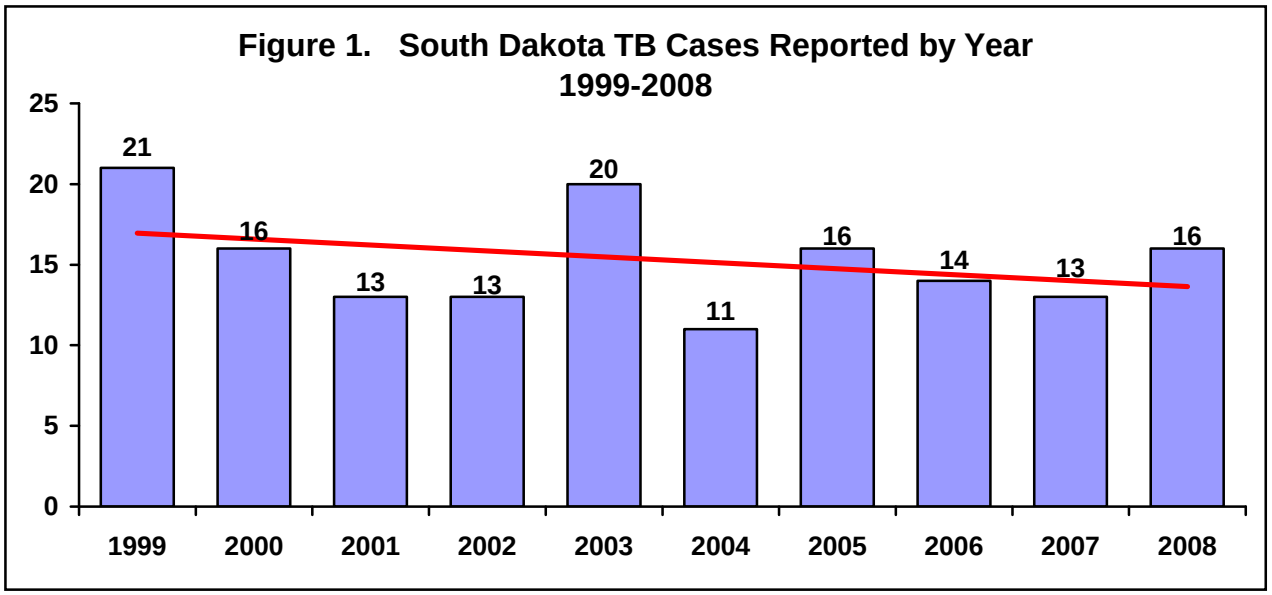
SOUTH DAKOTA DEPARTMENT OF HEALTH

Tuberculosis Control Program Annual Report 2008

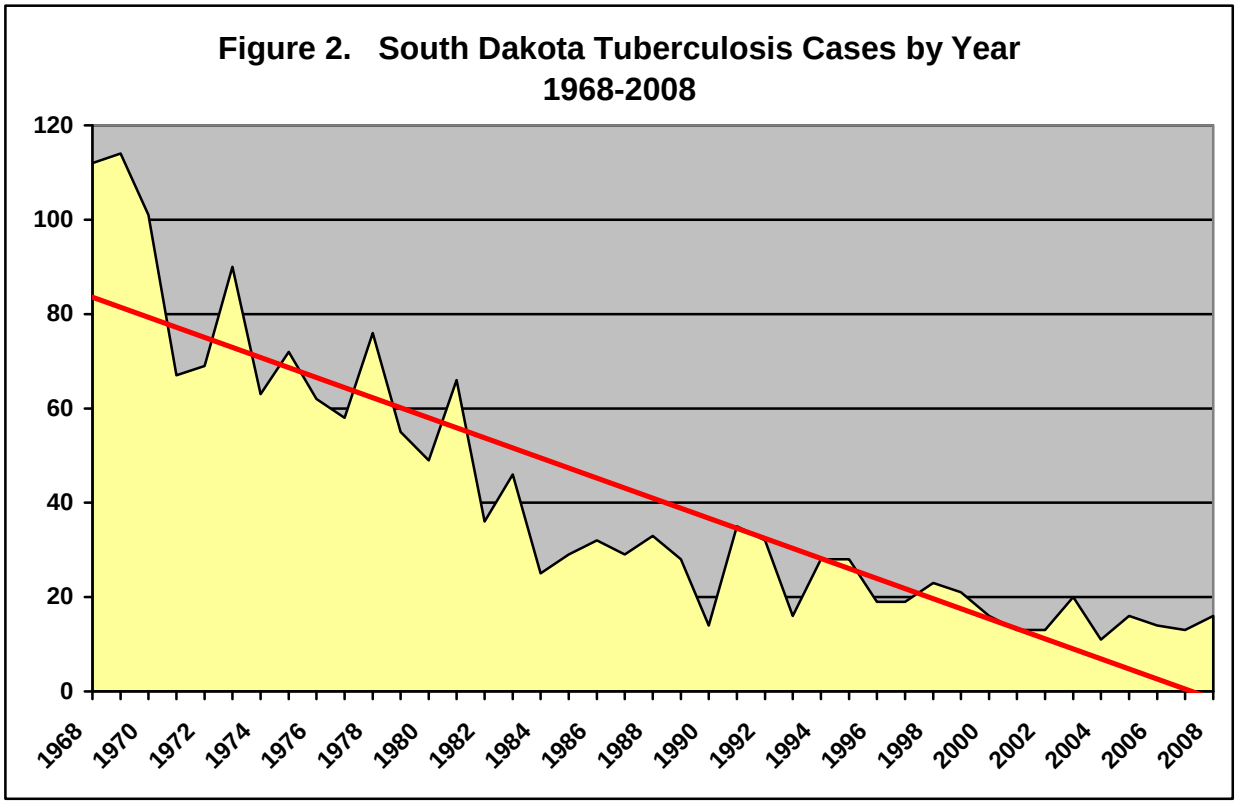
South Dakota Department of Health

For additional information, please contact Kristin Rounds, Tuberculosis Control Program Coordinator at (605) 773-3737 or 1-800-592-1861. Additional information may be obtained from the South Dakota TB Control Program website: www.doh.sd.gov/tb.

During the last ten years, South Dakota averaged 15 cases of tuberculosis (TB) per year. During 2008, there were 16 cases of TB reported to the South Dakota Department of Health, which is an increase of 3 cases from 2007. Figure 1 describes the 10-year trend of decreasing TB case reports.



The 10-year trend of decreasing TB cases is part of a longer trend of decreasing disease over the last several decades. Figure 2 illustrates the decreasing trend of reported tuberculosis cases in South Dakota since 1968. This dramatic historical decrease is a result of mandatory reporting of suspected TB cases to the Department of Health along with case management and comprehensive contact investigations which ensure that those exposed to tuberculosis receive appropriate intervention efforts.



The most recent data available nationally and regionally is from calendar year 2007. Figure 3 provides a comparison of the TB case rate per 100,000 population for the United States as well as a regional comparison of South Dakota and our border states of North Dakota, Minnesota, Iowa, Nebraska, Wyoming and Montana. Please note that South Dakota has the second highest TB case rate behind Minnesota when comparing these 7 states.

