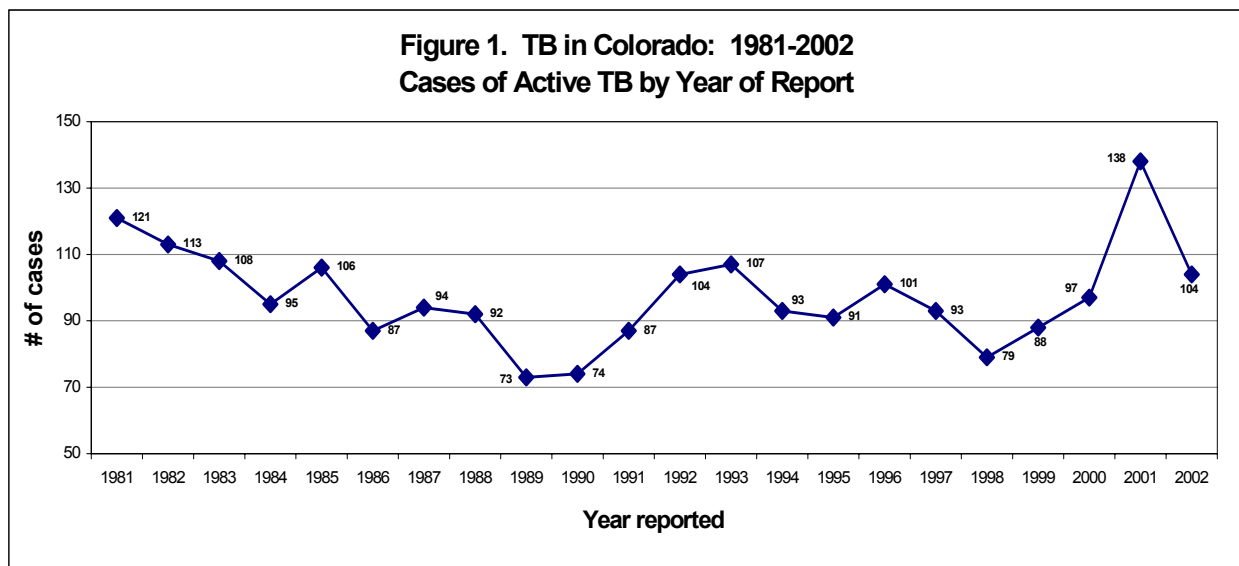


## Tuberculosis in Colorado A Summary of Cases Reported in 2002

A total of 104 new cases of active tuberculosis (TB) were reported in Colorado in 2002, down from 138 new cases for the previous year. Interestingly, this is the same number of cases Colorado reported a decade ago (**Figure 1**). **Table 1** shows a comparison between 2001 and 2002 cases.



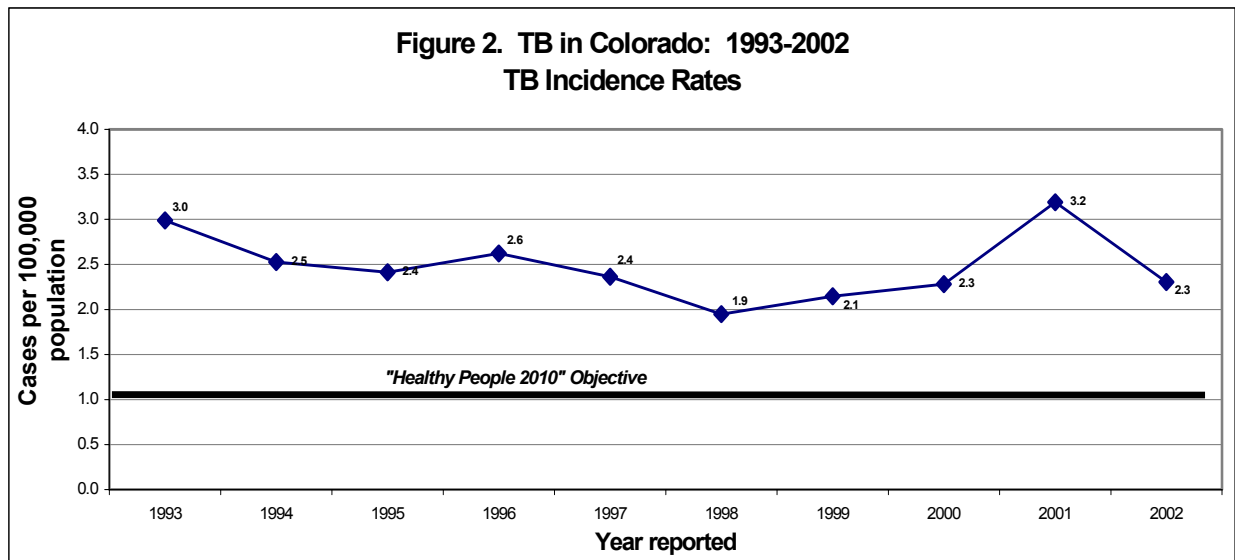
**Table 1. TB in Colorado: 2001-2002  
Comparison of 2001 and 2002 Cases**

