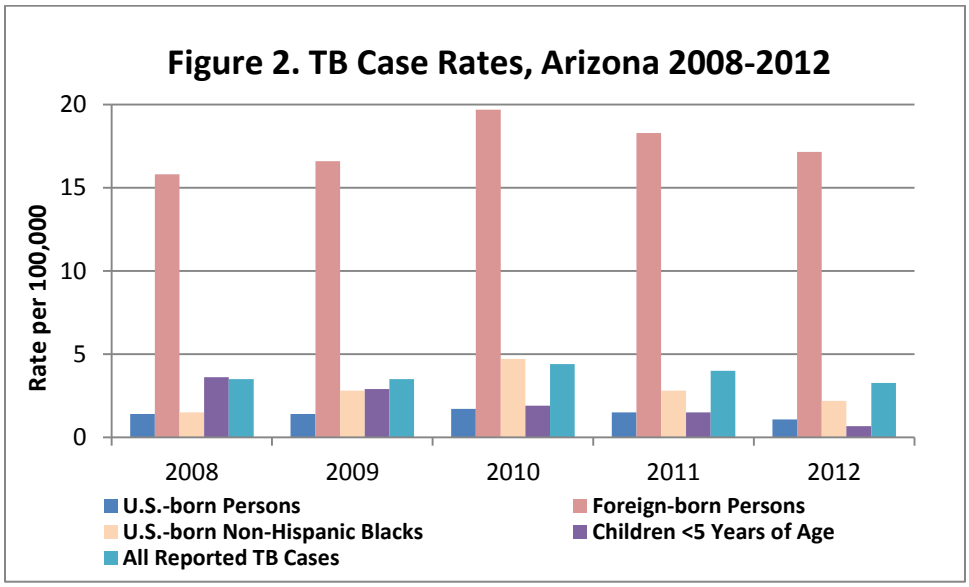


**Figure 3. TB Cases by County of Residence, Arizona 2012.** Four of Arizona's fifteen counties, Maricopa, Pima, Pinal and Yuma accounted for 90.9% (192/211) of all cases reported. Maricopa County, the most highly populated county in Arizona, reported 51.2% (108/211) of the state's cases.

The TB cases reported from Pinal County accounted for 19.9% (42/211) of cases statewide with 88.1% (37/42) diagnosed in a correctional facility. There are twenty-one correctional facilities located within Pinal County, including U.S. Immigrations and Customs Enforcement Service Processing Centers (ICE-SPC), federal, state, local and privately managed facilities. Yuma County reported 12.3% (26/211) of total cases and Pima County reported 7.6% (16/211). In 2012, there were no cases reported in Santa Cruz or Graham County.

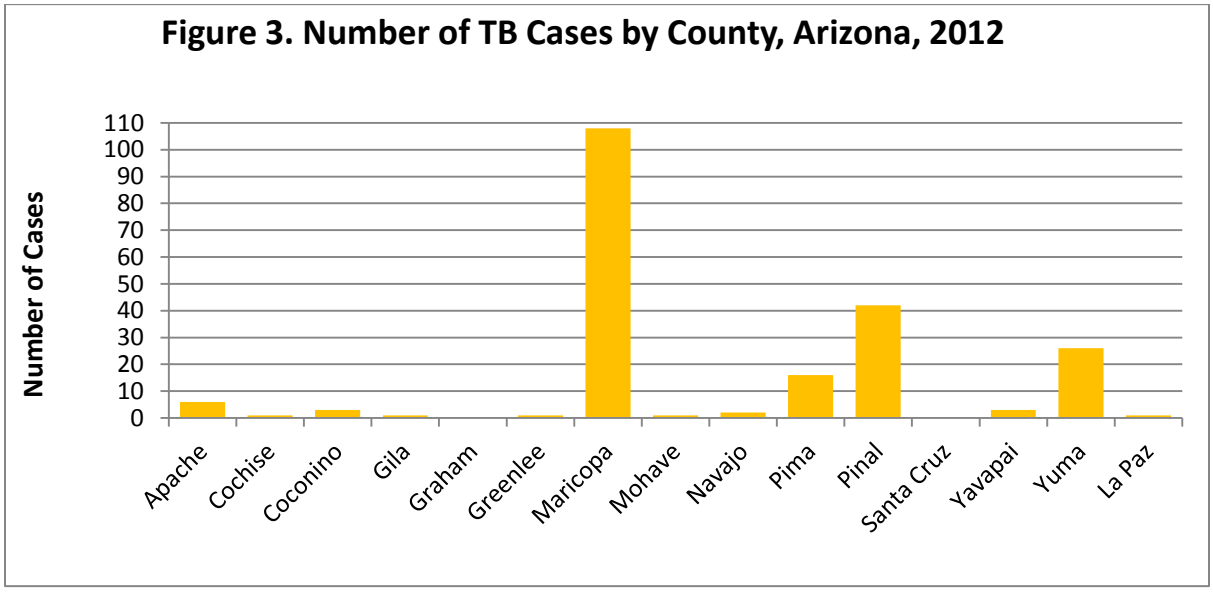


**Figure 4. TB Case Rates by County, Arizona 2012.** The statewide TB case rate was exceeded in Apache, Greenlee, Pinal, Yuma and La Paz counties. Maricopa County, which reports around 50% of the states TB cases annually decreased from 3.1 per 100,000 in 2011 to 2.8 per 100,000 in 2012. This is lower than the state and national rate.

Pinal County decreased from 13.6 to 11.0 per 100,000. Yuma County decreased from 15.3 per 100,000 in 2011 to 12.9 per 100,000. Both La Paz and Greenlee counties increased from 2011 as no cases were reported that year. In 2012, both counties reported 1 case. Both counties have very low populations therefore their case rates are artificially elevated.

