Annual Surveillance Report

Tuberculosis in Utah

Five-Year Statistical Review

2006 - 2010

UTAH DEPARTMENT OF HEALTH

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Utah Department of Health
Division of Disease Control & Prevention
Bureau of Epidemiology
Tuberculosis Control Program

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Executive Summary

Tuberculosis (TB), like many other infectious diseases, is a challenge to control. Its airborne mode of transmission, failure of providers to "think TB" as morbidity declines, elevated rates in racial/ethnic groups and foreign-born persons, and its prolonged treatment regimen of six months or more are just some of the obstacles faced by those attempting to eliminate the disease.

This report is a five-year statistical review of TB in Utah from 2006 through 2010. Although some aspects of Utah's TB epidemiology mirror national trends, there are aspects of the local epidemiology that differ and must be considered in controlling the disease in our state.

The number of reported TB cases in Utah has generally declined since 1993. In 2010, 20 cases of active TB disease were reported, the lowest case count since TB has been reported. During the five-year period from 2006 to 2010, Utah reported an average of 31 cases of TB per year.

Utah is a low-incidence TB state, with case rates less than one-third of the national rate. From 2006 to 2010, Utah reported an average annual case rate of 1.1 per 100,000 persons.

The majority of Utah's TB morbidity occurs in the Salt Lake Valley Health District. Over the past five years, this district carried 60% of the state's TB burden. The next highest percentage distributions were Utah County and the Weber-Morgan Health Districts with 8.3% of the cases each.

From 2006 to 2010, Salt Lake Valley, Bear River, Southeastern, and Weber-Morgan Health Districts had TB case rates above or equal to the statewide five-year average of 1.1 cases per 100,000 persons. Salt Lake Valley Health District had the highest TB case rate in the state at 1.8 cases per 100,000 persons.

From 2006 to 2010, eight percent of Utah's TB morbidity was pediatric cases less than 15 years of age. Forty-six percent (6 of 13) of the pediatric cases– all less than five years of age - were diagnosed with active TB disease during a contact investigation. Another pediatric case, aged 5 to 9, was the initial case that uncovered an adult source case - which led to the finding of two additional pediatric cases. An additional pediatric case, aged 10-14 yrs, had been identified as a contact in 2005 but did not complete treatment for latent TB infection. This underscores the importance of initiating contact and source case investigations in a timely manner and ensuring that contacts start and complete treatment for their latent TB infection.

The disparity in TB rates between Whites and racial/ethnic minorities continues to persist. Hispanics have constituted the largest percentage of TB cases among all racial/ethnic groups in Utah for the past eight years. Between 2006 and 2010, Black/African Americans, Asians, Native Hawaiian/Other Pacific Islanders, Hispanics, and American Indian/Alaska Natives all had TB rates that were significantly higher than that of Whites.

The majority of Utah's TB cases are among foreign-born persons. From 2006 to 2010, foreign-born persons accounted for an average of 68% of the TB cases per year. The top three countries of origin - Mexico, Somalia, and Vietnam - span three continents and accounted for 49% of the total number of foreign-born cases.

Executive Summary

The majority of the cases reported with TB in Utah were among persons living in a private residence at the time of diagnosis. During the 2006 to 2010 time frame, 94% of TB cases resided in a private residence at the time of diagnosis; 2% were homeless; 1% were in a correctional institution; 1% lived in a long-term care facility at the time of TB diagnosis; and 2% had other living arrangements.

Of TB cases aged 15 years or greater reported in Utah from 2006 to 2010, an average of 7% per year reported being homeless, 1% reported injecting drug use, 3% reported noninjecting drug use, and 8% reported excess alcohol use in the 12 months prior to TB diagnosis.

For the five-year period from 2006 to 2010, 96% (150 of 157) of persons with TB reported a positive or negative HIV test result; and 3% of TB cases of all ages were coinfected with HIV and 3% of persons aged 25-44 years were coinfected with HIV.

The majority of TB cases reported among Utah residents had pulmonary involvement. From 2006 through 2010, cases with pulmonary disease alone accounted for 55% of Utah's TB cases; and cases with both pulmonary and extrapulmonary involvement accounted for 18% of the cases. Extrapulmonary cases accounted for 27% of the cases during this time period.

From 2006 to 2010, 78% of Utah's TB cases had a positive culture for *Mycobacterium tuberculosis*, and drug susceptibility testing was conducted on 100% of the isolates. Relative to the total number of laboratory culture-confirmed TB cases in this five-year period, 19% of the isolates were resistant to one or more anti-tuberculosis medications and 13% had resistance to at least isoniazid (INH). Five cases were resistant to at least INH and rifampin (RIF), known as multidrug resistant TB (MDR-TB).

From 2006 to 2010, 95% of persons in Utah who were treated for TB had all doses of their medications given by directly observed therapy (DOT), and 5% completed their treatment utilizing a combination of directly observed and self-administered therapy. Reasons for self-administration of therapy included travel abroad and accommodation of culture observances.

From 2006 to 2010, a total of 728 persons were reported as suspect TB, and a five-year average of 22% of the TB suspects per year were later diagnosed with active TB disease.

Utah received 631 newly-arriving refugees and immigrants with Class B TB from 2006 to 2010. Due to the change in October 2007 of the Technical Instructions for screening and treating TB overseas, Utah has experienced an increase in Class B arrivals since 2008.

1. Tuberculosis in Utah

Tuberculosis Morbidity in Utah

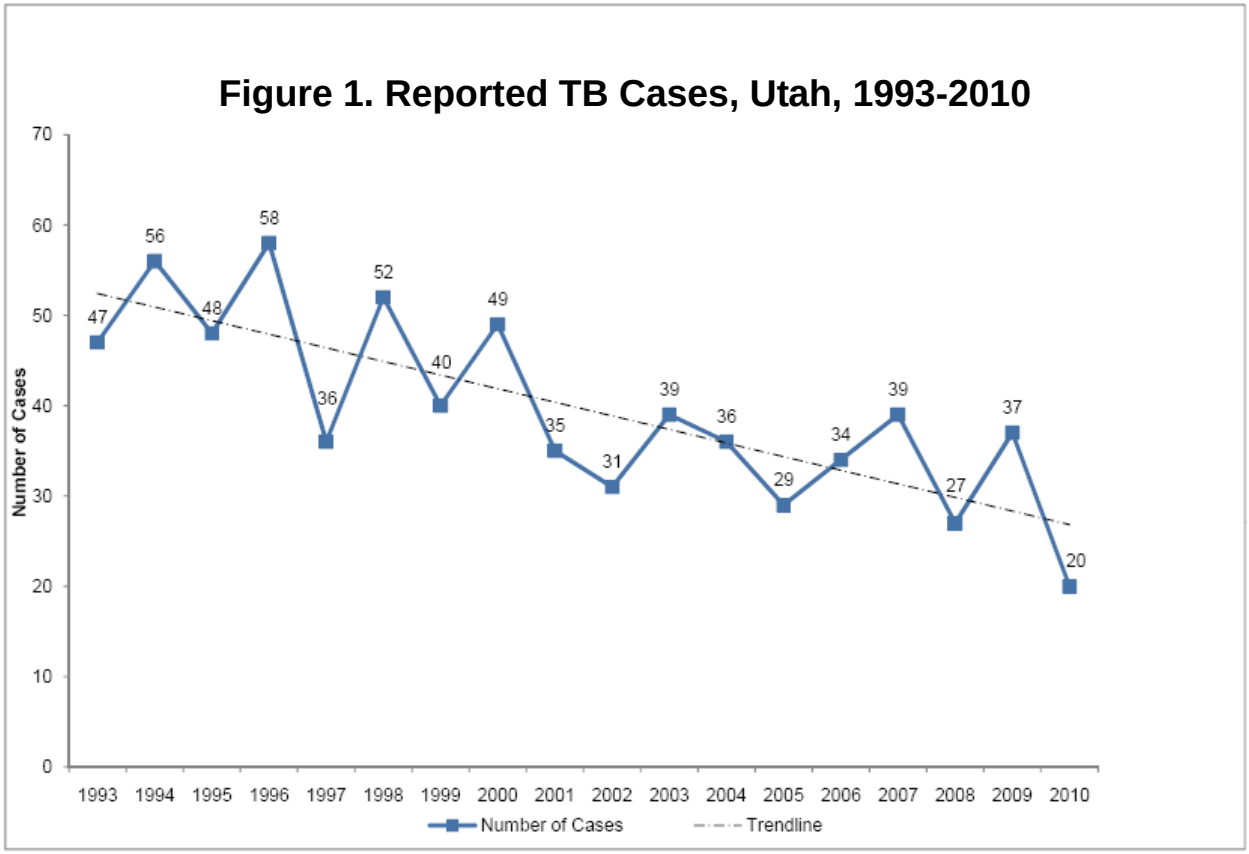
Tuberculosis (TB) is an immediately reportable disease in Utah, and much of our understanding of the occurrence of TB comes from case surveillance. Reports of Utah's TB cases are submitted to the Division of TB Elimination (DTBE), Centers for Disease Control and Prevention (CDC). Since 1993, these reports have been submitted using the Report of Verified Case of Tuberculosis (RVCT) form.