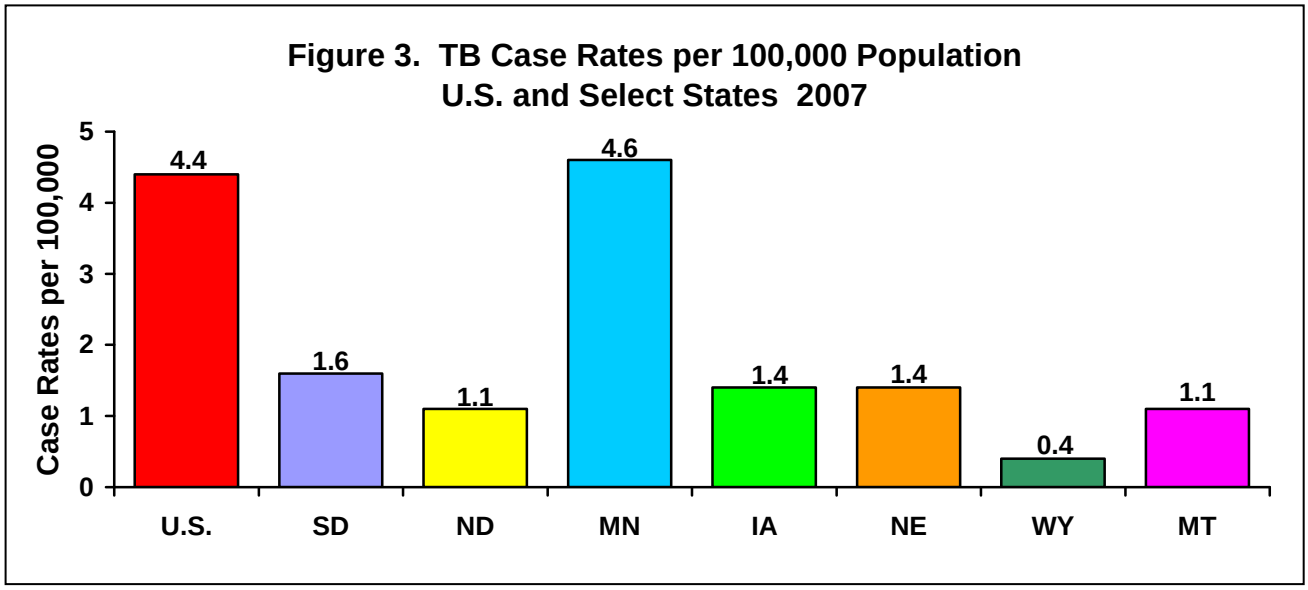
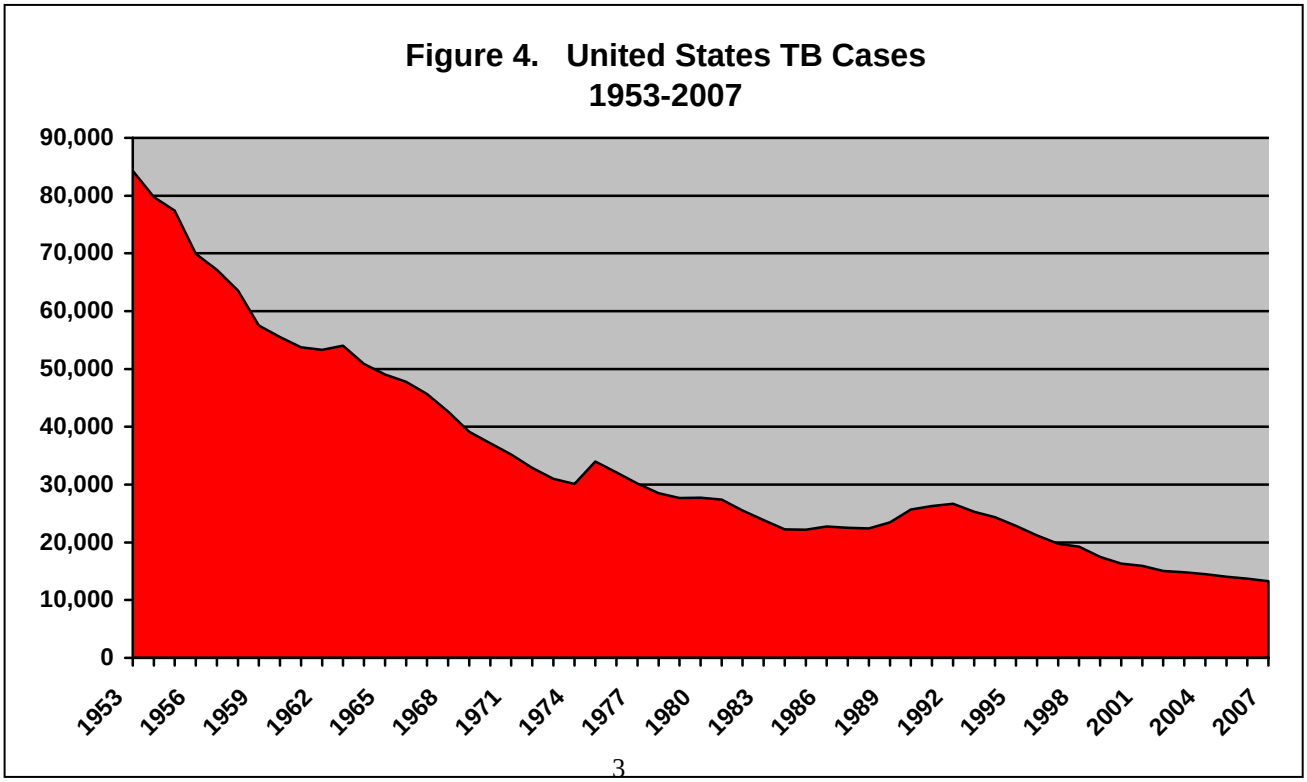


Figure 4 illustrates the historical trend of decreasing TB cases reported in the United States. In 2007 there were 13,299 TB cases reported in the US which was the lowest year on record, representing a 3.3% decrease from 2006. During 2007, 26 states reported increased case counts from 2006. The 4 states of California, Texas, New York and Florida accounted for 48% of the national case total. During 2007, 1.1% of the reported cases had primary multi-drug resistance compared to 1.0% in 2006 which is defined as no previous history of TB disease and resistance to the tuberculosis medications of at least isoniazid and rifampin.

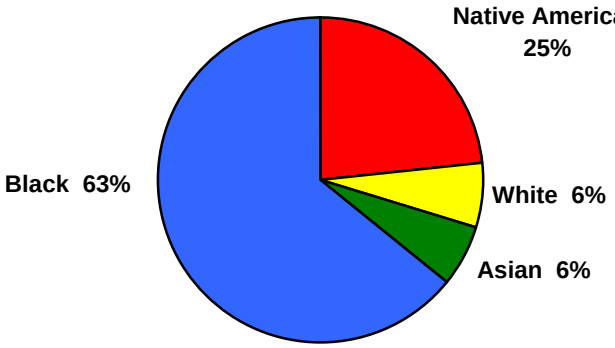


Native Americans have historically represented the highest percentage of TB cases by race. However in 2008, this trend changed to Blacks having the highest percentage of TB cases at 63%. Native Americans only contributed 25% of the total TB cases reported. The increase in Black TB cases was a mix of foreign-born persons and US-born children born to foreign-born parents. Nine of the 10 Black cases were associated with an outbreak of TB in the southeast area of the state. Table 1 and Figure 5 provide information on TB cases by race in 2008.

Table 1. TUBERCULOSIS CASES REPORTED BY SEX AND RACE SOUTH DAKOTA 2008

Race	Male	Female	Total	% of Cases
Native American	1	3	**4**	25%
White	0	1	**1**	6%
Black	4	6	**10**	63%
Hispanic	0	0	**0**	0%
Asian	1	0	**1**	6%
Total	**6**	**10**	**16**	**100%**

Figure 5. TB Cases by Race South Dakota 2008



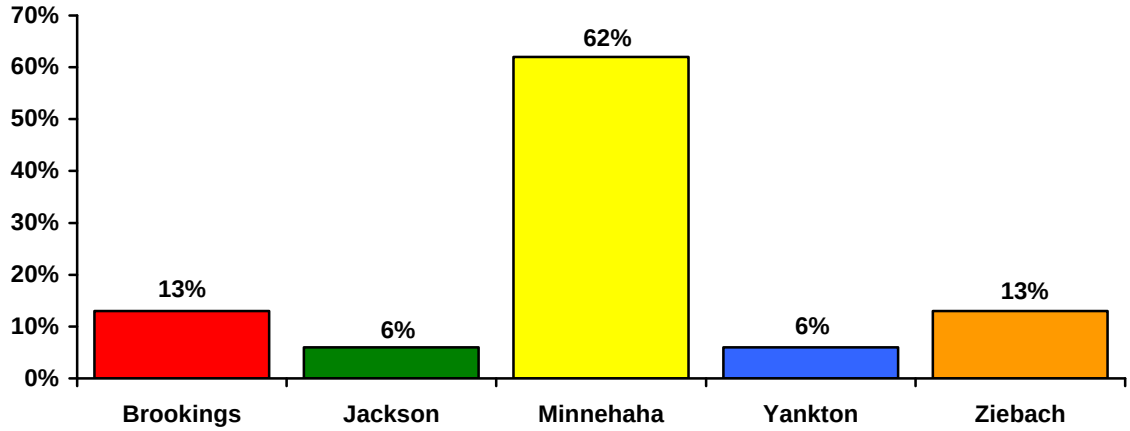
The TB incidence rate, which measures the number of TB cases per 100,000 population, is the best measure for determining the progress towards the elimination of TB in South Dakota. Native American TB case rates have dropped considerably while white cases have consistently remained low. The Black, Asian and other races mainly represent TB cases born outside of the United States who were diagnosed in South Dakota. Table 2 provides additional information on TB case rates for the last 6 years.

Table 2. TUBERCULOSIS MORBIDITY INCIDENCE RATES PER 100,000 BY RACE & YEAR SOUTH DAKOTA 2003-2008

Race	2003	2004	2005	2006	2007	2008
US Case Rate (All Races)	*5.1*	*4.9*	*4.7*	*4.6*	*4.4*	*Not available**
SD All Races	2.6	1.5	2.1	1.8	1.7	2.1
SD Native American	14.6	7.3	8.8	8.8	10.3	5.9
SD White	0.9	0.6	0.6	0.1	0.4	0.1
SD Black	0.0	0.0	48.4	64.5	32.3	161.3
SD Asian	69.4	0.0	52.1	52.1	17.4	17.4
All Other SD Races	0.0	41.3	0.0	0.0	0.0	0.0

**2008 US case rate data is not yet available.*

Figure 6. TB Cases Reported by County of Residence
South Dakota 2008



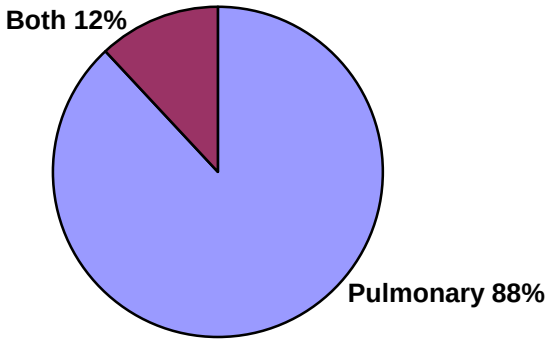
Tuberculosis cases in South Dakota have historically been located in a few geographic locations that consistently report the majority of TB cases. These include Minnehaha County which reports the most foreign-born TB cases and Shannon, Todd and Pennington counties which reports the highest Native American TB cases. During 2008, Minnehaha County had a significantly higher rate of reported TB cases. Figure 6 and Table 3 provide additional information on the counties of residence of the TB cases in 2008.