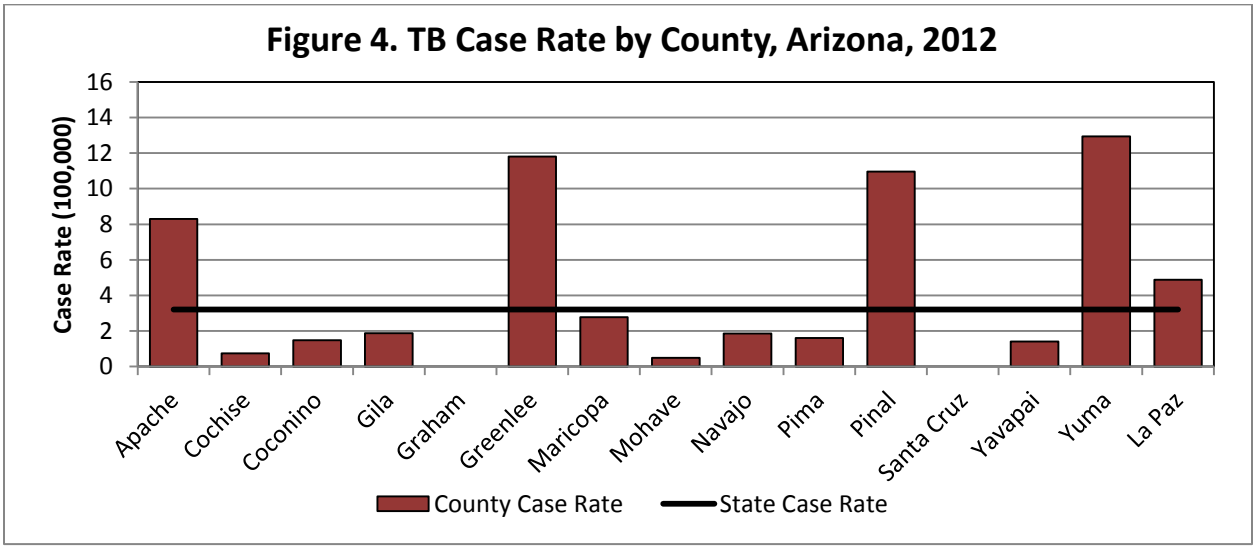



**Figure 5. Number of TB cases by Race and Ethnicity and Figure 6. Case Rates by Race and Ethnicity.** Hispanic ethnicity of any race accounts for 58.3% (123/211) of all reported TB cases annually. TB cases of Asian descent accounted for 14.2% (30/211) followed by African-American at 11.4% (24/211), Non-Hispanic Whites 9.0% (19/211) and Native American accounted for 7.1% (15/211) of the cases.

The highest TB case rate among racial/ethnic groups was reported for TB cases of Asian descent with15.0 per 100,000. The rate decreased 26.8% from 20.5 per 100,000 in 2011. The rates among Native Americans decreased 23.6% from 5.5 per 100,000 in 2011 to 4.3 per 100,000 in 2012. TB case rates among Hispanics decreased 10.7% from 7.5 per 100,000 in 2011 to 6.7 per 100,000 in 2012 The TB case rate among African-Americans increased 21.3% from 7.0 per 100,000 in 2011 to 8.9 per 100,000 in 2012.

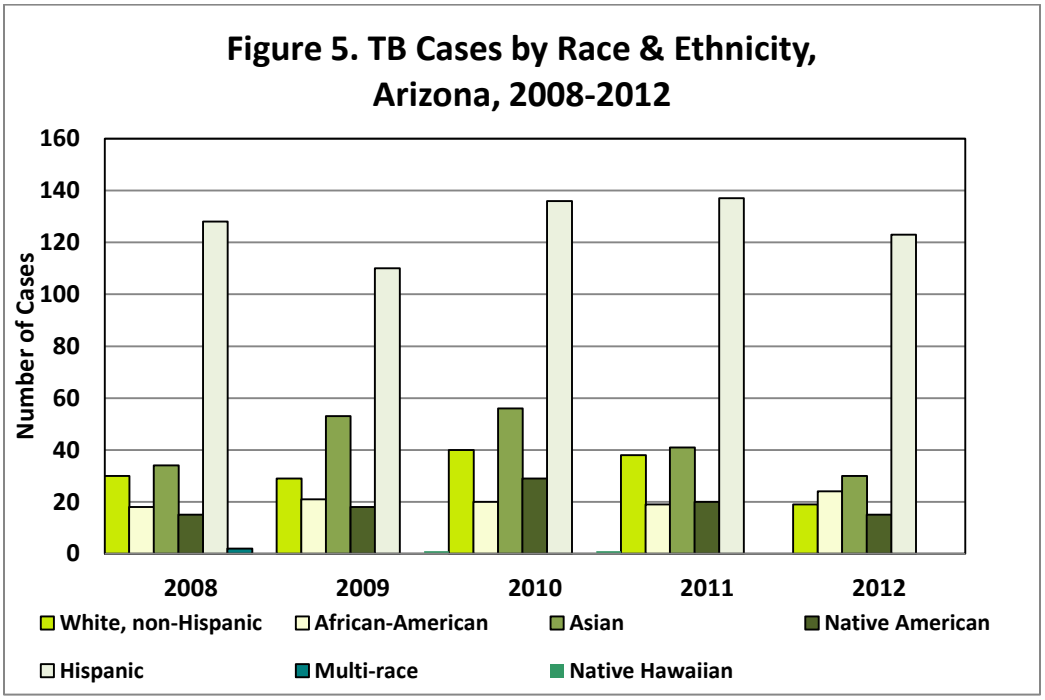


Figure 5. TB Cases by Race & Ethnicity, Arizona, 2008-2012
Number of Cases
160
140
120
100
80
60
40
20
0
2008
2009
2010
2011
2012
White, non-Hispanic
African-American
Asian
Native American
Hispanic
Multi-race
Native Hawaiian

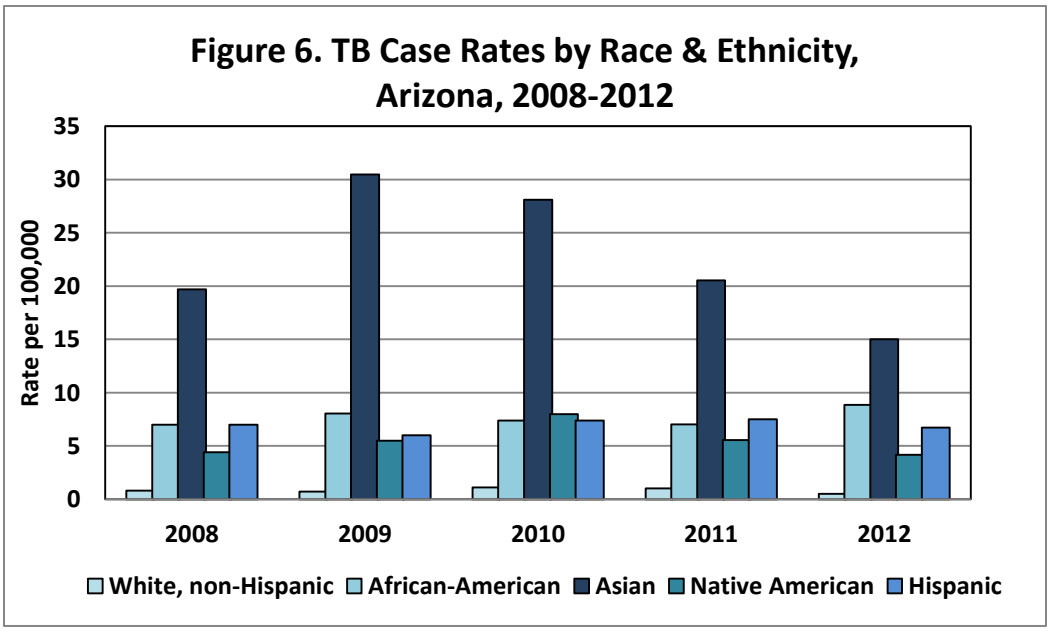
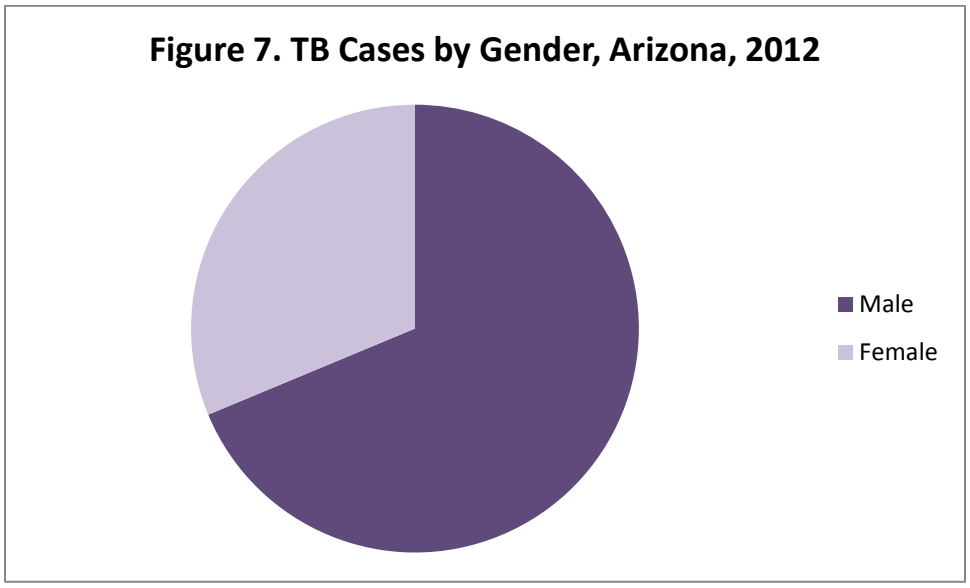