In 2010, 20 cases of active TB disease were reported in Utah—the lowest case count since TB has been reported. The previous lowest case count was in 2008 when 27 cases were reported.

For the five-year period from 2006 to 2010, Utah had an average of 31 cases of TB reported per year (range: 20-39). Utah's TB case count has fluctuated since 1993.

From 1993 to 2010, Utah had an average of 40 cases of active TB reported per year (range: 20-58). Despite the periodic increases, there was a general declining trend in the number of reported TB cases in Utah during this time period.

Figure 1. Reported TB Cases, Utah, 1993-2010



See Table 1, pg 2.
Cases were classified by count date.
Source: Utah Dept of Health, Bureau of Epidemiology, TB Control Pgm.

Incidence in Utah and the US

The 2010 TB case rate in Utah was 0.7 per 100,000 persons, a decrease from 1.3 per 100,000 persons in 2009. For the five-year period from 2006 to 2010, Utah had an average of 1.1 cases of TB per 100,000 persons (range: 0.7-1.4 per 100,000 persons).

For the past 17 years, Utah's case rate was an average of 28% of the national rate. Utah achieved the Healthy People 2010 goal of obtaining a TB incidence rate of 1.0 per 100,000 persons.

Table 1. Reported TB Cases and Rates,* Utah and United States, 1993-2010

Year	Utah		US
	Cases	Rate	Rate
1993	47	2.5	9.7
1994	56	2.9	9.2
1995	48	2.4	8.5
1996	58	2.8	7.9
1997	36	1.7	7.2
1998	52	2.4	6.6
1999	40	1.8	6.3
2000	49	2.2	5.8
2001	35	1.5	5.6
2002	31	1.3	5.2
2003	39	1.6	5.1
2004	36	1.5	4.9
2005	29	1.1	4.8
2006	34	1.3	4.6
2007	39	1.4	4.4
2008	27	1.0	4.2
2009	37	1.3	3.8
2010	20	0.7	3.6

*Cases per 100,000 population.
Cases were classified by count date.
Sources: Utah Case Rates – Utah Dept of Health, Bureau of Epidemiology, TB Control Pgm.
US Case Rate – Centers for Disease Control and Prevention (CDC), Division of TB Elimination.

Table 2. TB Cases, Percentages, and Case Rates* by Local Health District, Utah, 2006-2010

Local Health District	2006		2007		2008		2009		2010		2006-2010 Total		
	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	Rates
Bear River	2	5.9	2	5.1	2	7.4	5	13.5	1	5.0	12	7.6	1.5
Central	1	2.9	1	2.6	0	0.0	0	0.0	0	0.0	2	1.3	0.5
Davis	1	2.9	2	5.1	1	3.7	3	8.1	3	15.0	10	6.4	0.7
Salt Lake	26	76.5	21	53.8	16	59.3	18	48.6	13	65.0	94	59.9	1.8
Southeastern	1	2.9	1	2.6	2	7.4	0	0.0	0	0.0	4	2.5	1.5
Southwest	1	2.9	2	5.1	2	7.4	1	2.7	0	0.0	6	3.8	0.6
Summit	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0.0
Tooele	0	0.0	0	0.0	0	0.0	2	5.4	0	0.0	2	1.3	0.7
TriCounty	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0.0
Utah	1	2.9	7	17.9	1	3.7	4	10.8	0	0.0	13	8.3	0.5
Wasatch	0	0.0	1	2.6	0	0.0	0	0.0	0	0.0	1	0.6	0.9
Weber-Morgan	1	2.9	2	5.1	3	11.1	4	10.8	3	15.0	13	8.3	1.1
State	34	100	39	100	27	100	37	100	20	100	157	100	1.1

*Cases per 100,000 population.
Note: Percentages may not sum to 100 due to rounding.
Cases were classified by count date.
Source: Cases – Utah Dept of Health, Bureau of Epidemiology, TB Control Pgm.
Population Estimates – Utah Governor's Office of Planning and Budget.

Local Health Districts

The majority of Utah's TB morbidity occurs in the Salt Lake Valley Health District. In 2010, this district accounted for 65% (13 of 20) of the reported TB cases. Davis County and the Weber-Morgan Health Districts had the next highest percentage with 15% (3 of 20) of the reported TB cases each. The remaining case was in Bear River Health District.

In the past, TB morbidity was more widely distributed throughout the state—involving rural as well as urban areas. This has led to a concern regarding TB cases being missed, and the TB Control Program plans to conduct an active surveillance project in 2011.

From 2006 to 2010, Salt Lake Valley Health District had 60% of the TB cases (range: 49%-76%). The next highest percentage distributions were Utah County and the Weber-Morgan Health Districts with 8.3% of the cases each.

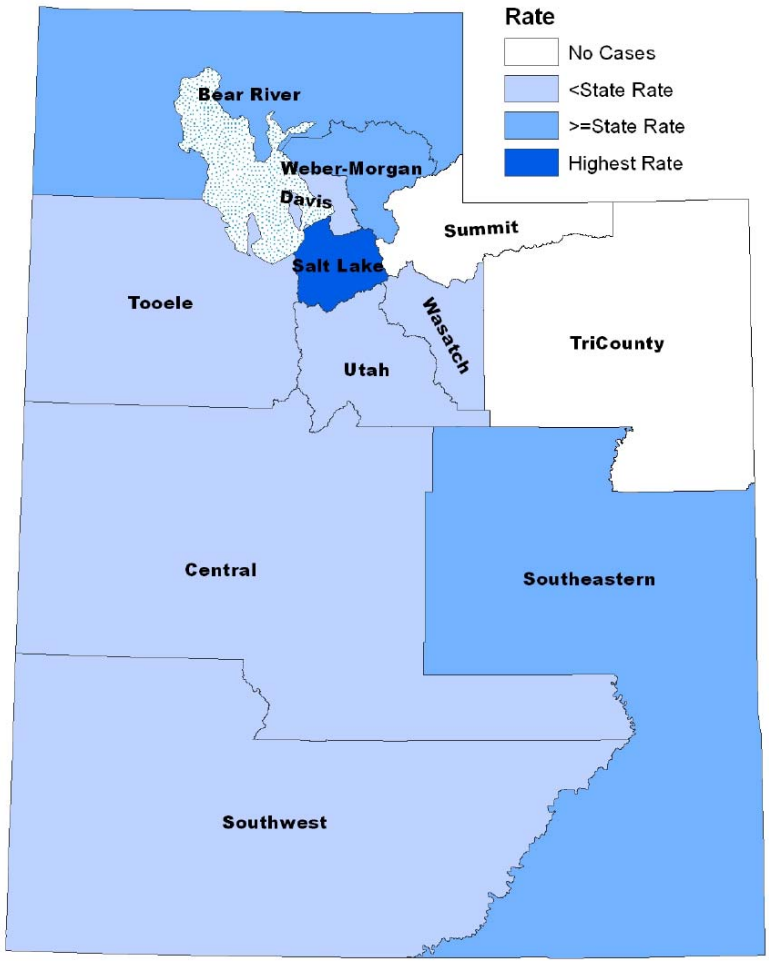
Ten of the 12 local health districts had a case of TB in the past five years. Only Summit County and TriCounty Health Districts had no cases in this time period. The state TB Control Program works closely with our local health partners to provide resources and expertise to ensure that active TB cases are treated to completion.

Tuberculosis in Utah

From 2006 to 2010, Salt Lake Valley, Bear River, Southeastern, and Weber-Morgan Health Districts had TB case rates above or equal to the statewide five-year average of 1.1 cases per 100,000 persons. Salt Lake Valley Health District had the highest TB case rate in the state at 1.8 cases per 100,000 persons, followed by Bear River and Southeastern with 1.5 cases per 100,000 persons each, and Weber-Morgan with 1.1 cases per 100,000 persons.

Foreign-born persons represented 81% (76 of 94) of the cases in Salt Lake Valley and 67% (8 of 12) of the cases in the Bear River Health District. In Weber-Morgan Health District, 77% (10 of 13) of the cases were either foreign-born or children who had a foreign-born connection. American Indians/ Alaska Natives represented 75% (3 of 4) of the cases in the Southeastern Health District.

Figure 2. TB Case Rates by Local Health District, Utah, 2006-2010



See Table 2, pg 3.
*Cases per 100,000 population.
Cases were classified by count date.
Source: Utah Dept of Health, Bureau of Epidemiology, TB Control Pgm.