Table 3. TB CASES REPORTED BY COUNTY OF RESIDENCE
SOUTH DAKOTA 2008

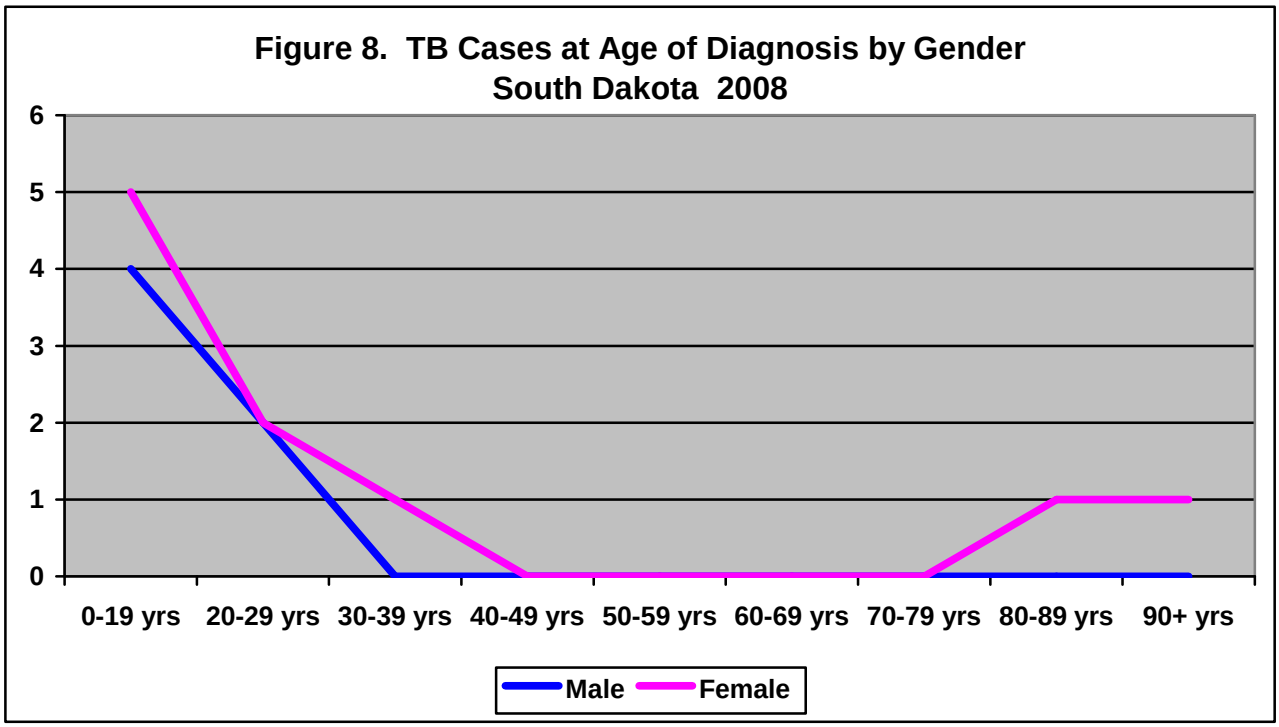
County	# of TB Cases	County	# of TB Cases
Brookings	2	Yankton	1
Jackson	1	Ziebach	2
Minnehaha	10		

Tuberculosis remains primarily a pulmonary disease with approximately 85% of cases reported nationally reported as pulmonary disease and 15% as non-pulmonary disease. South Dakota has historically reported a higher percentage of non-pulmonary TB disease. However in 2008, 14 cases (88%) were diagnosed with pulmonary TB and 2 additional TB cases (12%) had both pulmonary and non-pulmonary sites of disease as described in Figure 7. The non-pulmonary sites of disease in 2008 included lymph node and pericardial tuberculosis.

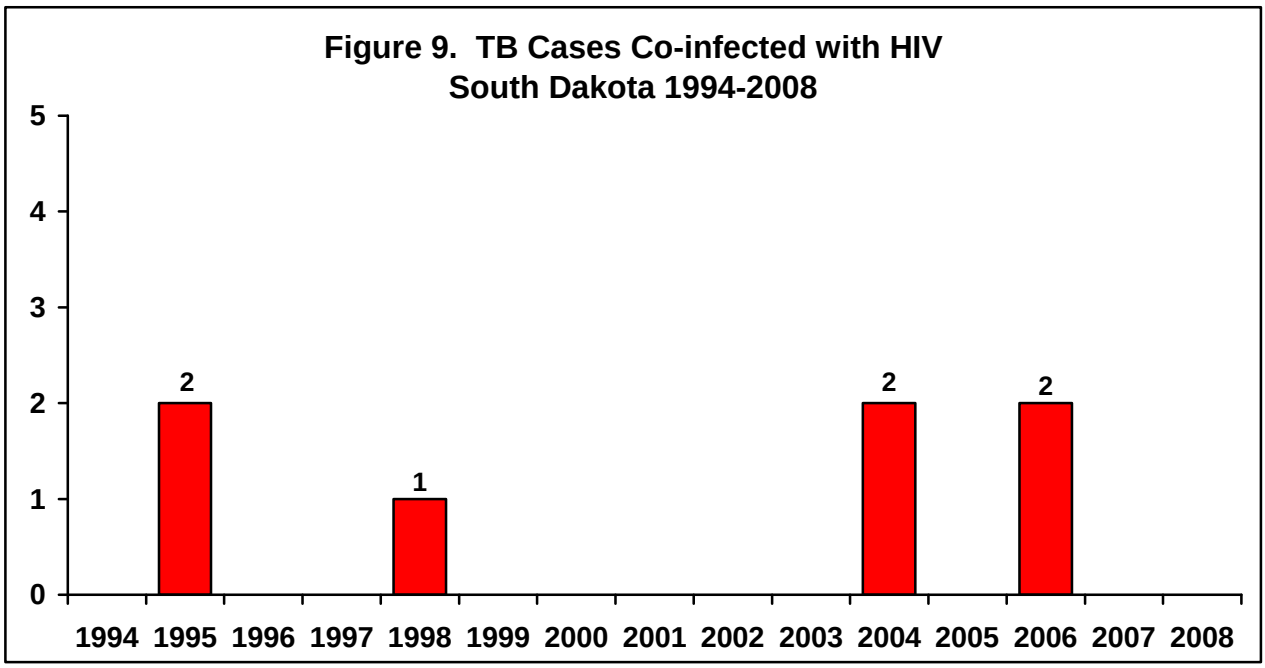
Figure 7. Percentage of Pulmonary versus Non-pulmonary
South Dakota 2008