Figure 6. TB Case Rates by Race & Ethnicity, Arizona, 2008-2012
Rate per 100,000
35
30
25
20
15
10
5
0
2008
2009
2010
2011
2012
White, non-Hispanic
African-American
Asian
Native American
Hispanic

**Figure 7. and 8. TB Cases by Gender, Arizona, 2012**. In 2012, males accounted for 68.7% (145/211) of active TB cases. Females accounted for 31.3% (66/211) of cases. This is consistent with previous year's data.



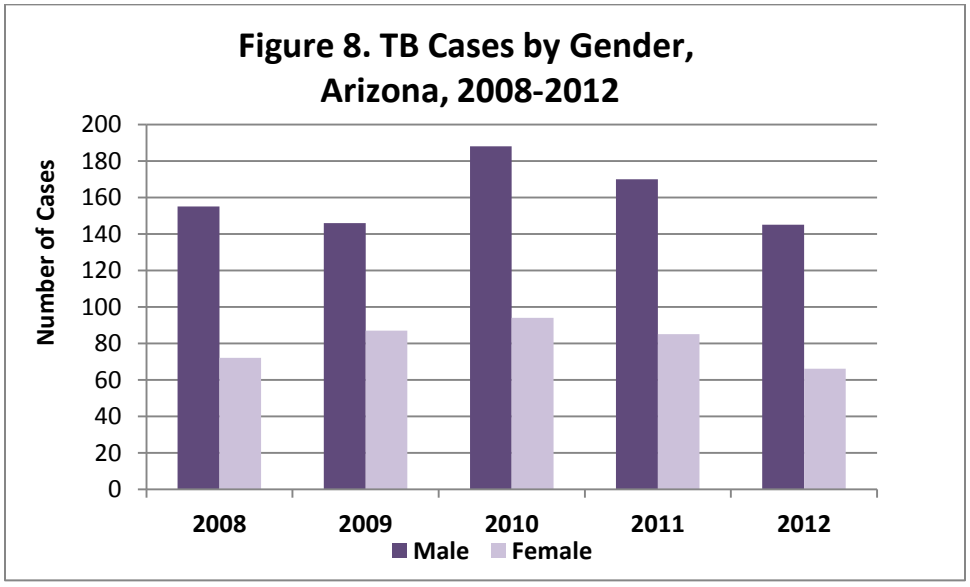
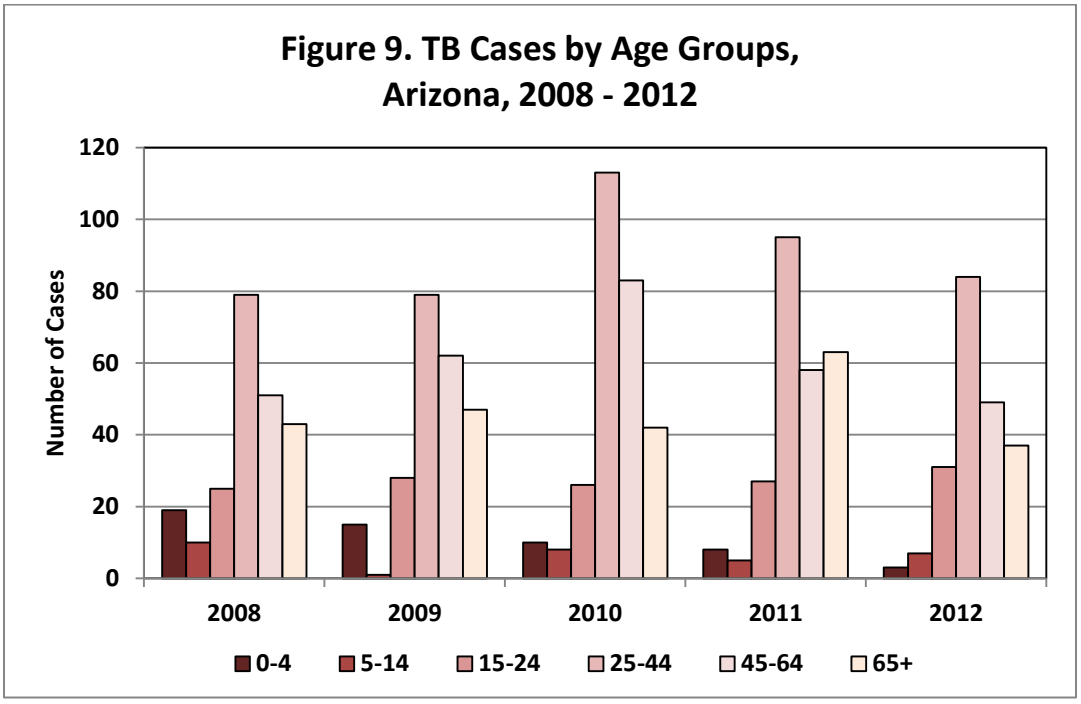




**Figure 9. Number of TB Cases by Age Groups and Figure 10. TB Case Rates by Age Groups.** In 2012, 39.8% (84/211) of TB cases were reported in the 25 – 44 year age group. Those in the 45 – 64 year age group accounted for 23.2% (49/211) of TB cases followed by the 65+ age group with 17.5% (37/211) and the 15 -24 age group with 14.7% (31/211). Pediatric cases aged 5 – 14 years contributed 3.3% (7/211) and those 4 and under accounted for 1.4% (3/211) of all cases.

In Arizona, the highest case rates occurred in the 25 - 44 year old age group (6.8 per 100,000). The second highest occurred in those 65 years or older (4.2 per 100,000). The TB case rate declined 11.7% for the 25 – 44 year old age group from 2011. The TB case rate decreased 40.8% for the age group of 65 years of age and older from 2011. Also, the TB case rate declined 38.9% from 2011 for cases aged 0 – 4 years.