2. TB by Gender, Age, and Race/Ethnicity

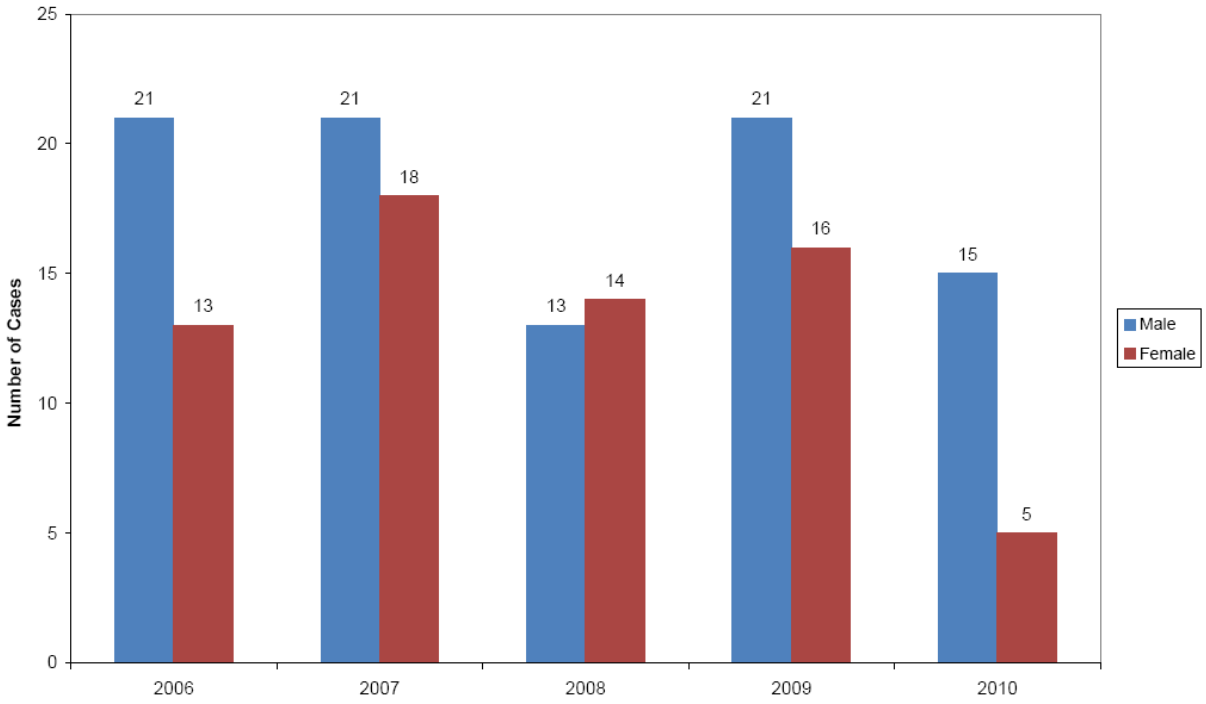
Gender

In 2010, 75% (15 of 20) of persons with TB in Utah were male and 25% (5 of 20) were female.

During 2006 to 2010, males accounted for 58% of the TB cases per year (range: 48%-75%) while females accounted for an average of 42% (range: 25%-52%).

The distribution of TB cases by gender in the US in 2009 was 61% in males and 39% in females. (CDC. *Reported Tuberculosis in the United States, 2009*).

Figure 3. TB Cases by Gender, Utah, 2006-2010



Cases were classified by count date.
Source: Utah Dept of Health, Bureau of Epidemiology, TB Control Pgm.

TB by Gender, Age, and Race/Ethnicity

Age Groups

In 2010, none of the TB cases in Utah occurred in children 0-14 years of age; 5% (1 of 20) in persons 15-24 years of age; 45% (9 of 20) in persons 25-44 years of age; 30% (6 of 20) in persons 45-64 years of age; and 20% (4 of 20) in persons ≥65 years.

Of the 157 TB cases reported in Utah from 2006 to 2010, an average of 8% of the cases were <15 years of age (range: 0%-18%); 16% were 15-24 years of age (range: 5%-26%); 38% were 25-44 years of age (range: 22%-51%); 21% were 45-64 years of age (range: 14%-30%); and 17% were ≥65 years of age (range: 9%-33%).

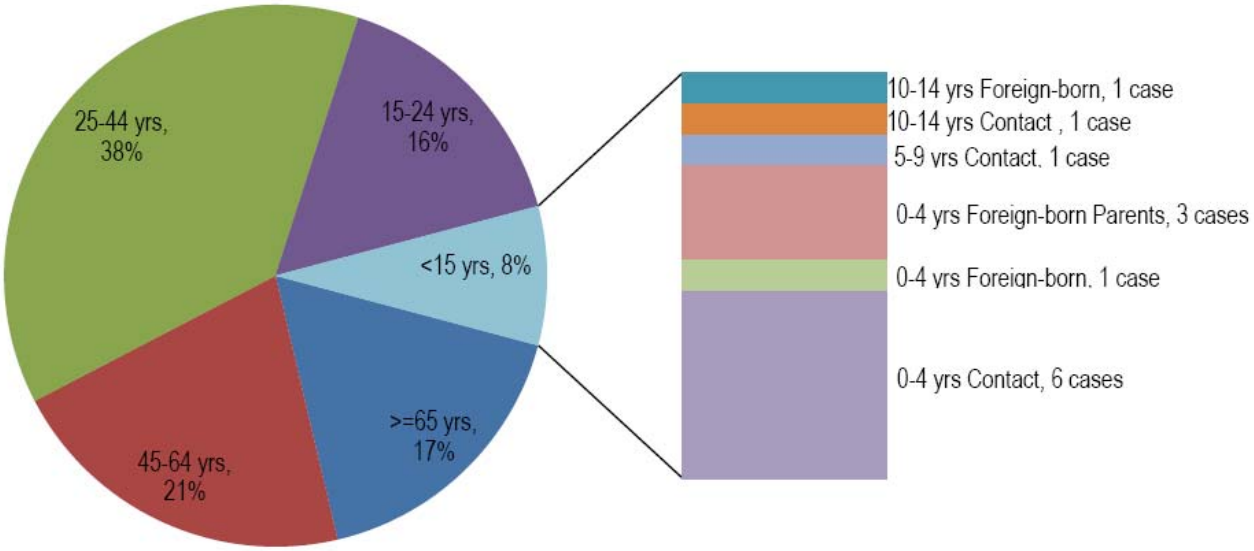
In 2009, the distribution of TB cases reported in the US by age group was as follows: 6% of the cases were <15 years of age; 11% were 15-24 years of age; 34% were 25-44 years of age; 30% were 45-64 years of age; and 20% were 65 years of age and older. (CDC. *Reported Tuberculosis in the United States, 2009*).

Children

From 2006 to 2010, eight percent of Utah's TB morbidity were pediatric cases less than 15 years of age. Forty-six percent (6 of 13) of the pediatric cases– all less than five years of age - were diagnosed with active TB disease during a contact investigation. Another pediatric case, aged 5 to 9, was the initial case that uncovered an adult source case - which led to the finding of two additional pediatric cases. An additional pediatric case, aged 10-14 yrs, had been identified as a contact in 2005 but did not complete treatment for latent TB infection. This underscores the importance of initiating contact and source case investigations in a timely manner and ensuring that contacts start and complete treatment for their latent TB infection.

The remaining five children were either foreign-born or were US-born children less than five years of age of foreign-born parents.

Figure 4. TB Cases by Age Group, Utah, 2006-2010



Note: Percentages may not sum to 100 due to rounding. FB=Foreign-born. Cases were classified by count date.
Source: Utah Dept of Health, Bureau of Epidemiology, TB Control Pgm.

TB by Gender, Age, and Race/Ethnicity

Race/Ethnicity

In 2010, 80% of all reported TB cases in Utah occurred in racial and ethnic minorities: 35% in Hispanics; 25% in Blacks or African Americans; 15% in Asians; and 5% in American Indians or Alaska Natives. No cases of TB were reported in Native Hawaiian or Other Pacific Islanders.

During 2006 to 2010, the highest proportion of TB cases were among Hispanics with 38%, followed by Asians with 24%. Hispanics constituted the single largest percentage of TB cases among all racial/ethnic groups in Utah for the eighth consecutive year. The percentage of TB cases among Whites fluctuated during this five-year period, from as high as 22% (6 of 27) in 2008 to as low as 10% (4 of 39) in 2007, with a five-year average of 15%.

In 2009, the distribution of TB cases reported in the US by race/ethnicity was as follows:

29% in Hispanics;
28% in Asians;
25% in Blacks or African Americans;
16% in Whites;
1% in American Indians or Alaska Natives; and,
1% in Native Hawaiians or Other Pacific Islanders.

(CDC. *Reported Tuberculosis in the United States, 2009*).