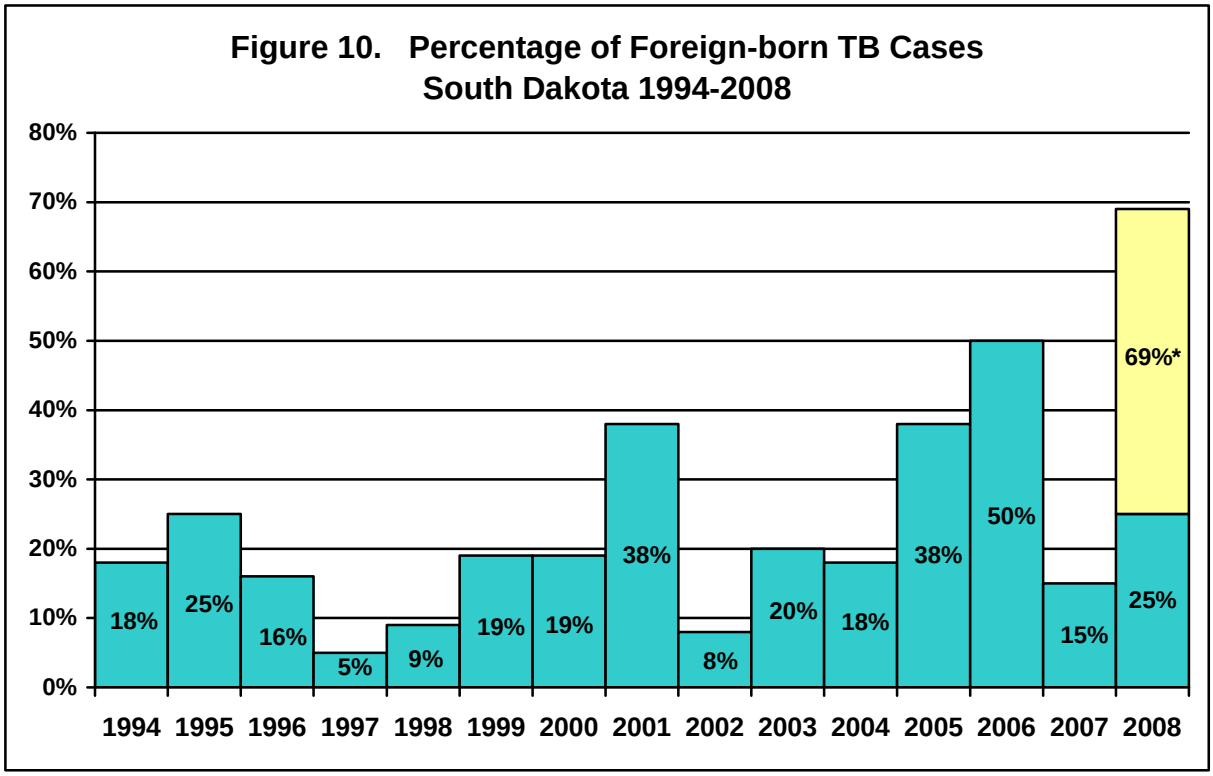
The average age of the TB case in 2008 was 22 years of age. This is a considerable shift of TB cases to younger ages compared to 2007 when the average age was 60 years of age. This was mainly due to a cluster of TB cases reported in the southeast part of the state. During 2008, 51% of the TB cases were reported in persons less than 10 years of age. Figure 8 illustrates the age at diagnosis by gender for tuberculosis cases reported in 2008.



Co-infection with HIV is an important risk factor for the development of active TB. Because of this, all TB cases diagnosed in South Dakota aged 25-44 years of age are offered HIV testing. Co-infected TB cases require more monitoring for toxicity and are frequently treated with second line TB medications. Figure 9 describes the number of TB cases co-infected with HIV since 1994 documenting that these HIV co-infected TB cases remain uncommon.

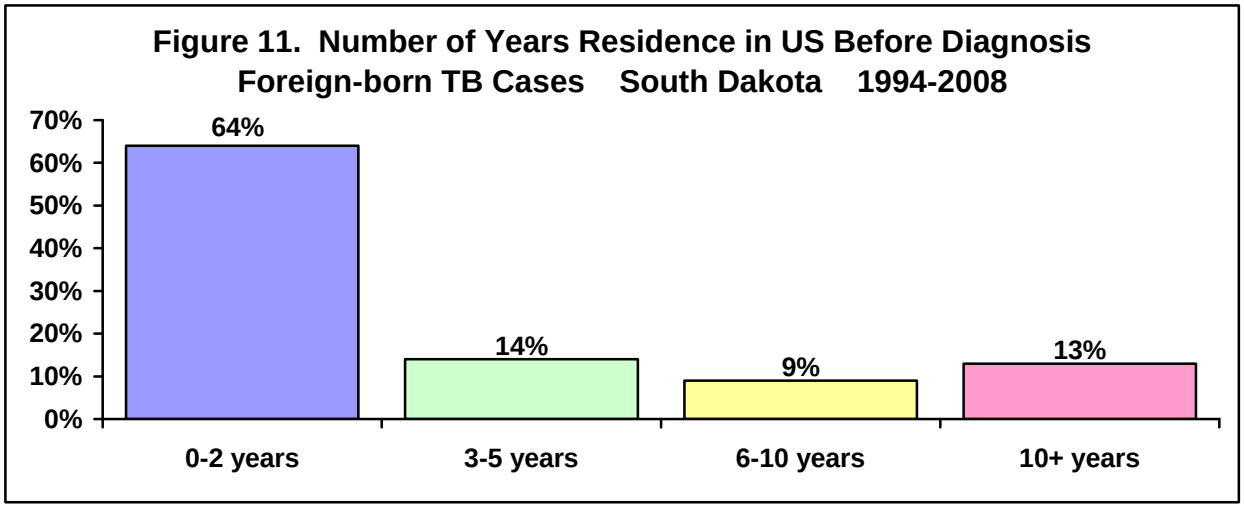


Tuberculosis cases who were born outside the United States continue to represent an important risk group in the United States as well as in South Dakota. During 2008 this group increased to 25% of the total cases reported. Figure 10 describes the percentage of foreign-born TB cases in South Dakota. US-born TB cases born to foreign-born parents is a relatively new TB risk factor which has been identified nationally. If the US-born TB cases born to foreign-born parents are also included in the below calculation, the 2008 South Dakota percentage increases to 69% (see yellow shaded area in Figure 10).

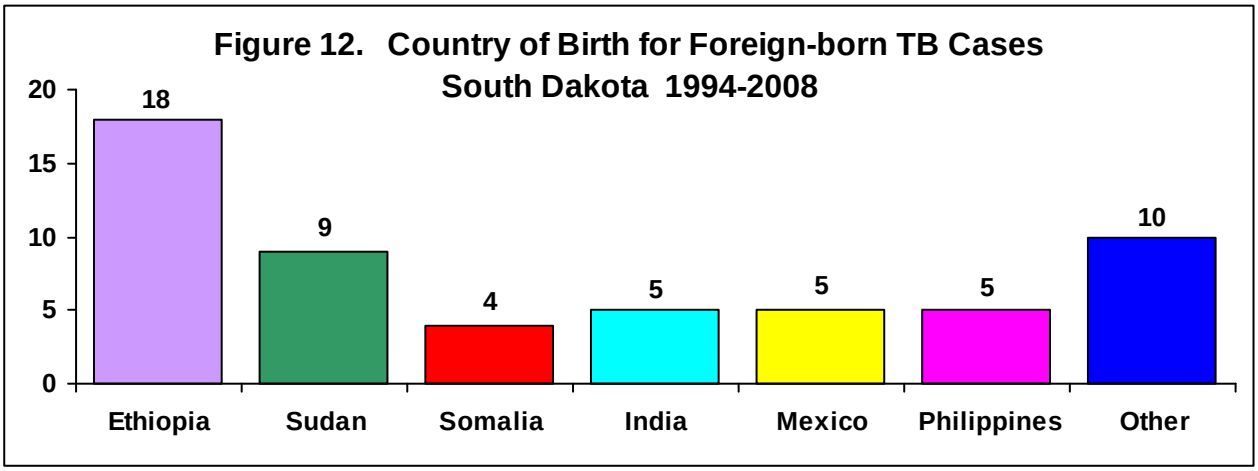


** 69% includes both foreign-born TB cases as well as US-born TB cases born to foreign-born parents.*

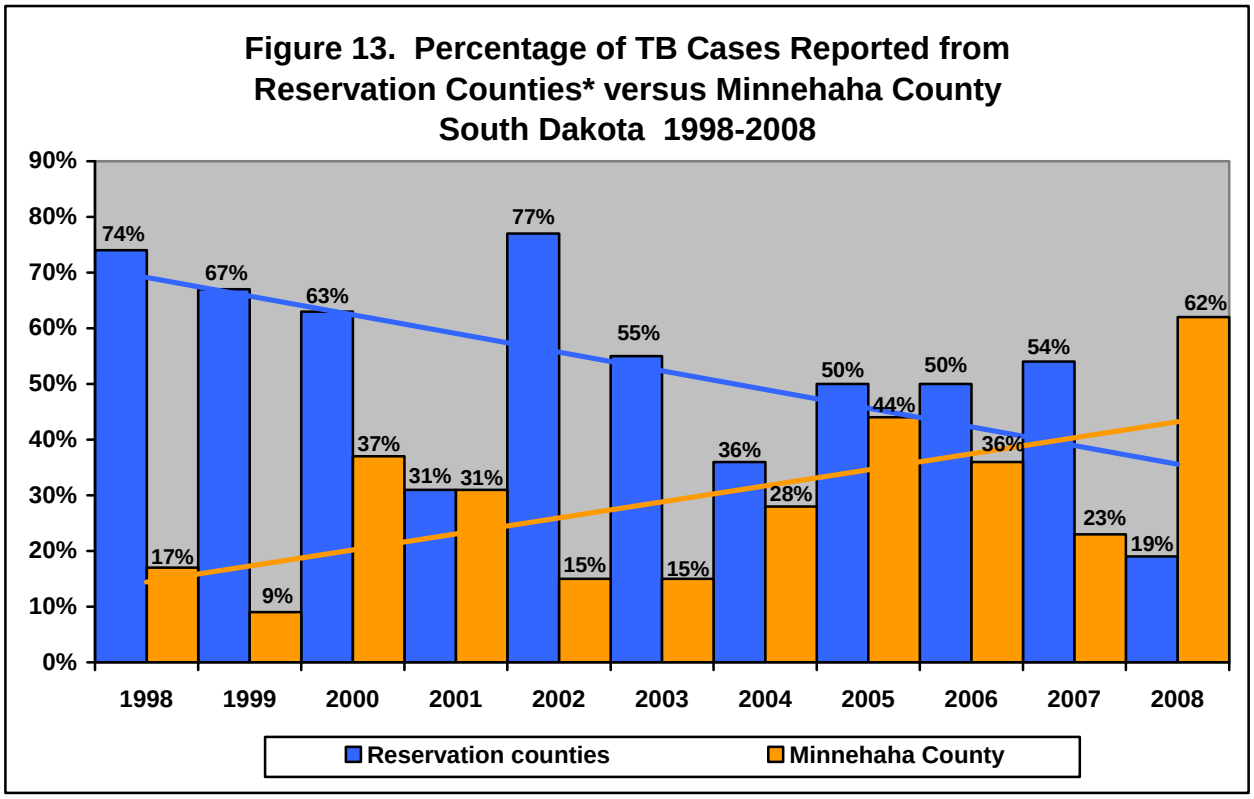
Most foreign-born persons who develop active TB usually do so within the first 2 years after arrival in the United States. Figure 11 describes that 64% of foreign-born TB cases since 1994 developed active TB within the first 2 years of their arrival. Because of this increased risk, these individuals are targeted for preventive TB program activities including targeted TB skin testing and preventive treatment programs.