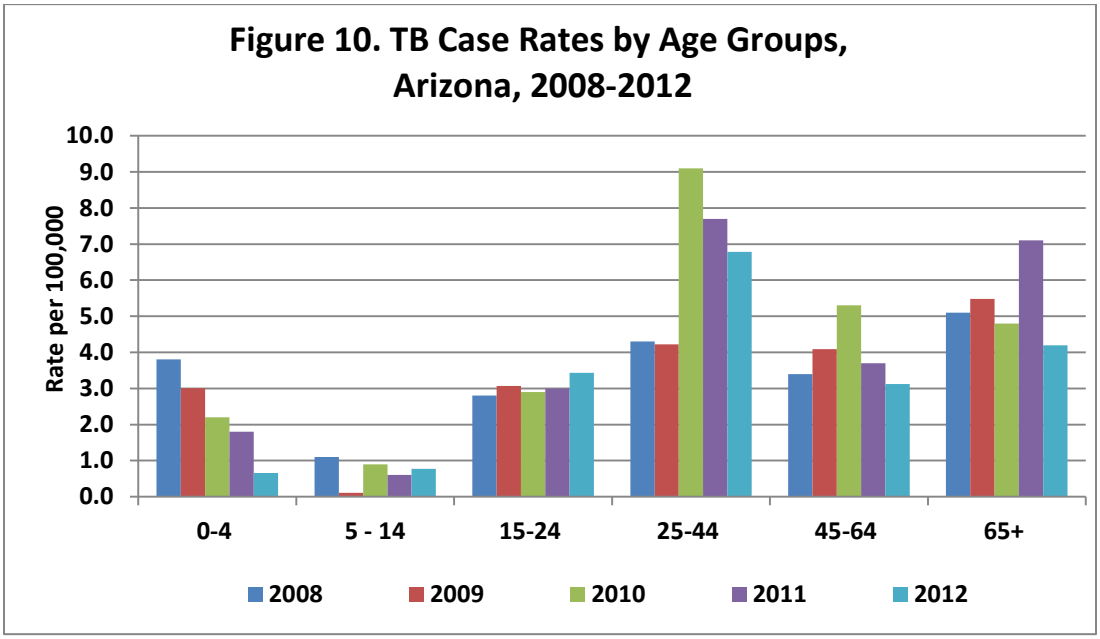
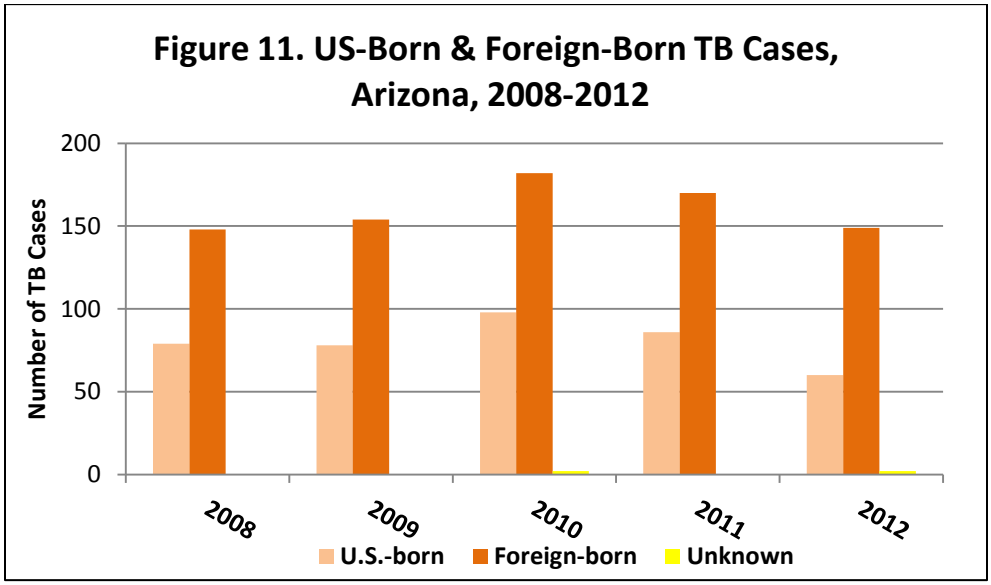



**Figure 11 and 12. TB Cases by Country of Birth, Arizona 2012.** Over half of all reported TB cases reported in the United States occur among foreign-born persons. The risk of disease among the foreign-born also appears related to chronological age and age at immigration; younger people and those who immigrated at younger ages are at lower risk for subsequent infection with TB. In 2012, 70.6% (149/211) of the TB cases were identified as foreign born-cases. U.S.-born TB cases accounted for 28.4% (60/211) of total reported cases. For TB surveillance purposes, a U.S.-born person is defined as someone born in the United States or its associated jurisdictions or someone born in a foreign county but with at least one U.S.-citizen parent.

For country of birth besides the United States, Mexico accounted for the highest percentage with 35.1% (74/211). Guatemala has the second highest with 7.1 % (15/211) of cases considered foreign-born. Bhutan and the Philippines accounted for 3.3% (7/211) of cases each. Somalia accounted for 2.4% (5/211) of cases and Honduras and Vietnam contributed 1.9% (4/211) cases each.



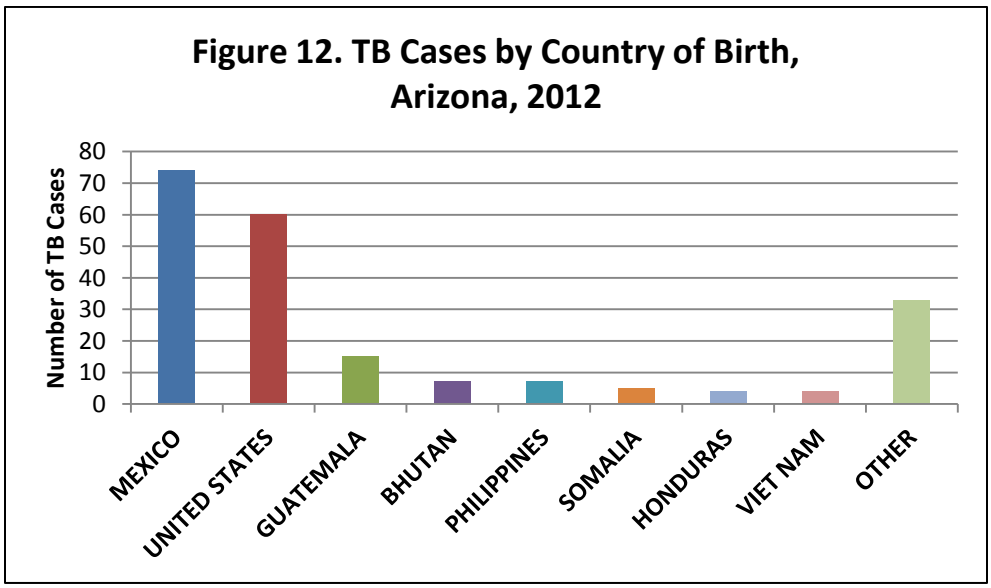



**Figure 13. Percentage of TB cases with HIV Co-infection and % HIV Results Known, Arizona 2008 -2012.** HIV is the strongest known risk factor for TB disease. The Department recommends all medical providers to provide HIV counseling and testing for all TB patients. Co-infection with HIV and TB in individuals is a major concern. Immunosuppression by HIV can negatively impact the body's ability to fight infection. Individuals with co-infection have high mortality rates and are more susceptible to increased drug resistance. This leads to longer and more complex treatment regimens.

In 2012, 89.6% (189/211) of all reported cases had HIV screening results reported and with positive results reported for 5.2% (11/211) of the cases. In TB cases within the 25 - 44 year old age group, HIV screening results were reported for 96.4% (81/84) of TB cases with 8.4% (7/84) reported positive results.