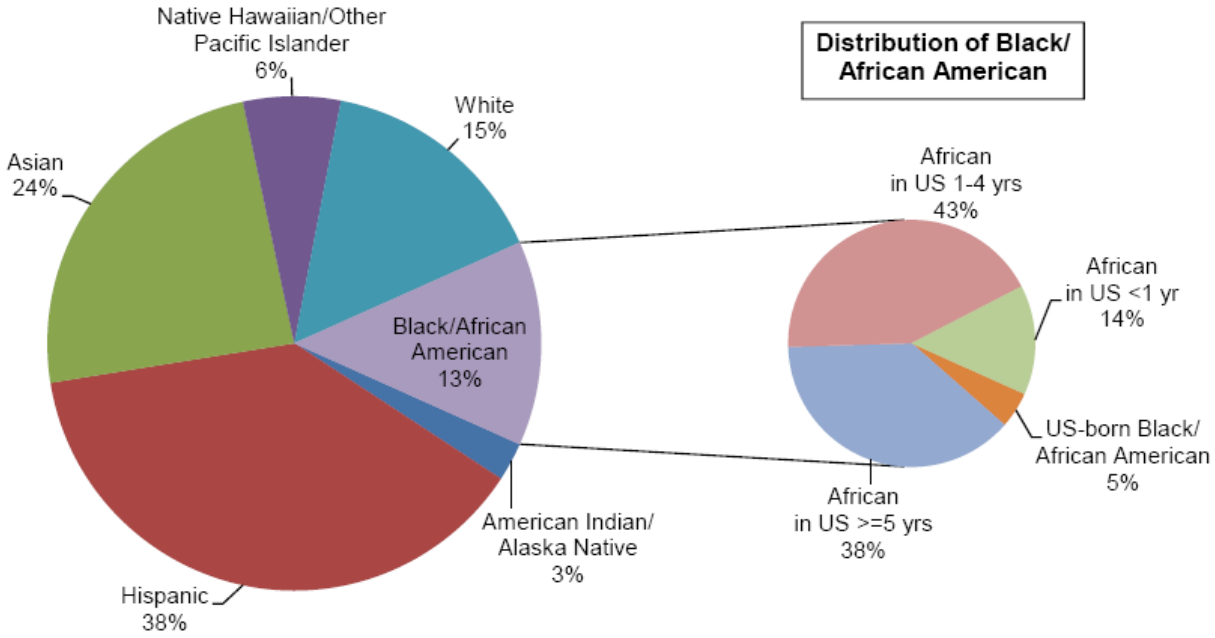
Table 3. TB Cases, Percentages, and Case Rates* by Race/Ethnicity**, Utah, 2006-2010

Race/Ethnicity	2006		2007		2008		2009		2010		2006-2010 Total			
	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	Rates	95% CI
American Indian /Alaska Native	1	2.9	1	2.6	1	3.7	0	0.0	1	5.0	4	2.5	2.5	(0.7-6.4)
Asian	6	17.6	12	30.8	6	22.2	11	29.7	3	15.0	38	24.2	14.3	(10.1-19.7)
Black/ African American	6	17.6	4	10.3	3	11.1	3	8.1	5	25.0	21	13.4	14.9	(9.3-22.8)
Hispanic	13	38.2	15	38.5	10	37.0	15	40.5	7	35.0	60	38.2	3.7	(2.8-4.7)
Native HI/Other Pacific Islander	3	8.8	3	7.7	1	3.7	3	8.1	0	0.0	10	6.4	10.0	(4.8-18.4)
White	5	14.7	4	10.3	6	22.2	5	13.5	4	20.0	24	15.3	0.2	(0.1-0.3)
Multiple Races	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0.0	(. - .)
State	34	100	39	100	27	100	37	100	20	100	157	100	1.1	(1.0-1.3)

*Cases per 100,000 population.
**All races are non-Hispanic.
Note: Percentages may not sum to 100 due to rounding. CI=Confidence interval.
Cases were classified by count date.
Source: Utah Dept of Health, Bureau of Epidemiology, TB Control Pgm.

TB by Gender, Age, and Race/Ethnicity

Figure 5. TB Cases by Race/Ethnicity* and Length of US Residence in Blacks/African Americans, Utah, 2006-2010



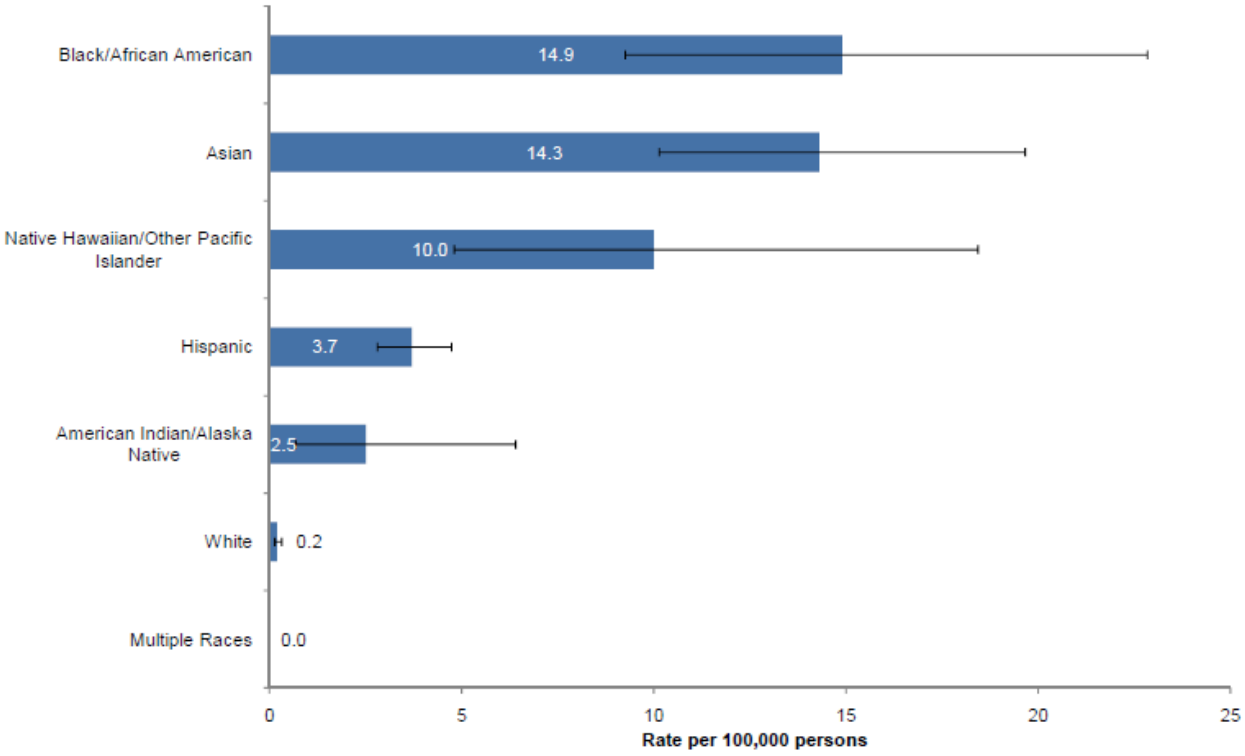
See Table 3, pg 7.
*All races are non-Hispanic.
Note: Percentages may not sum to 100 due to rounding.
Cases were classified by count date.
Source: Utah Dept of Health, Bureau of Epidemiology, TB Control Pgm.

From 2006 through 2010, the percentage of TB cases among Blacks or African Americans in Utah has ranged from 8% (3 of 37) in 2009 to as high as 25% (5 of 20) in 2010, with a five-year average of 13%. The increase in TB cases in this racial group was the result of the arrival of refugees from East and West Africa to Utah.

During this five-year period, 95% (20 of 21) of the reported Black/African American cases were among African refugees and immigrants: 14% (3 of 21) had been in US residence for less than one year; 43% (9 of 21) had been in US residence from one to four years; and 38% (8 of 21) had been in US residence for five years or more.

TB by Gender, Age, and Race/Ethnicity

Figure 6. TB Case Rates by Race/Ethnicity,* Utah, 2006-2010



See Table 3, pg 7.
*All races are non-Hispanic.
Cases were classified by count date.

In Utah, disparities in TB rates continue to exist between Whites and racial/ethnic minorities. Between 2006 and 2010, Black/African Americans, Asians, and Native Hawaiian/Other Pacific Islanders continued to have the highest case rates at 14.9; 14.3; and 10.0 per 100,000, respectively.

Disparities in TB rates also continue to persist nationally between Whites and racial/ethnic minorities. In 2009, Asians, Native Hawaiian/Other Pacific Islanders, and Black/African Americans had the three highest case rates at 23.3; 16.7; and, 7.6 per 100,000, respectively. (CDC. *Reported Tuberculosis in the United States, 2009*).

3. TB by Risk Factor

Residence at Diagnosis

The majority of TB cases reported in Utah were among persons living in a private residence at the time of diagnosis. In 2010, 100% (20 of 20) of persons with TB in Utah were living in a private residence at the time of their diagnosis.

Of the 157 TB cases reported during the 2006 to 2010 time frame, the distribution of residence at the time of diagnosis was as follows: 94% resided in a private residence (range: 85%-100%); 2% were homeless (range: 0%-5%); 1% was in a correctional institution (range: 0%-3%); 1% lived in a long-term care facility (range: 0%-3%); and 2% had other living arrangements (range: 0%-5%).

Table 4 . TB Cases and Percentages by Residence at Time of Diagnosis, Utah, 2006-2010

Residence	2006		2007		2008		2009		2010		Total	
	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%
Private Residence	30	88.2	33	84.6	27	100.0	37	100.0	20	100.0	147	93.6
Homeless	1	2.9	2	5.1	0	0.0	0	0.0	0	0.0	3	1.9
Corrections	1	2.9	1	2.6	0	0.0	0	0.0	0	0.0	2	1.3
Long Term Care	1	2.9	1	2.6	0	0.0	0	0.0	0	0.0	2	1.3
Other	1	2.9	2	5.1	0	0.0	0	0.0	0	0.0	3	1.9
Total	34	100	39	100	27	100	37	100	20	100	157	100

Note: Percentages may not sum to 100 due to rounding.
Cases were classified by count date.
Source: Utah Dept of Health, Bureau of Epidemiology, TB Control Pgm.