Foreign-born TB cases continue to come from many areas of the world however the majority of the TB cases reported in South Dakota are of African descent. Figure 12 describes the country of birth for the foreign-born TB cases reported in South Dakota since 1994. Countries of birth for the "other" category include Afghanistan, China, Indonesia, Romania, Russia, South Africa and Vietnam.

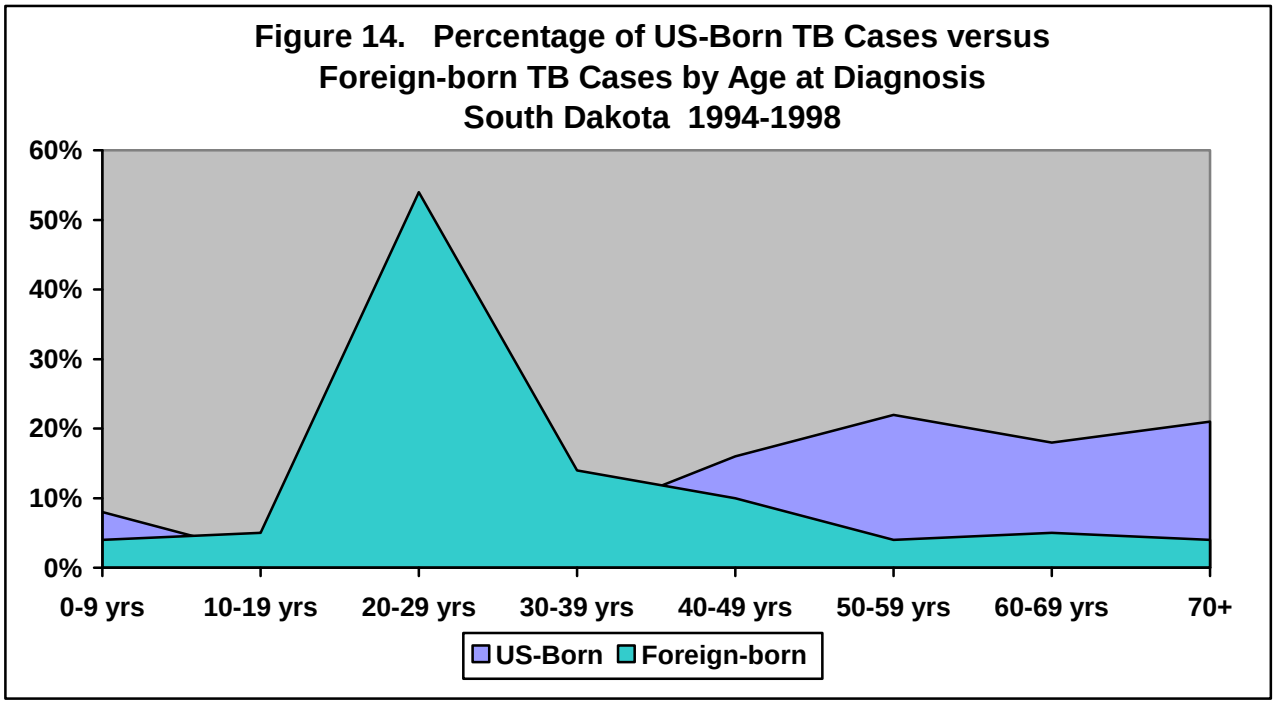


Another aspect to the increase of foreign-born TB cases in South Dakota is the change in geography where TB cases are reported. Historically, the highest percentage of TB cases were reported from counties that included and bordered American Indian Reservations. As Native American TB cases have decreased and foreign-born TB cases have increased, there has been a geographic shift of TB cases from reservation counties to Minnehaha County as illustrated in Figure 13. This is due to the fact that most foreign-born persons who resettle in South Dakota do so in Minnehaha County.

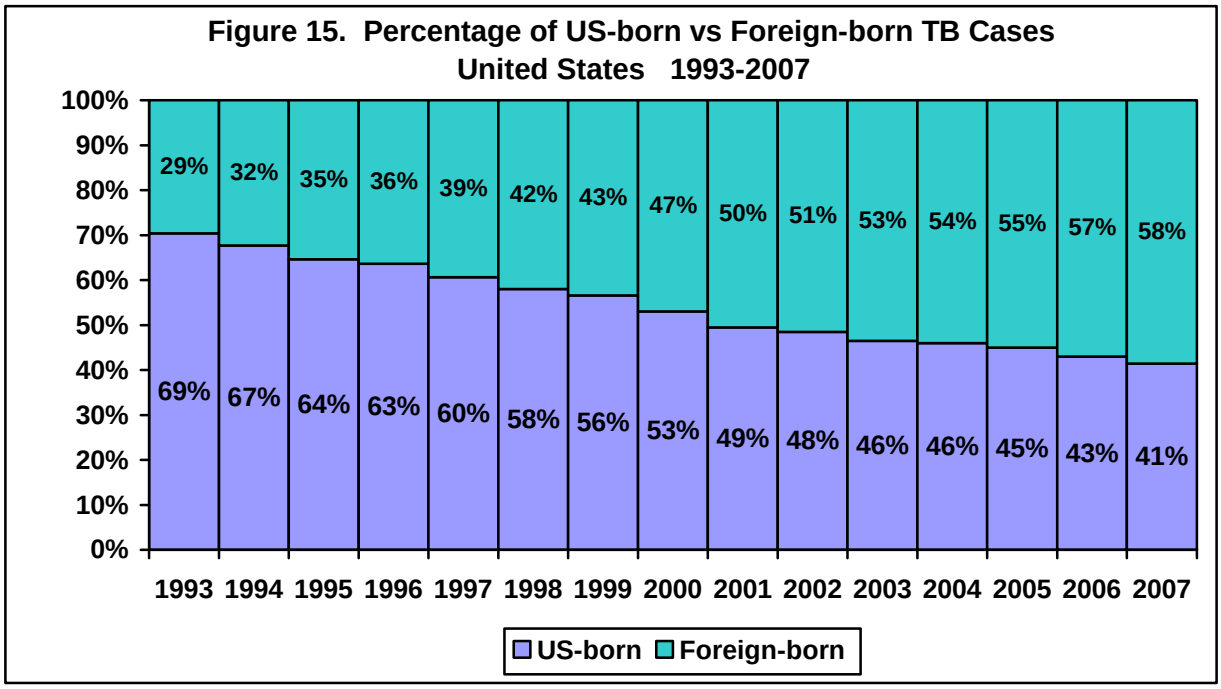


* Reservation counties include Bennett, Brule, Buffalo, Charles Mix, Corson, Dewey, Jackson, Mellette, Pennington, Shannon, Todd, Tripp, Walworth and Ziebach counties.