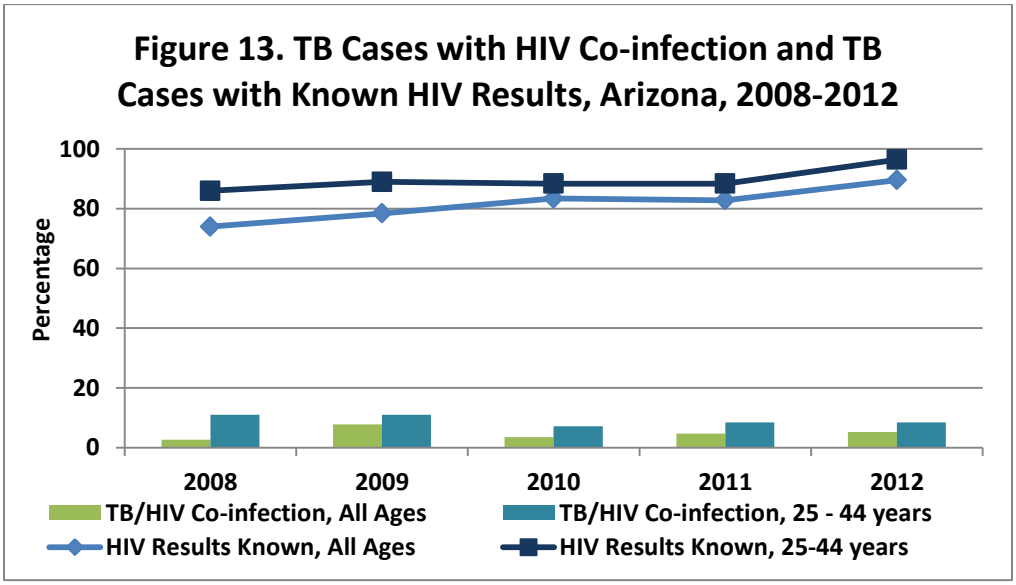


**Figure 14. TB Cases diagnosed in a Correctional Facility.** Arizona has consistently ranked as one of the highest states in the nation for percentage of TB cases diagnosed while incarcerated. In 2012, among reported cases over the age of fourteen, residence in a correctional facility at time of diagnosis represented 27.2% (55/202) of cases. Routine evaluation of all inmates for TB during the intake process allows for diagnosis of both latent and active TB in this population. The Department works closely with all correctional facilities in the state and provides correctional health staff with TB training and education to ensure facilities abide by inmate screening requirements.

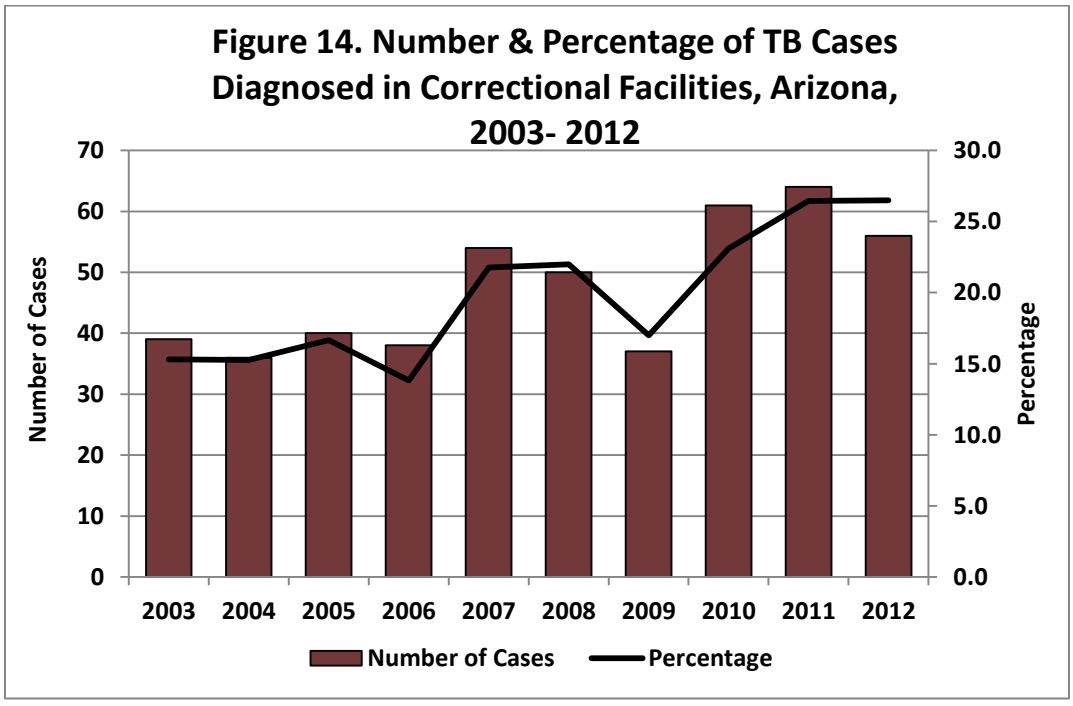


**Table 1. TB Cases by Selected Risk Factors.** Risk factors associated with cases reported to the Department in 2012 include diabetes mellitus in 17.1% (36/211) of cases, homelessness in 5.7% (12/211), incomplete LTBI therapy in 2.4% (5/211) and contact of an infectious TB case within the previous two years in 3.8% (8/211) of cases.

Among reported cases over the age of fourteen, risk factors included non-injecting drug use in 12.9% (26/202) of cases, injecting drug use in 4.0% (8/202), and excess alcohol use in 11.9% (24/202) of cases. High-risk occupations for TB transmission include health care workers and migrant farm workers. Migrant farm workers comprised 8.4% (17/211) and health care workers represented 4.0% (8/202) of 2012 cases. The other significant risk factors include TB/HIV co-infection, residence in a correctional facility and country of birth. These risk factors were discussed in more detail individually.

**Table 1. Tuberculosis Cases by Selected Risk Factors, Arizona, 2010-2012**

| | 2010 | | 2011 | | 2012 | |
|---|---|---|---|---|---|---|
| | **Cases** | **%** | **Cases** | **%** | **Cases** | **%** |
| **Total Cases** | **282** | | **255** | | **211** | |
| **Occupation** | | | | | | |
| Health Care Worker ≥15 years | **4** | **1.5** | **10** | **4.1** | **8** | **4.0** |
| Migrant Farm Worker ≥15 years | **8** | **3.0** | **19** | **7.9** | **17** | **8.4** |
| **Reported Behaviors** | | | | | | |
| Injecting Drug Use[a] ≥15 years | **8** | **3.0** | **8** | **3.3** | **8** | **4.0** |
| Non-injecting Drug Use[a] ≥15 years | **16** | **6.1** | **25** | **10.3** | **26** | **12.9** |
| Excess Alcohol Use[a] ≥15 years | **27** | **10.2** | **34** | **14.1** | **24** | **11.9** |
| **Type of Residence** | | | | | | |
| Long Term Care Facility[b] | **6** | **1.8** | **8** | **3.1** | **2** | **1.0** |
| Homeless[a] | **24** | **8.5** | **15** | **5.9** | **12** | **5.7** |
| **Comorbidity** | | | | | | |
| Diabetes Mellitus[c] | **31** | **11.0** | **31** | **12.2** | **36** | **17.1** |
| Immunosuppression (Not HIV/AIDS)[c] | **9** | **3.2** | **6** | **2.3** | **4** | **1.9** |
| **Incomplete LTBI Therapy[c]** | **10** | **3.5** | **6** | **2.4** | **5** | **2.4** |
| **Contact of infectious TB case (2 years or less)[c]** | **15** | **5.3** | **15** | **5.9** | **8** | **3.8** |

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

[b]Residence at time of diagnosis.