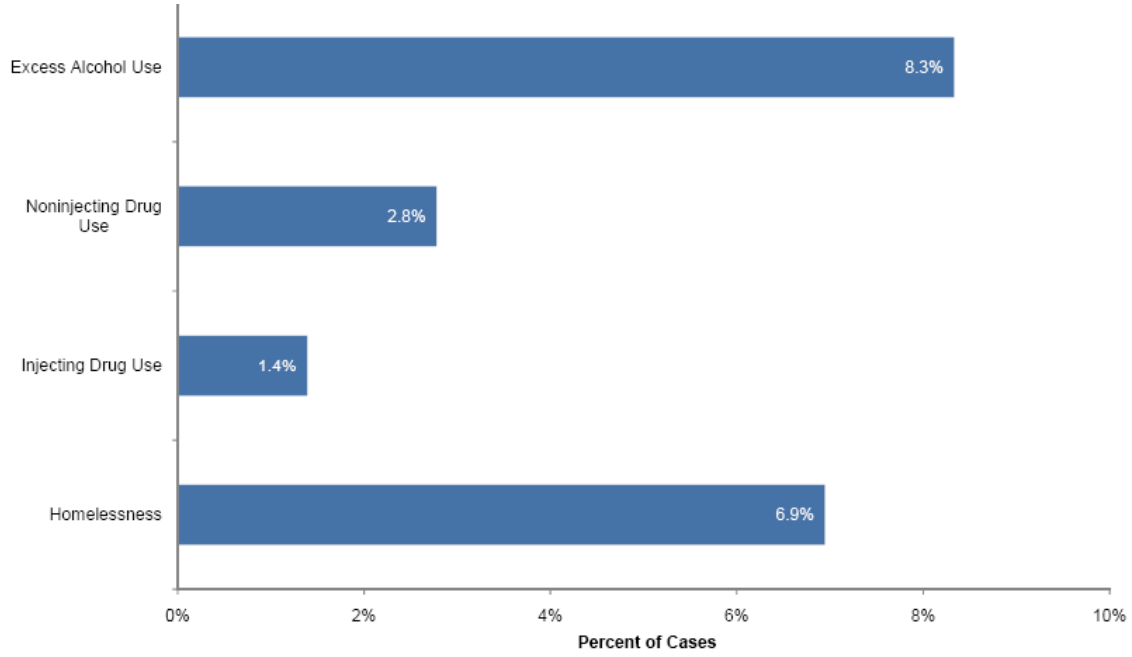
Homelessness & Substance Abuse

In 2010, the percentages of TB cases in Utah aged 15 years or more who were homeless and/or reported substance abuse in the 12 months prior to TB diagnosis were as follows: 5% (1 of 20) were homeless; 0% (0 of 20) reported injecting drug use; 5% (1 of 20) reported noninjecting drug use; and 10% (2 of 20) reported excess alcohol use.

Of the 144 TB cases aged 15 years or more reported in Utah from 2006 to 2010, an average of 7% per year were reported as being homeless in the 12 months prior to TB diagnosis (range: 0%-14%). In terms of substance abuse in the 12 months prior to TB diagnosis, an average of 1% reported injecting drug use (range: 0%-5%); 3% reported noninjecting drug use (range: 0%-5%); and 8% reported excess alcohol use (range: 4%-14%).

In the US in 2009, the percentage of TB cases aged 15 years or more with information on homelessness and/or reported substance abuse in the 12 months prior to TB diagnosis was as follows: 5% were homeless; 1% reported injecting drug use; 8% reported noninjecting drug use; and 13% reported excess alcohol use. (CDC. *Reported Tuberculosis in the United States, 2009*).

Figure 7. Homelessness and Substance Abuse* in TB Cases Aged ≥ 15, Utah, 2006-2010



*Homelessness and substance abuse in the 12 months prior to TB diagnosis.
Note: Categories are not mutually exclusive.
Cases were classified by count date.
Source: Utah Dept of Health, Bureau of Epidemiology, TB Control Pgm.

TB by Risk Factor

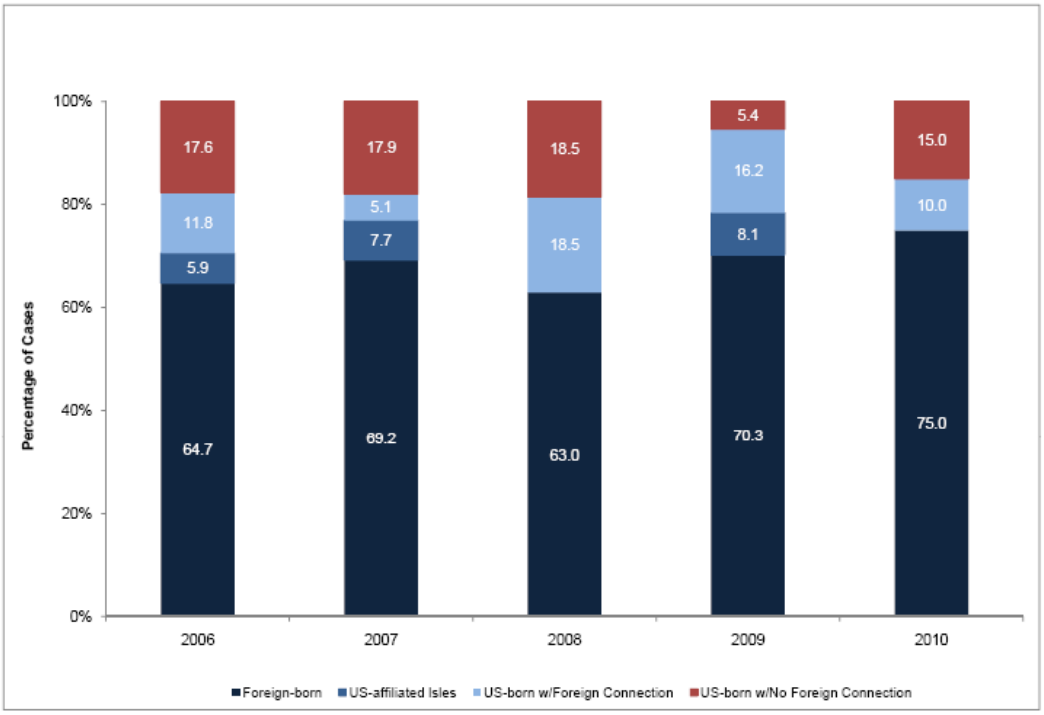
Country of Origin

In 2010, 75% (15 of 20) of all reported TB cases occurred in foreign-born persons; no cases were reported in persons born in an US-affiliated island (UAI); 10% (2 of 20) in US-born persons with a foreign connection; and 15% (3 of 20) of the cases were US-born persons with no known foreign connection. Of the US-born persons with a foreign connection, one person was a missionary and also had experience working in a country with a high incidence of TB; and the other person had lived for 14 years in a country with a high incidence of TB.

From 2006 to 2010, foreign-born persons accounted for an average of 68% of the TB cases per year (range: 63%-75%). Persons born in an UAI accounted for an average of 5% of the cases per year (range: 0%-8%). US-born persons with a foreign connection accounted for an average of 12% of the cases per year (range: 5%-19%); persons with foreign connections included individuals who had lived in countries with a high incidence of TB, US-born children who were contacts of foreign-born or UAI cases, and US-born children of foreign-born parents.

In 2009, 59% of all TB cases in the US occurred in foreign-born persons. Utah ranked 14th out of 50 states for its percentage of TB cases that were of foreign-born persons. These numbers show the importance of effectively screening and treating individuals from high TB prevalence areas. (CDC. *Reported Tuberculosis in the United States, 2009*).

Figure 8. Percent of TB Cases Among Foreign, US-affiliated Islands (UAIs),* vs US-born Persons, Utah, 2006-2010



*Includes persons born in American Samoa, the Federated States of Micronesia, Guam, the Republic of the Marshall Islands, Midway Island, the Commonwealth of the Northern Mariana Islands, Puerto Rico, the Republic of Palau, the US Virgin Islands, and US minor and outlying Pacific islands.
Cases were classified by count date.
Source: Utah Dept of Health, Bureau of Epidemiology, TB Control Pgm.

TB by Risk Factor

The distribution of the countries of birth of foreign-born persons reported with TB in Utah from 2006 to 2010 illustrates the truly global nature of the disease. The top three countries of origin - Mexico, Somalia, and Vietnam - span three continents and accounted for 49% of the total number of foreign-born cases. The top 11 countries in the table below accounted for 78% of the total number of foreign-born cases.