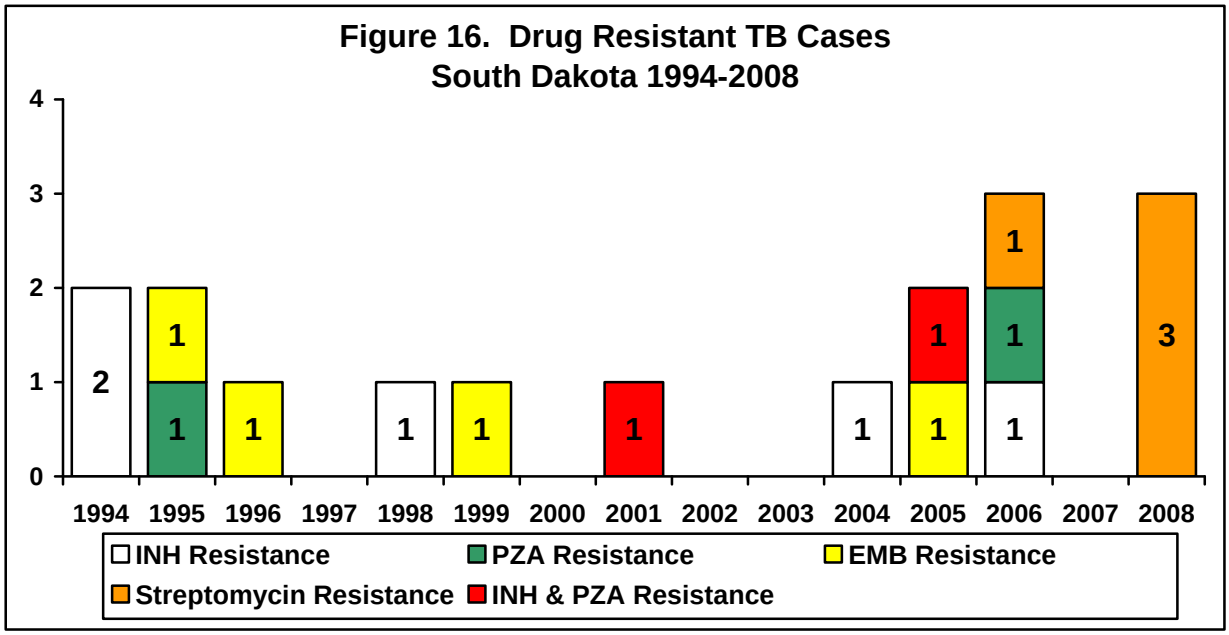
Foreign-born TB cases consistently are reported in younger persons as compared to US born patients in South Dakota. This presents additional TB control issues as these TB cases more commonly have young children who have been exposed in the home and many are employed which may require an investigation at their worksite to those exposed. Figure 14 illustrates that the majority of foreign-born TB cases are diagnosed while young adults.



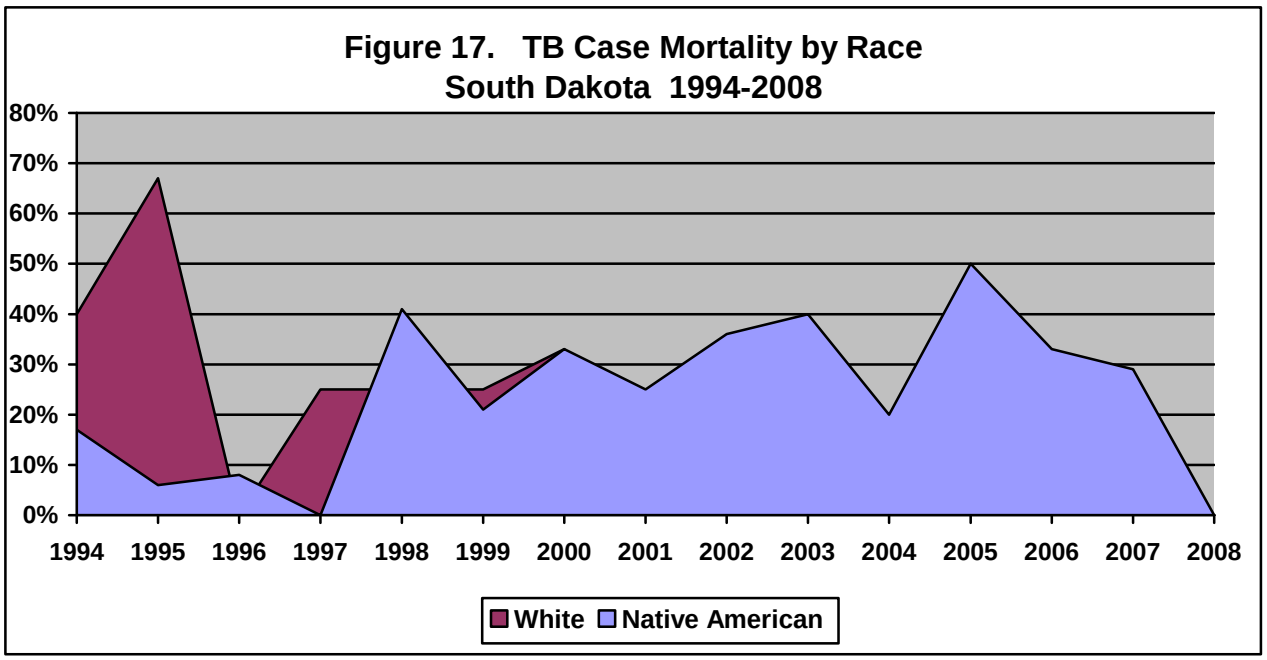
Foreign-born TB cases represent a unique challenge to the South Dakota TB Control Program because of cultural issues, language barriers and a greater likelihood of drug resistance. As these cases continue to increase in South Dakota, additional time and resources will need to be dedicated to address these unique issues. Figure 15 describes the ever increasing trend of the percentage of foreign-born TB in the United States since 1995.



All culture positive TB cases are tested for drug resistance to first-line TB medications including isoniazid, rifampin, pyrazinamide, ethambutol and streptomycin. Patients with single drug resistance can usually be successfully treated for their TB disease. Multi-drug resistant TB (defined by CDC as resistance to at least INH and RIF) is a significant public health problem because of the difficulty in achieving a successful treatment outcome. Figure 16 describes the drug resistant TB cases since 1994 illustrating that South Dakota has most often had single drug resistant cases reported. No multi-drug resistant TB cases have ever been reported in South Dakota although the Department of Health has managed a few MDR-TB case reported in other states that have moved to South Dakota.



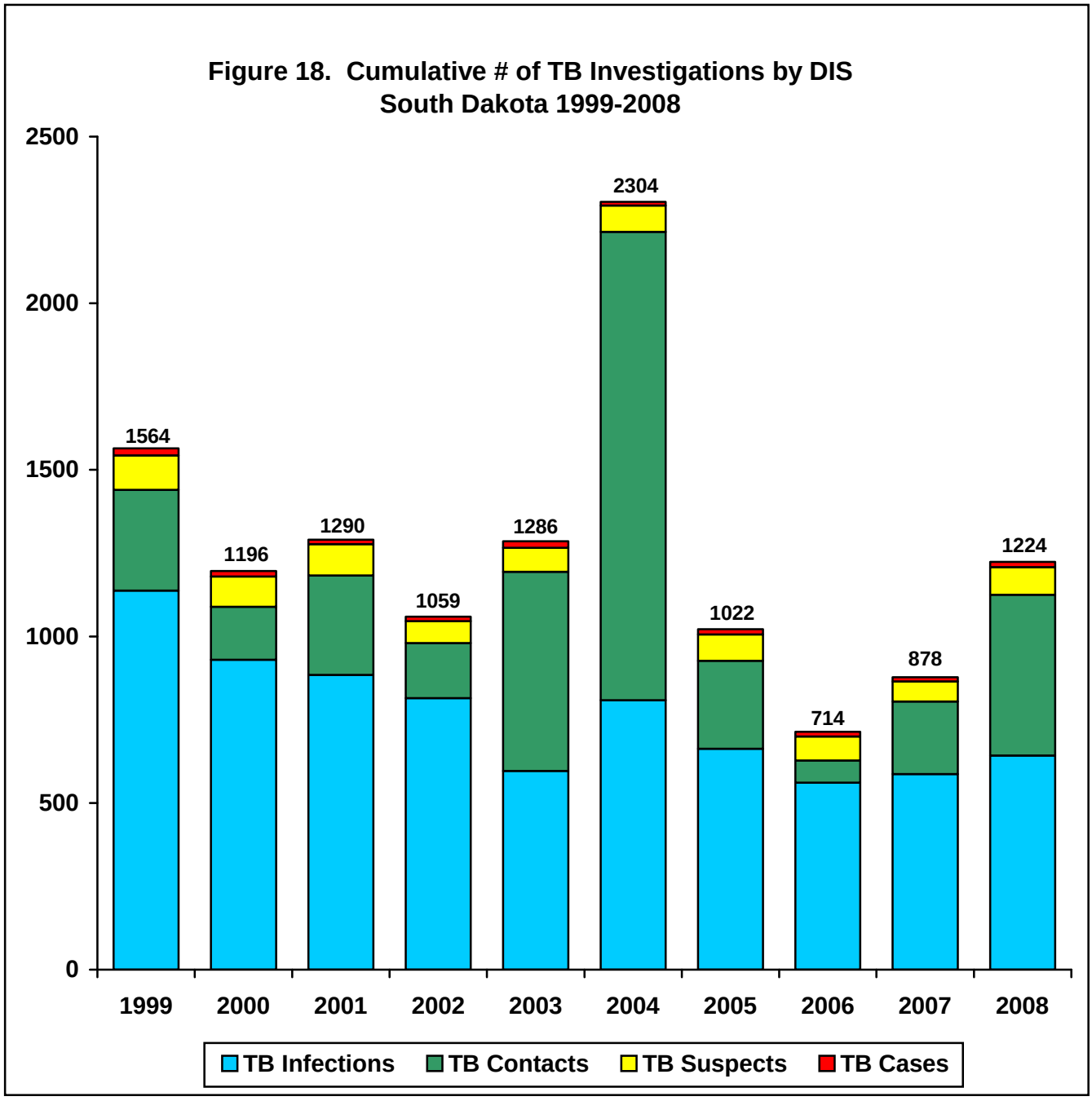
South Dakota has reported a higher than expected mortality rate during certain years, especially among Native American patients. Figure 17 describes the mortality rates by race since 1994 showing the higher trend among Native American cases since 1998. Mortality rates are calculated by the percentage of TB cases by race that die during the year of their diagnosis.