**Table 2. TB Cases Reported with Drug Sensitivity and Drug Resistance.** In 2012, 79.6% (168/211) of the TB cases reported had positive culture results. Of these cases, 98.2% (165/168) reported drug sensitivity results. Isoniazid (INH) resistance remained consistent from 2011 at 7.9% (13/211) of cases. No cases of multi-drug resistance TB was reported in 2012.

| Tuberculosis Cases Resistant to INH and Other Anti-TB Drugs, Arizona, 2006 - 2012 | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Year | Cases | Culture Confirmed | Drug Sensitivity Testing | | INH Resistant[a] | | MDR[b] | | Other Resistance[c] | | Total Resistance[d] | |
| | | | No. | (%) | No. | (%) | No. | (%) | No. | (%) | No. | (%) |
| 2006 | 313 | 228 | 210 | (92.1) | 17 | (8.1) | 2 | (1.0) | 10 | (4.8) | 29 | (13.8) |
| 2007 | 302 | 222 | 218 | (98.2) | 18 | (8.3) | 3 | (1.4) | 14 | (6.4) | 35 | (16.1) |
| 2008 | 227 | 152 | 146 | (96.1) | 6 | (4.1) | 0 | (0.0) | 6 | (4.1) | 12 | (8.2) |
| 2009 | 232 | 181 | 178 | (98.3) | 13 | (7.3) | 0 | (0.0) | 23 | (12.9) | 36 | (20.2) |
| 2010 | 282 | 202 | 196 | (97.0) | 15 | (7.7) | 0 | (0.0) | 14 | (7.1) | 29 | (14.8) |
| 2011 | 256 | 192 | 189 | (98.4) | 15 | (7.9) | 1 | (0.5) | 13 | (6.9) | 29 | (15.3) |
| 2012 | 211 | 168 | 165 | (98.2) | 13 | (7.9) | 0 | (0.0) | 8 | (4.8) | 21 | (12.7) |

[a]Isolates may also be resistant to other drugs, including rifampin, 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

**Figure 15. Directly Observed Therapy, Arizona, 2001-2010.** Directly observed therapy (DOT) is the standard of care for administering TB medications to active cases. In DOT, health care workers observe the individual take his/her medications to ensure compliance with the treatment regimen. All LHDs are encouraged to provide DOT for community cases. DOT can be difficult for some of Arizona's LHDs as most of the rural counties are large and require traveling long distances to provide this service. Several LHDs also provide DOT for correctional facilities within their jurisdictions.

In 2010, 92.6% (249/269) of the TB cases who started treatment received directly observed therapy or a combination of directly observed therapy and self-administered therapy. Self-administered therapy only was reported for 5.2% (14/269) of cases.

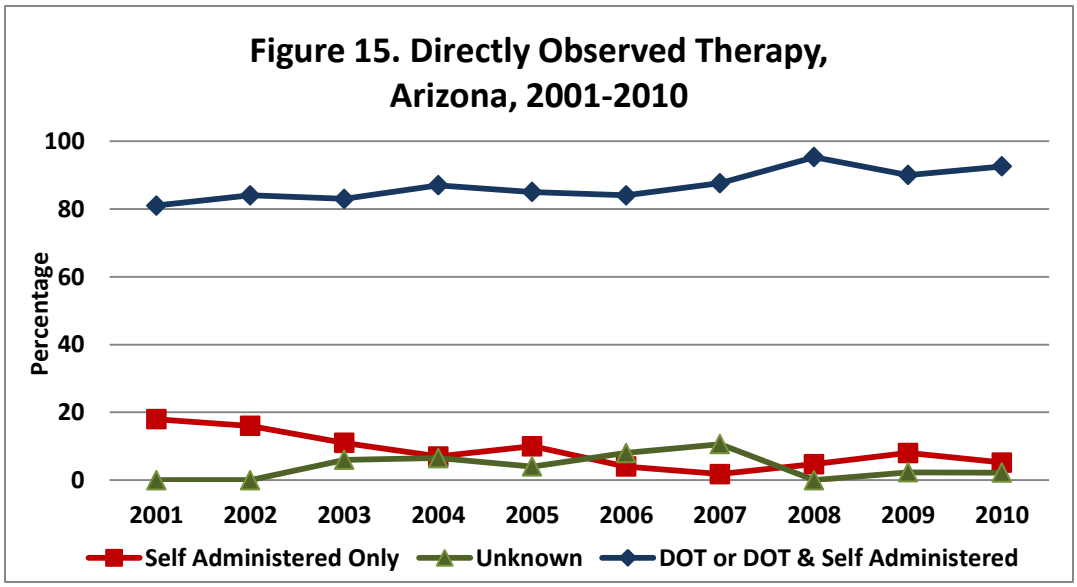


**Figure 16. Completion of Treatment, Arizona, 2001-2010.** Completion of treatment for TB cases is a continuing focus for the Department. The overall goals for treatment of TB are to cure the individual patient and limit the transmission of TB to other people. Thus, successful treatment of each individual TB patient benefits the individual and the community. The Department conducted cohort reviews and collaborated with LHDs which improved completion of treatment in Arizona. Also, the Department utilizes international referrals to provide completion of treatment information for TB cases that have left the U.S. and returned to their country of origin. In 2010, 87.5% (189/216) of the eligible cases completed treatment within twelve months. Overall, 92.4% (206/223) of the cases completed therapy regardless of the time frame.

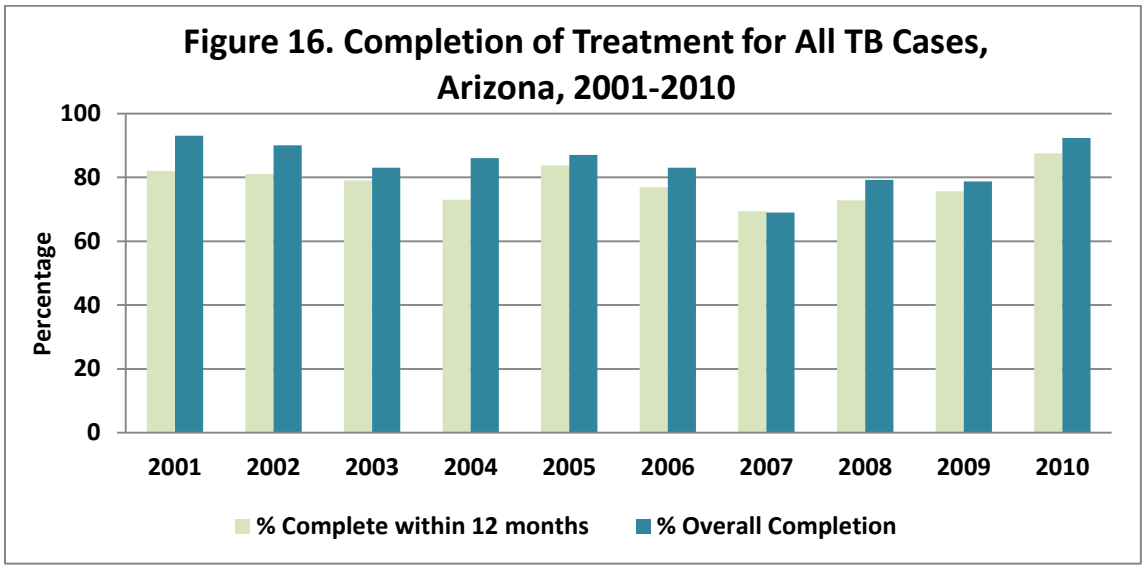


**Figure 17. Completion of Treatment for Non-Correctional Facility TB Cases.** Residence in a correctional facility impacts completion of treatment rates negatively. For cases of TB not diagnosed in a correctional facility, 90.7% (176/194) of cases completed treatment within one year. 96.0% (193/201) of non-correctional facility cases completed therapy regardless of the time frame.