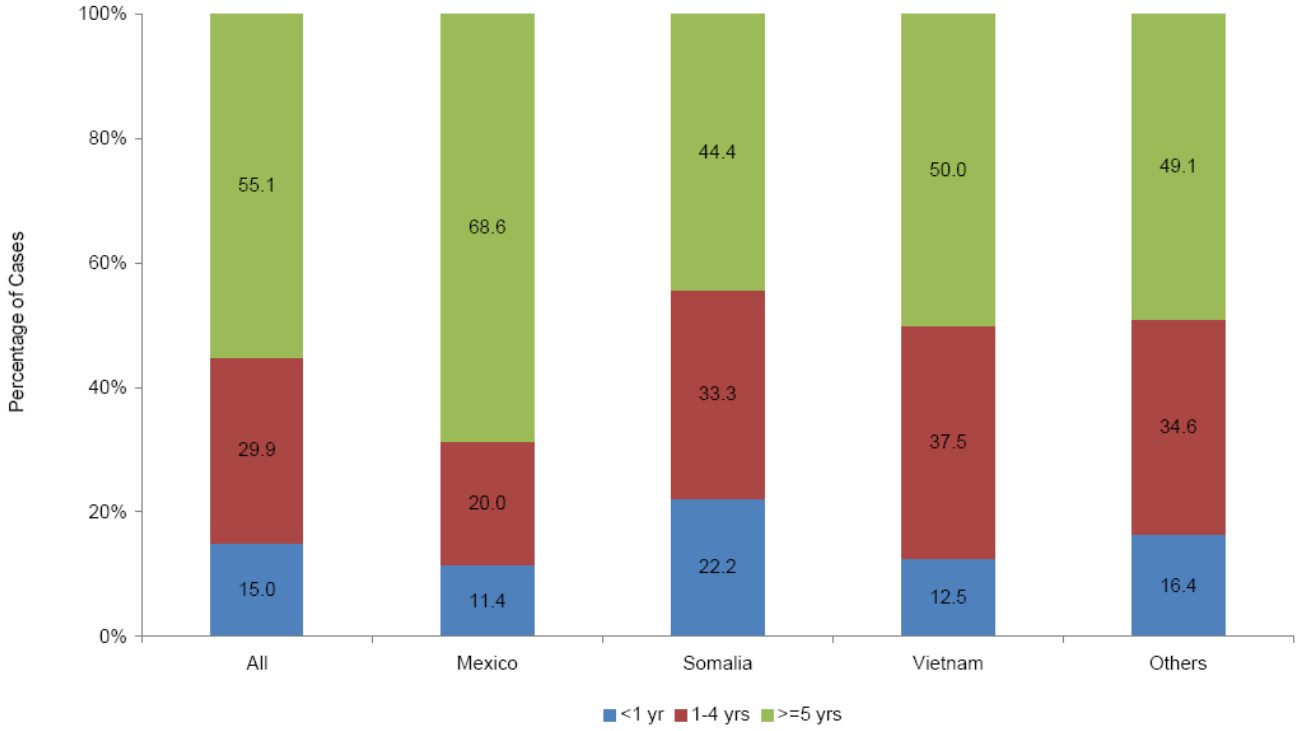
Persons from 19 different countries each accounted for less than three percent of the total but, altogether, accounted for 22% of foreign-born persons reported with TB in Utah.

Table 5. Country of Origin for Foreign-born* Persons Reported with TB, Utah, 2006-2010

Country of Origin	No.	%
Mexico	35	32.7
Somalia	9	8.4
Vietnam	8	7.5
India	6	5.6
Peru	5	4.7
Philippines	5	4.7
China	4	3.7
Laos	3	2.8
Pakistan	3	2.8
Sierra Leone	3	2.8
Sudan	3	2.8
Others**	23	21.5
Total	107	100.0

*Includes persons born outside the US, American Samoa, the Federated States of Micronesia, Guam, the Republic of the Marshall Islands, Midway Island, the Commonwealth of the Northern Mariana Islands, Puerto Rico, the Republic of Palau, the US Virgin Islands, and US minor and outlying Pacific islands.
**Other countries include: Afghanistan, Azerbaijan, Bolivia, Burma, Cambodia, Chad, Croatia, Cuba, Dominican Republic, El Salvador, Eritrea, Hong Kong, Kenya, Korea, Liberia, Mongolia, Nepal, Nicaragua, and Tonga.
Note: Percentages may not sum to 100 due to rounding.
Cases were classified by count date.
Source: Utah Dept of Health, Bureau of Epidemiology, TB Control Pgm.

Figure 9. Length of US Residence Prior to TB Diagnosis in Foreign-born* Persons, Utah, 2006-2010



*Includes persons born outside the US, American Samoa, the Federated States of Micronesia, Guam, the Republic of the Marshall Islands, Midway Island, the Commonwealth of the Northern Mariana Islands, Puerto Rico, the Republic of Palau, the US Virgin Islands, and US minor and outlying Pacific islands.
Cases were classified by count date.
Source: Utah Dept of Health, Bureau of Epidemiology, TB Control Pgm.

Of all the cases of TB diagnosed in foreign-born persons in Utah from 2006 through 2010, 15% (16 of 107) of the cases of TB had been in the US for less than one year; 30% (32 of 107) between one and four years; and 55% (59 of 107) for five or more years.

As illustrated in Figure 9, the length of US residence prior to TB diagnosis varies according to the country of origin. Among persons born in Mexico, 11% (4 of 35) had been in the US for less than one year; 20% (7 of 35) between one and four years; and 69% (24 of 35) for at least five years.

Among persons born in Somalia, 22% (2 of 9) had been in the US for less than one year; 33% (3 of 9) between one and four years; and 44% (4 of 9) for five or more years.

Among persons born in Vietnam, 13% (1 of 8) had been in the US for less than one year; 38% (3 of 8) between one and four years; and 50% (4 of 8) for five or more years.

4. TB by Clinical Information

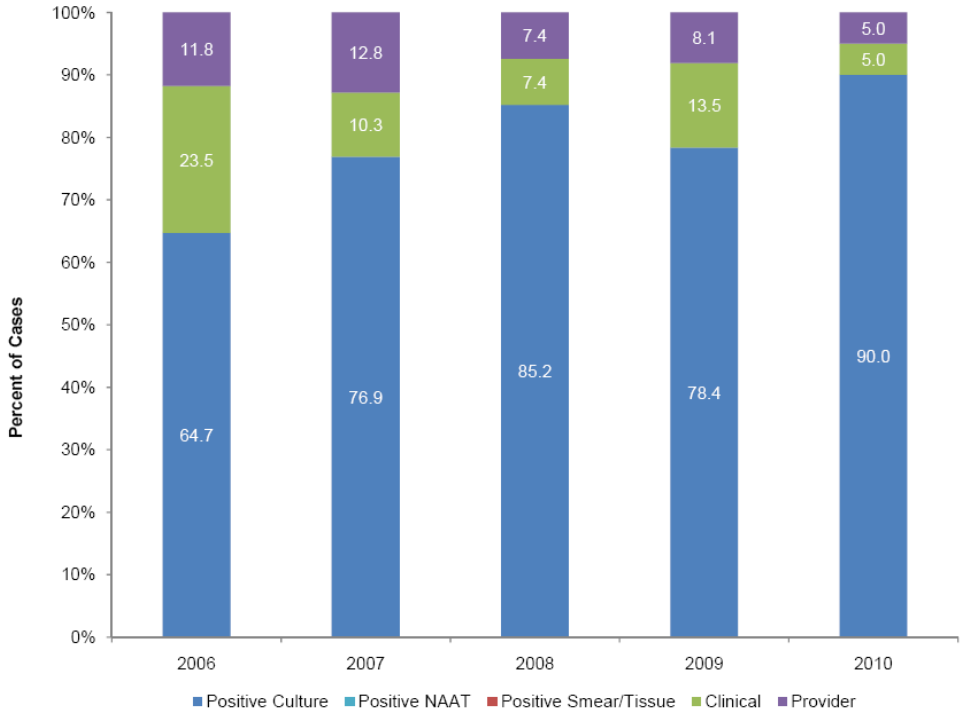
Case Verification

In 2010, 90% (18 of 20) of TB cases reported in Utah were confirmed by isolation of *Mycobacterium tuberculosis* from a laboratory culture; 5% (1 of 20) were verified by the clinical case definition of TB; and 5% (1 of 20) were confirmed by provider diagnosis[1].

The case verification breakdown of the 157 TB cases reported in Utah from 2006 to 2010 was as follows: 78% by positive culture (range: 65%-90%); 13% by clinical case definition (range: 5%-24%); and 10% by provider diagnosis (range: 5%-13%).

Utah's case verification distribution is very similar to that of all cases reported in the US. In 2009, 77% of the cases reported in the US were confirmed by laboratory culture; 1% by positive smear/tissue; 14% by clinical case definition; and 8% by provider diagnosis. (CDC. *Reported Tuberculosis in the United States, 2009*).