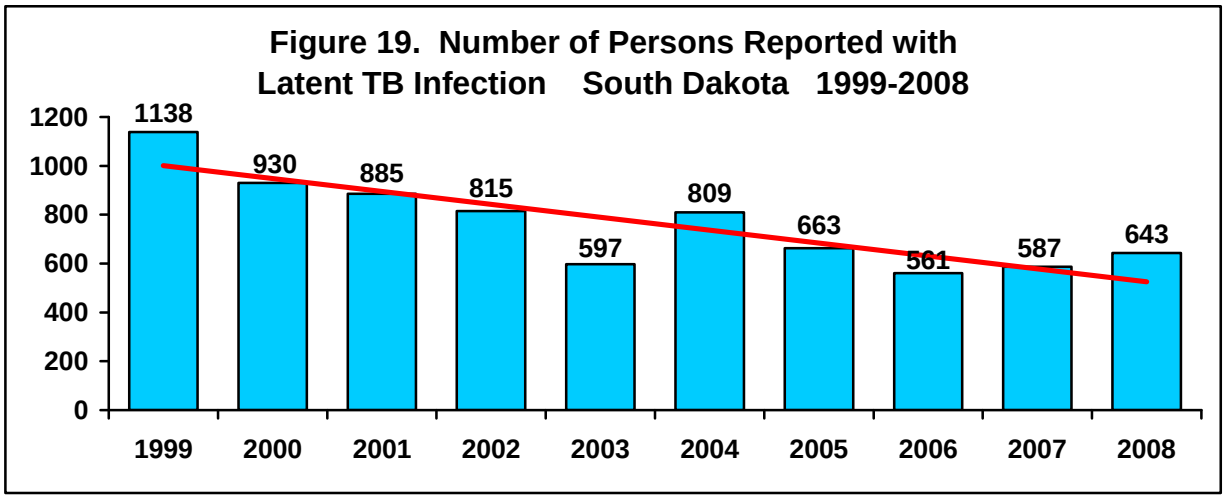
The workload in the TB Control Program includes four categories of patients:

1) **TB cases** (persons diagnosed with active TB)
2) **TB suspects** (persons suspected of active TB with a pending diagnosis)
3) **TB contacts** (persons confirmed to have been exposed to an infectious TB case)
4) **Latent TB infection** (persons reported with a positive TB skin test)

All of these conditions are reportable to the TB Control Program and are initiated for investigation. Disease Intervention Specialist (DIS) staff are responsible for ensuring appropriate investigation, treatment and follow-up of these individuals statewide. Figure 18 describes this cumulative caseload which is divided among 19 DIS staff illustrating that the active TB cases and suspect TB cases represent the smallest number of patients reported. TB contacts and patients with latent TB infection make up the greatest percentage of assigned workload for DIS staff within the TB Control Program.



Providing for appropriate treatment and follow-up of active TB cases and suspects is the highest priority of the Tuberculosis Control Program. However, in order to achieve TB elimination in South Dakota, an emphasis must be made on preventing future cases of TB. This is accomplished by follow-up of persons infected with latent TB infection. These individuals are infected with the TB bacteria (*Mycobacterium tuberculosis*) but have not yet developed an active form of the disease. By finding and treating these individuals, future TB cases can be prevented and therefore the TB Control Program dedicates time and resources to this preventive strategy.



Figures 19 presents the number of patients reported with latent TB infection (positive TB skin tests) over the last 10 years. All of these individuals have the potential to develop active TB disease and potentially be infectious to others.

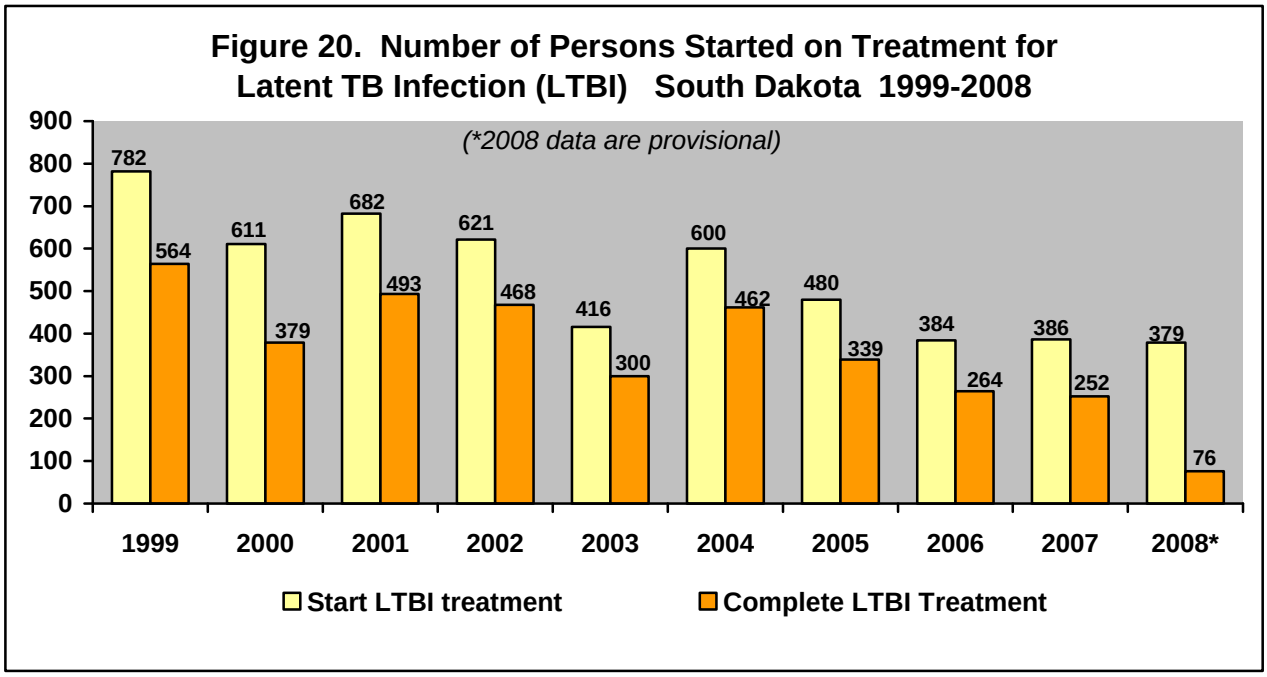
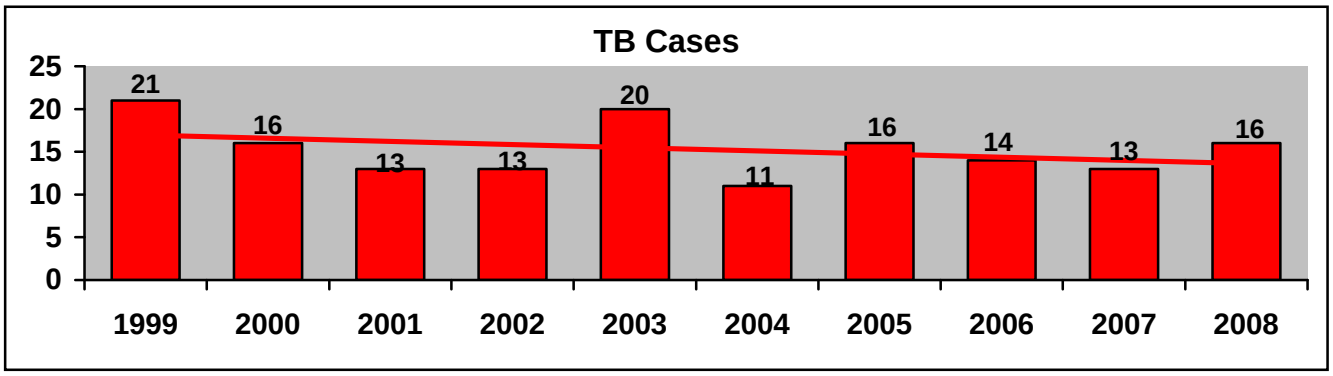
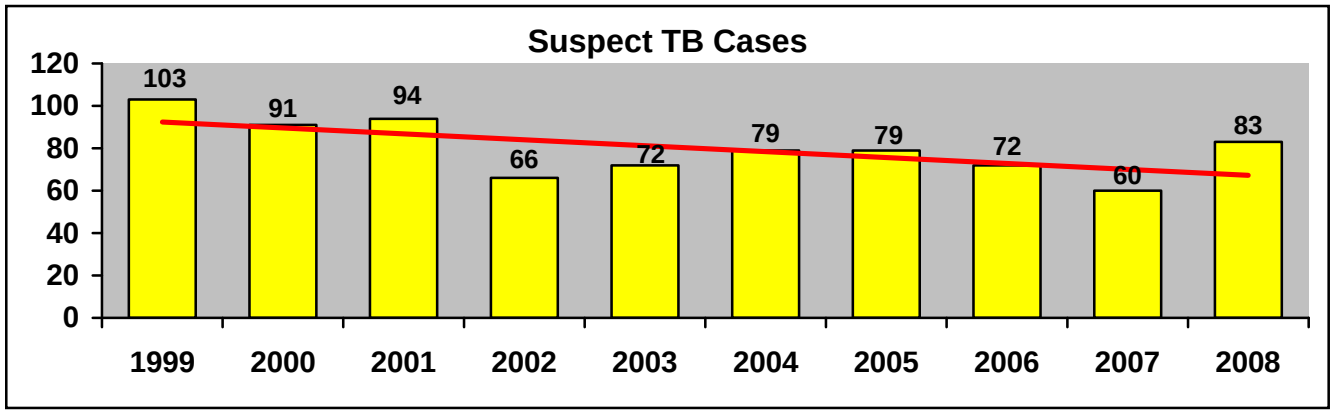
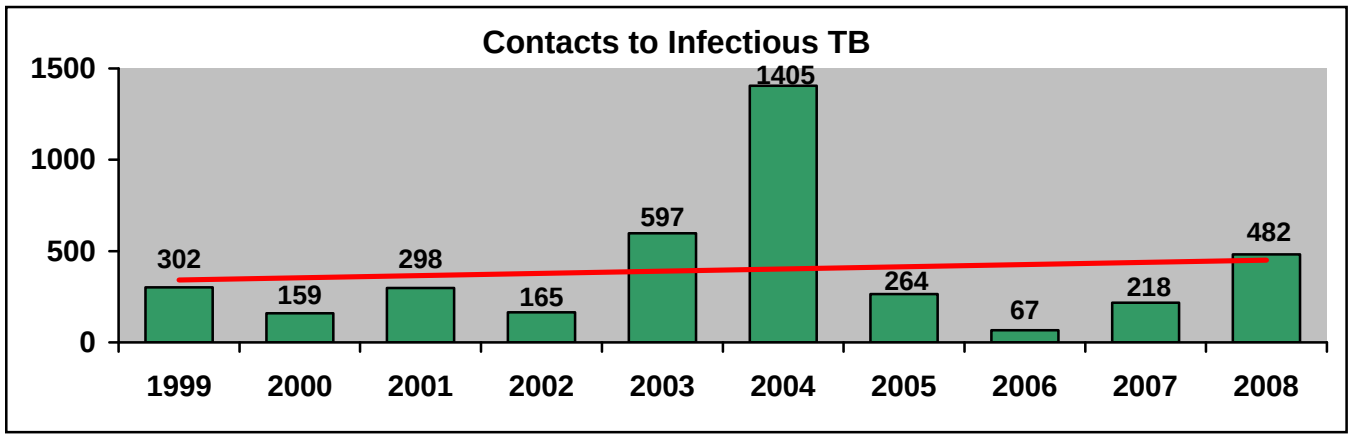