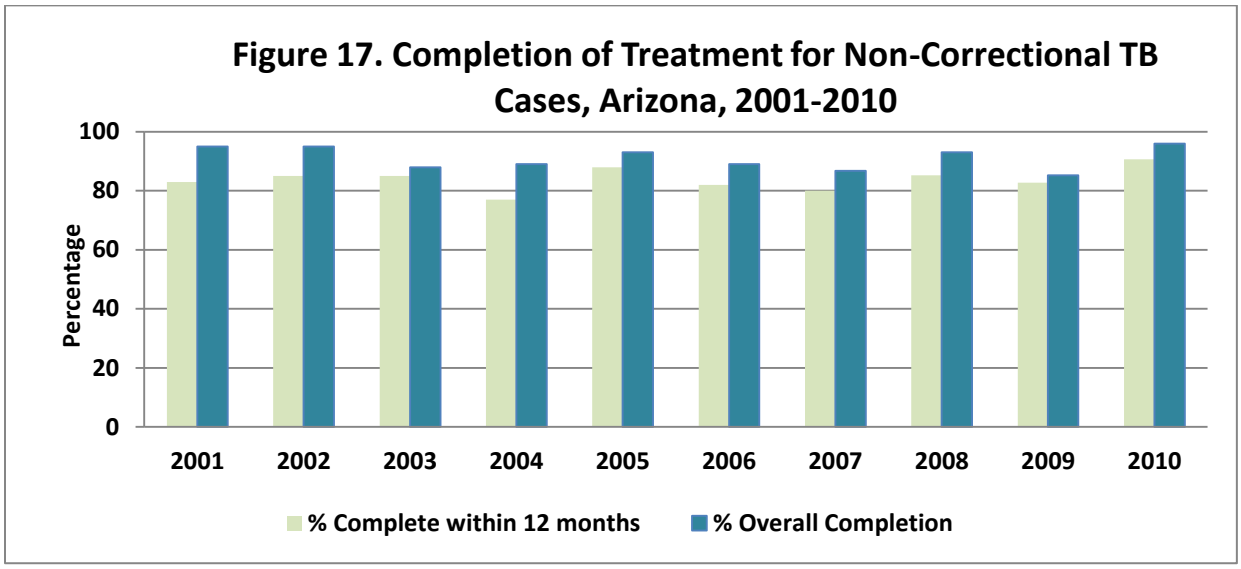



**Figure 18. Completion of Treatment for Homeless Non-Correctional TB Cases.** In 2010, 87.5% (14/16) of homeless non-correctional TB cases for whom therapy was indicated for a year or less completed treatment. Overall completion of treatment regardless of time frame was also 87.5% (14/16).

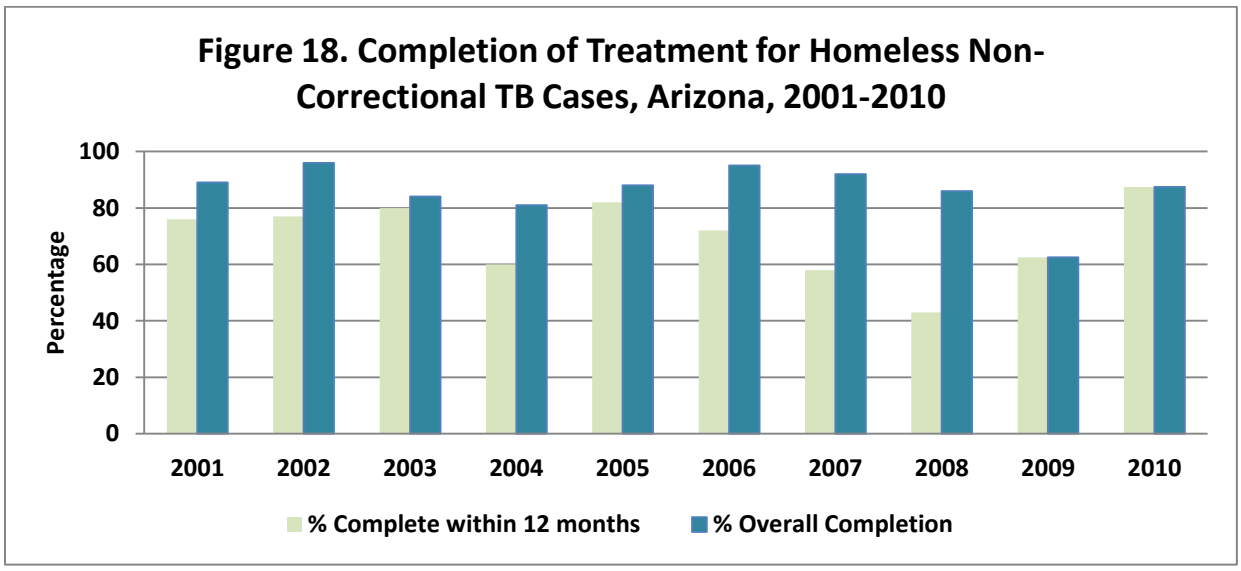
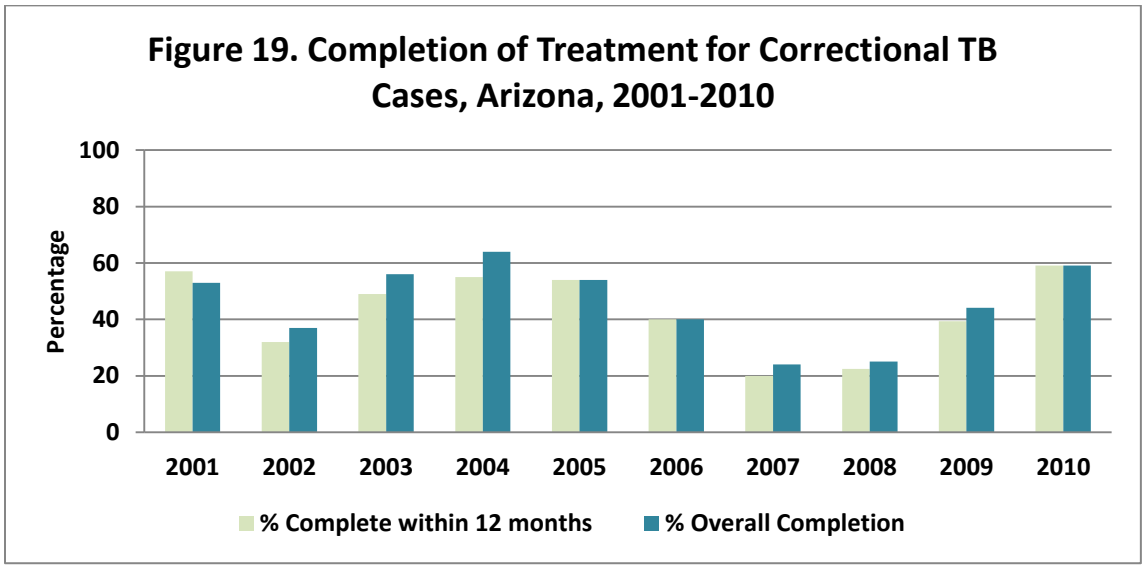