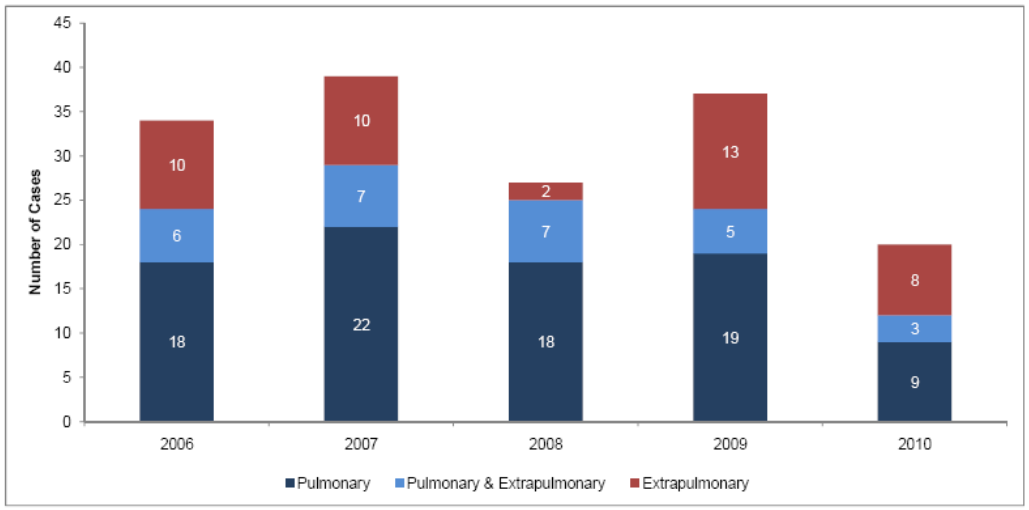
Figure 10. Percent of TB Cases by Case Verification,* Utah, 2006-2010



*The nucleic acid amplification test (NAAT) category became available in 2009.
Cases were classified by count date.
Source: Utah Dept of Health, Bureau of Epidemiology, TB Control Pgm.

[1]Clinical cases are defined as cases that have a positive tuberculin skin test, have other signs and symptoms compatible with TB, are treated with two or more anti-tuberculosis medications, and have completed a diagnostic evaluation. When patients meet neither the laboratory nor clinical case definition, they may be verified TB cases based on provider diagnosis.

Figure 11. TB Cases by Site of Disease, Utah, 2006-2010



Cases were classified by count date.
Source: Utah Dept of Health, Bureau of Epidemiology, TB Control Pgm.

Site of Disease

In 2010, the percentage of TB cases with pulmonary disease alone was 45% (9 of 20). An additional 15% (3 of 20) had pulmonary and extrapulmonary involvement; therefore, 60% (12 of 20) of the TB cases had some pulmonary involvement. The remaining 40% (8 of 20) of the cases had extrapulmonary disease alone.

From 2006 to 2010, 157 TB cases were reported in Utah. Of these, 55% were pulmonary alone (range: 45%-67%); 18% were pulmonary and extrapulmonary (range: 14%-26%); and 27% were extrapulmonary alone (range: 7%-40%).

In 2009, 69% of the TB cases in the US were pulmonary; 9% had both pulmonary and extrapulmonary disease; and 21% were extrapulmonary. (CDC. *Reported Tuberculosis in the United States, 2009*).

TB by Clinical Information

Table 6. HIV Status in Persons with TB, Utah, 2006-2010

HIV Status	2006		2007		2008		2009		2010		Total	
	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%
Negative	33	97.1	36	92.3	23	85.2	34	91.9	20	100.0	146	93.0
Positive	1	2.9	1	2.6	1	3.7	1	2.7	0	0.0	4	2.5
Indeterminate	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0
Refused	0	0.0	1	2.6	0	0.0	0	0.0	0	0.0	1	0.6
Not Offered	0	0.0	1	2.6	3	11.1	2	5.4	0	5.0	6	3.8
Total	34	100.0	39	100.0	27	100.0	37	100.0	20	100.0	157	100.0

Note: Percentages may not sum to 100 due to rounding.
Cases were classified by count date.
Source: Utah Dept of Health, Bureau of Epidemiology, TB Control Pgm.

HIV Testing

Knowledge of a TB patient's human immunodeficiency virus (HIV) status is critical in ensuring that the optimal drug regimen is selected, to refer patients to HIV primary care if a positive result is newly detected, and to guide the conduct of contact investigations.

In 2010, 100% (20 of 20) of persons with TB reported a positive or negative HIV test result.

For the five-year period from 2006 to 2010, 96% (150 of 157) of persons with TB reported a positive or negative HIV test result. The one case where testing was refused was in a patient from a foreign culture in which the spouse refused the administration of the test. Reasons for not offering the HIV test included cases in pediatric patients less than four years of age, in elderly patients, and TB diagnosis at the time of death or shortly after beginning TB treatment.

HIV Coinfection

In 2010, none of the reported TB cases were coinfected with HIV.

During the 2006-2010 time frame, an average of 3% of TB cases aged 25 to 44 (range: 0%-8%) and 3% of all cases per year (range: 0%-4%) were coinfected with HIV.

Utah's percentage of HIV coinfection in persons reported with TB is lower than the national average. In the US in 2009, 10% of TB cases aged 25 to 44 and 6% of persons with TB in all age groups were coinfected with HIV . (CDC. *Reported Tuberculosis in the United States*, *2009*).

Table 7. TB Cases with HIV Coinfection, Utah, 2006-2010

Year	25-44 Years HIV Positive		All Ages HIV Positive		Total Cases 25-44	All
	No.	%	No.	%	No.	No.
2006	1	8.3	1	2.9	12	34
2007	0	0.0	1	2.6	13	39
2008	0	0.0	1	3.7	6	27
2009	1	5.3	1	2.7	19	37
2010	0	0.0	0	0.0	9	20
Total	2	3.4	4	2.5	59	157

Note: Percentages may not sum to 100 due to rounding.
Cases were classified by count date.
Source: Utah Dept of Health, Bureau of Epidemiology, TB Control Pgm.

Drug Susceptibility Testing

Drug susceptibility testing (DST) was performed on the initial specimen isolates for all 18 persons with TB confirmed by laboratory culture in 2010. A total of 33% (6 of 18) of the isolates were resistant to one or more anti-tuberculosis medications, and 33% (6 of 18) of the cases were resistant to at least isoniazid (INH). There were two cases of multidrug resistant TB (MDR-TB).

During the 2006 to 2010 time frame, drug susceptibility testing was completed on 100% (122 of 122) of the isolates of TB cases confirmed by laboratory culture. The percentage of culture isolates that had resistance to one or more anti-tuberculosis medications relative to the total number of laboratory culture-confirmed TB cases per year ranged from 9% to 33%, with a five-year average of 19%. The percentage of culture isolates that had resistance to at least INH relative to the total number of culture-confirmed TB cases ranged from 4% to 33%, with a five-year average of 13%. Five cases of MDR-TB were reported during this time frame.

In 2009, 9% of the reported cases in the US with drug susceptibility results were resistant to at least INH and 1% were confirmed with MDR-TB. (CDC. *Reported Tuberculosis in the United States, 2009*).

Table 8. Drug Susceptibility Testing (DST) and Primary Drug Resistance, Utah, 2006-2010

Year	Culture Pos. Cases	Cases with DST Results		Resistance >= 1 Drug		At Least INH		At Least INH & RIF	
		No.	%	No.	%	No.	%	No.	%
2006	22	22	100.0	6	27.3	3	13.6	0	0.0
2007	30	30	100.0	3	10.0	2	6.7	1	3.3
2008	23	23	100.0	2	8.7	1	4.3	1	4.3
2009	29	29	100.0	6	20.7	4	13.8	1	3.4
2010	18	18	100.0	6	33.3	6	33.3	2	11.1
Total	122	122	100.0	23	18.9	16	13.1	5	4.1

Note: A single case can be reported in more than one category.
Percentages may not sum to 100 due to rounding.
Cases were classified by count date.
Source: Utah Dept of Health, Bureau of Epidemiology, TB Control Pgm.

Directly Observed Therapy

Directly observed therapy (DOT) involves the direct visual observation by a health care provider or other reliable person of a patient's ingestion of medication. In 2010, 85% (17 of 20) of persons in Utah who started treatment for TB had all doses of medications thus far administered by DOT. Because TB treatment is typically administered for a minimum of six months, many of these patients are still on treatment. Of the three cases that had a combination of self-administered and directly observed therapy, two involved travel abroad and one case was allowed self-administration of medication in order to accommodate culture observances.

From 2006 to 2010, an average of 95% of persons who were treated for TB in Utah had all doses of their medications given by DOT (range: 85%-100%), and an average of 5% completed their treatment utilizing a combination of directly observed and self-administered therapy (range: 0%-15%).

Utah's percentage of cases utilizing DOT is significantly higher than the national average. The most recent national statistics available regarding the percentage of cases given DOT are from 2007. In that year, 56% of the cases for which information regarding DOT was available completed treatment using only DOT and 33% utilized both directly observed and self-administered therapy. (CDC. *Reported Tuberculosis in the United States, 2009*).

Table 9. Use of Directly Observed Therapy (DOT), Utah, 2006-2010

Year	Total Starting Treatment	DOT		DOT & Self-Administered		Self-Administered	
		No.	%	No.	%	No.	%
2006	34	32	94.1	2	5.9	0	0.0
2007	39	37	94.9	2	5.1	0	0.0
2008	26	25	96.2	1	3.8	0	0.0
2009	36	36	100.0	0	0.0	0	0.0
2010	20	17	85.0	3	15.0	0	0.0
Total	155	147	94.8	8	5.2	0	0.0

*Not all patients have completed treatment.
Cases were classified by count date.
Source: Utah Dept of Health, Bureau of Epidemiology, TB Control Pgm.