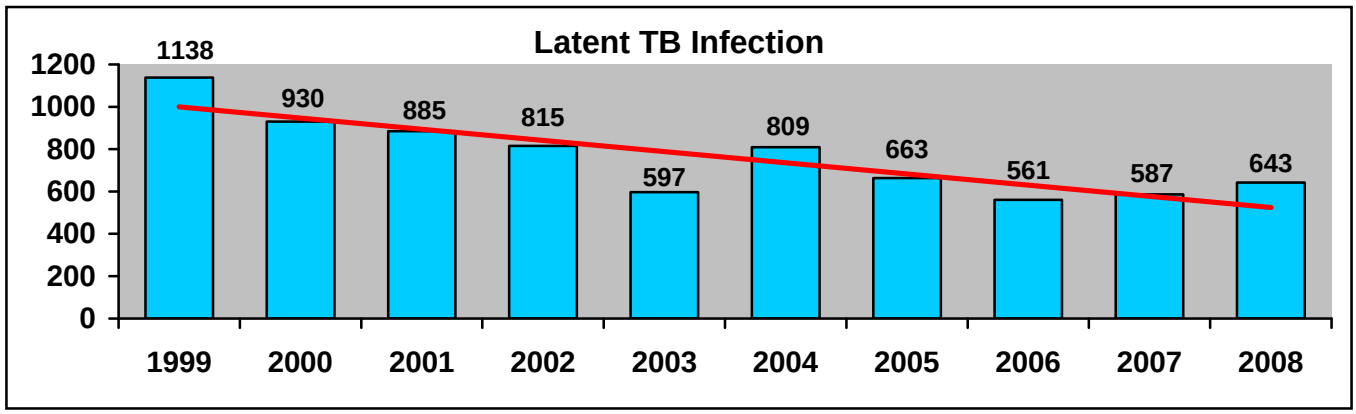
Figure 20 presents the number of patients with latent TB infection that started on a course of preventive treatment as well as the number who ultimately complete this treatment. The treatment is usually done with Isoniazid (INH) which is provided free of charge to patients statewide by the TB Control Program.

Summary of TB Control Program Caseload
South Dakota 1999-2008



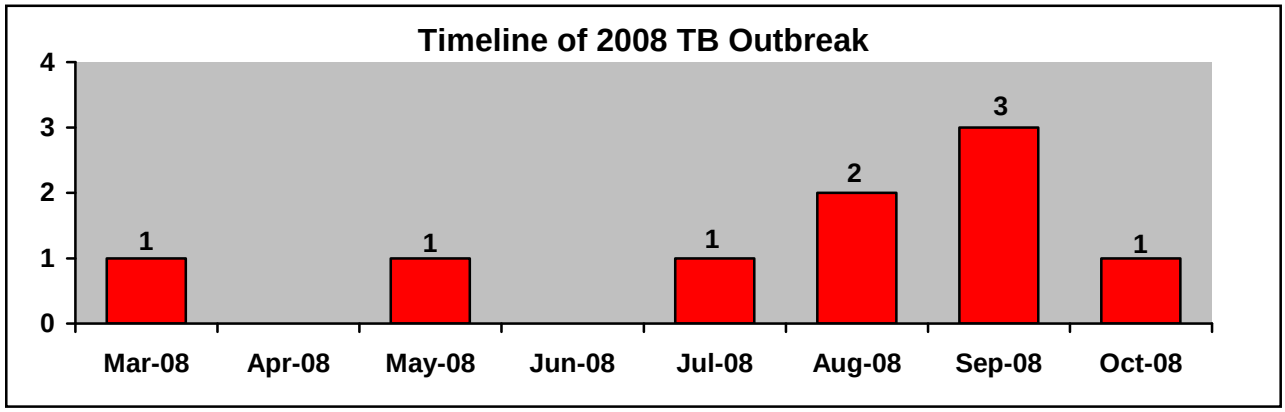






2008 Tuberculosis Outbreak

During 2008, there was a cluster of TB cases reported over an 8 month time period. Nine TB cases were reported and all were epidemiologically linked. These 9 cases, including 7 children accounted for 56% of the total cases reported statewide during 2008. The first TB case reported in March 2008 was a 3 month old infant who had been acutely ill since 2 weeks of age. Congenital tuberculosis was investigated in the child's mother, however she was asymptomatic and ruled out. This indicated that the child had to have been exposed to an infectious TB case shortly after birth. Repeated interviews with the family did not identify a source case for this exposure. In May 2008, a second infant was reported with tuberculosis. No epidemiological links were identified between the families, however the children were born within hours of each other at the same hospital. An investigation was initiated at the hospital to identify a possible infectious health care worker as the source however this also was ruled out. In July 2008 an adult TB case was reported which later was confirmed to be the source case for the first 2 infant TB cases. A complete investigation was initiated which yielded 6 additional TB cases during the next 3 months, all of which were linked to the source case.



Of the 9 TB cases reported in this cluster, only 3 were laboratory confirmed. The remaining 6 cases were diagnosed through clinical and/or radiographic findings suggestive of active TB. Genotype testing was completed for the 3 laboratory confirmed cases which confirmed a genetic match between them, confirming the epidemiological links identified previously. Listed below is a summary of the investigation:

33	**Total persons linked to the outbreak**
9	Active TB cases diagnosed
7	Contacts – not infected
17	Contacts – infected (6 previous +TB skin tests, 11 new +TB skin tests)

During this investigation, 26 persons were identified who were recommended for treatment. All 26 (100%) of these individuals received appropriate treatment as described below:

26	**Total persons treated**
9	Active TB treatment
14	New treatment for latent TB infection
3	Previous treatment for latent TB infection

This TB outbreak identified a new risk group for development of active TB that has never been reported before in South Dakota which is *US-born children to foreign-born parents*. Of the 9 total TB cases reported in this cluster, 2 were foreign-born adults and the remaining 7 cases were children born in the US to foreign-born parents. This new risk category is also being observed nationally and beginning in 2009, CDC will begin to collect data to track these cases.