**Figure 19. Completion of Treatment for Correctional TB Cases.** In 2010, 59.1% (13/22) of TB cases diagnosed in a correctional facility completed treatment within one year. Overall completion of treatment regardless of time frame was also 59.1% (13/22). The low percentages for completion of treatment in correctional facilities are likely due to the transient nature of those incarcerated. Cases are transfer facilities multiple times or are repatriated to their home country. Although international referrals are performed completion of treatment data is not always known.




## Contact Investigations

Contact investigations identify, examine, and evauluate all persons who are at risk of infection with TB due to recent exposure to a diagnosed infectious case. This process facilitates new case finding which allows for early detection and treatment of new infections. In some cases, it may even prevent disease. It is an essential component of tuberculosis control. The LHDs are reponsible for conducting contact investigations or coordinating with responsible parties outside local public health to ensure contact investigations are completed. The last year for which contact information data is available is 2010 due to the length of time to complete treatment. In 2010, contacts were identified for 75.9% (63/83) of sputum-smear positive TB cases. Among, smear-positive cases diagnosed in a correctional facility 38.9% (7/18) identified contacts compared to 86.2% (56/65) of community cases. Of contacts to sputum-smear positive TB cases, 67.7% (815/1203) were evaluated. Of the contacts evaulated 222 contacts were newly diagnosed latent TB infections. 86.9 % (193/222) of these cases initiated LTBI treatment and 39.9% (77/193) completed treatment.

**Table 2. Contacts to Sputum-Smear Positive TB Cases, Arizona, 2007-2011**

| | 2007 | | 2008 | | 2009 | | 2010 | | 2011* | |
|---|---|---|---|---|---|---|---|---|---|---|
| | No. | % | No. | % | No. | % | No. | % | No. | % |
| Cases with Contacts | 64 | 71 | 63 | 82 | 58 | 82 | 63 | 76 | 70 | 77 |
| Cases without Contacts | 26 | | 14 | | 13 | | 20 | | 21 | |
| Total Sputum-Smear Positive Cases | 90 | | 77 | | 71 | | 83 | | 91 | |

*Preliminary data for 2011.

| Table 3. Evaluation of Contacts to Sputum-Smear Positive TB Cases, Arizona, 2007-2011 | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | 2007 | | 2008 | | 2009 | | 2010 | | 2011* | |
| | No. | % | No. | % | No. | % | No. | % | No. | % |
| Contacts Evaluated | 409 | 88 | 476 | 63 | 594 | 70 | 815 | 68 | 764 | 66 |
| Contacts Not Evaluated | 54 | | 281 | | 250 | | 388 | | 400 | |
| Total Contacts to Sputum-Smear Positive Cases | 463 | | 757 | | 844 | | 1203 | | 1164 | |
| *Preliminary data for 2011. | | | | | | | | | | |

| Table 4. LTBI Therapy for Newly Infected Contacts, Arizona, 2007-2011 | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | 2007 | | 2008 | | 2009 | | 2010 | | 2011* | |
| | No. | % | No. | % | No. | % | No. | % | No. | % |
| Newly Diagnosed Infected Contacts | 142 | | 164 | | 213 | | 222 | | 187 | |
| Infected Contacts Started on LTBI Therapy | 98 | 69 | 91 | 55 | 39 | 18 | 193 | 87 | 141 | 75 |
| Infected Contacts Completing LTBI Therapy | 66 | 67 | 65 | 71 | 27 | 69 | 77 | 40 | 87 | 62 |
| *Preliminary data for 2011. | | | | | | | | | | |

## Evaluation of Class B1/B2 Referrals

Immigrants and refugees traveling to the U.S. are evaluated for TB as part of the admission process, and are assigned a classification according to the status of their disease. Class A individuals have TB disease and have been granted a waiver. Class B1 includes individuals with non-infectious pulmonary TB disease with negative acid-fast bacilli sputum smears and cultures. Class B1 also includes extra pulmonary TB cases. Class B2 individuals have positive skin tests but have negative evaluations for active TB disease. Class B3 individuals are recent contacts of a known TB case.

The CDC Division of Global Migration and Quarantine notifies the Department of all Class B individuals entering the state. The Department forwards these referrals to the LHDs where the individual will reside. The LHDs provide medical evaluation and treatment. The transitory nature of the immigrant and refugee population makes it difficult to initiate or complete evaluations and treatment for these individuals. The Department is developing strategies to overcome these barriers.

In 2012, the Department received 287 notifications for immigrants and refugees designated as class B1, of which 40.9% (117/287) initiated medical evaluation and 39.7% (114/287) completed medical evaluation. The Department received 207 Class B2 notifications. Of these 80.6% (167/207) completed the evaluation and 44.9% (75/167) were started on treatment for latent TB infection.

## International Referrals and Case Management

The Department coordinates with international referral agencies to ensure continuity of care for individuals with TB or suspected of having TB who return to their home country. CureTB facilitates the referral process with public health officials in Mexico. TBNet facilitates the

referral process for all countries including Mexico. In 2012, 149 cases and suspect cases were referred to these international agencies.

**Border Health Activities**

To ensure continuity of care for individuals being treated for TB who are repatriated to Mexico through Nogales, Arizona, the ADHS TB Control Program coordinates "Meet and Greets." The Meet and Greet involves transferring these individuals from Arizona and federal law enforcement authorities to Mexican law enforcement and public health authorities.

The Meet and Greet protocol developed in 2007 has resulted in better coordination of inmates returning to Mexico. The protocol includes working closely with the ADHS Office of Border Health, correctional facilities, LHDs, Sonoran partners, CureTB, and ICE authorities. In 2012, the Department arranged six Meet and Greets through the port of Nogales. The Department has developed a Meet and Greet protocol for the Port of San Luis, Yuma County.

.The Department is collaborating with Sonoran public health officials to improve communication and completion of treatment for binational TB cases. MEDSIS (Medical Electronic Disease Surveillance Intelligence System) the Arizona disease surveillance system for reporting TB cases will soon be translated into Spanish in 2013 and be made available to Sonora Public Health Officials to improve communication with the Department.

**Conclusion**

The Department continues to partner with local health departments, federal agencies, correctional facilities, and the international community to prevent and control TB in Arizona. The partnerships have improved treatment completion, data quality and communication between different jurisdictions. Continuing close collaborations with local health departments and outside partners will prevent further spread and curb the emergence of drug-resistant TB.