TB by Clinical Information

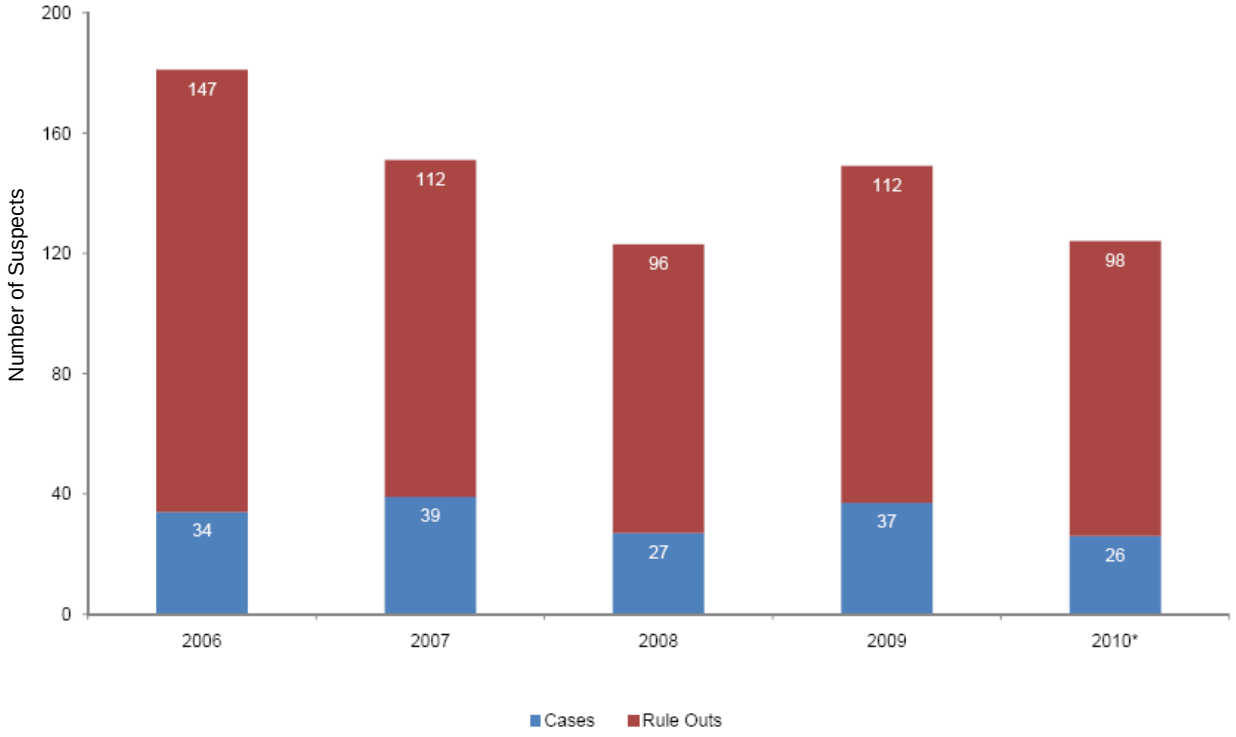
Suspects

A total of 124 suspects were identified from January 1, 2010 through December 31, 2010. Of those suspects, 26 were identified as Utah cases - including six cases that were counted in 2011. Therefore, 79% (98 of 124) suspects were either ruled out as having TB or were out-of-jurisdiction cases that moved to Utah.

Each suspect was monitored by a public health agency to ensure the completion of a diagnostic evaluation for TB. In 2010, 21% (26 of 124) of all reported suspects became verified Utah TB cases.

From 2006 to 2010, a total of 728 persons were reported as suspect TB. The percentage of Utah's TB suspects that were later diagnosed with active TB disease during this time frame ranged from 19% to 26% per year, with a five-year average of 22%. It is important for health care providers to consider TB as a possible diagnosis, even if an increase in suspect TB cases also means increased public health resources will be necessary to evaluate suspect cases.

Figure 12. Final Classification of TB Suspects, Utah, 2006-2010



*Six suspects were determined to have active TB in 2011
Cases were classified by count date.
Source: Utah Dept of Health, Bureau of Epidemiology, TB Control Pgm.

5. Class B TB Immigrant/Refugee Arrivals

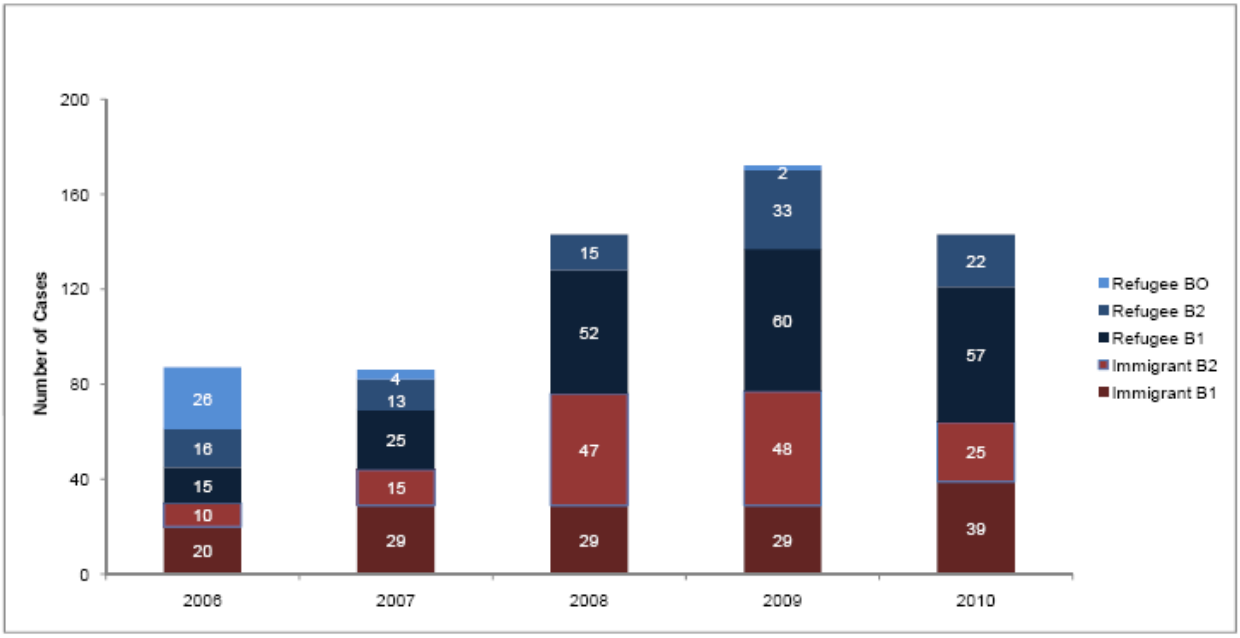
Class B Tuberculosis

All immigrant and refugee applicants to the US must undergo an overseas health screening. Persons found to have Class A or infectious TB are not allowed to enter the US unless a waiver is granted; persons found to have Class B TB require medical follow-up upon arrival in the US. In 2006, the CDC established a special "B Other" category for refugees arriving from Thailand; however, the Technical Instructions for TB Screening and Treatment changed in 2007 and eliminated the "B Other" category. These new Technical Instructions were phased in country by country; most countries, and all refugees are now screened using the 2007 instructions. Under both the old and new Technical Instructions, Class B1 indicates a higher suspicion for TB than Class B2.

In 2010, 39 immigrants who resettled in Utah were identified with Class B1 TB and 25 were identified with Class B2 TB. Among the refugee arrivals, 57 were identified with Class B1 TB and 22 were identified with Class B2 TB. The number of Class B arrivals doubled from 2007 to 2009 as a result of the new Technical Instructions being implemented – which defines Class B1 as persons with findings suggestive of pulmonary TB but who had negative AFB sputum smears and cultures; persons with pulmonary TB who completed treatment; or extrapulmonary TB and Class B2 TB as persons with latent TB infection.

The number of persons arriving with Class B TB decreased to 2008 levels in 2010. All persons identified with Class B TB were referred to the state-contracted refugee clinic or the local health department of their new residence for expedited evaluation.

Figure 13. Class B TB Immigrant/Refugee Arrivals, Utah, 2006-2010



Note: Immigrants are persons who are admitted to the US as lawful permanent residents.
Refugees are persons outside their country of nationality who are unable or unwilling to return to that country because of persecution or a well-founded fear of persecution.
Class B TB cases were classified in the year of arrival to the US.
Source: Utah Dept of Health, Bureau of Epidemiology, TB Control Pgm.

List of Abbreviations

CDC	Centers for Disease Control and Prevention
CI	Confidence interval
DOT	Directly observed therapy
DST	Drug susceptibility testing
DTBE	Division of TB Elimination
FB	Foreign-born
HIV	Human immunodeficiency virus
INH	Isoniazid
MDR-TB	Multidrug resistant tuberculosis
NAAT	Nucleic acid amplification test
RIF	Rifampin
RVCT	Report of Verified Case of Tuberculosis
TB	Tuberculosis
US	United States