	Year reported				
	2001		2002		% change
	n	%	n	%	
<b>Age Group</b>					
<15	16	11.6	8	7.7	(50.0)
15-24	20	14.5	13	12.5	(35.0)
25-44	44	31.9	32	30.8	(27.3)
45-64	32	23.2	28	26.9	(12.5)
65+	26	18.8	23	22.1	(11.5)
<b>TOTAL</b>	<b>138</b>	<b>100.0</b>	<b>104</b>	<b>100.0</b>	<b>(24.6)</b>
<b>Gender</b>					
Male	77	55.8	59	56.7	(23.4)
Female	61	44.2	45	43.3	(26.2)
<b>TOTAL</b>	<b>138</b>	<b>100.0</b>	<b>104</b>	<b>100.0</b>	<b>(24.6)</b>
<b>Race/Ethnicity</b>					
White	27	19.6	20	19.2	(25.9)
Black	19	13.8	10	9.6	(47.4)
Hispanic	68	49.3	41	39.4	(39.7)
Amer Ind/AK native	2	1.4	1	1.0	(50.0)
Asian/Pacific Is	22	15.9	32	30.8	45.5
<b>TOTAL</b>	<b>138</b>	<b>100.0</b>	<b>104</b>	<b>100.0</b>	<b>(24.6)</b>
<b>Region</b>					
Denver metro <sup>a</sup>	96	69.6	80	76.9	(16.7)
Other than Denver metro	42	30.4	24	23.1	(42.9)
<b>TOTAL</b>	<b>138</b>	<b>100.0</b>	<b>104</b>	<b>100.0</b>	<b>(24.6)</b>
<b>Country of Origin</b>					
United States	53	38.4	31	29.8	(41.5)
Mexico	35	25.4	29	27.9	(17.1)
Vietnam	6	4.3	6	5.8	0.0
Other countries	44	31.9	38	36.5	(13.6)
<b>TOTAL</b>	<b>138</b>	<b>100.0</b>	<b>104</b>	<b>100.0</b>	<b>(24.6)</b>
<b>HIV Status Among 25-44 Age Group</b>					
Negative	40	90.9	28	87.5	(30.0)
Positive	2	4.5	4	12.5	100.0
Refused testing	2	4.5	0	0.0	(100.0)
Not offered	0	0.0	0	0.0	-
<b>TOTAL</b>	<b>44</b>	<b>100.0</b>	<b>32</b>	<b>100.0</b>	<b>(27.3)</b>
<b>Risk factors</b>					
Homeless within past year	8	5.8	8	7.7	0.0
Resident of correctional facility at diagnosis	2	1.4	2	1.9	-
Resident of long-term care facility	4	2.9	4	3.8	0.0
Injected drug use within past year	1	0.7	1	1.0	0.0
Non-injected drug use within past year	9	6.5	6	5.8	(33.3)
Excess alcohol use within past year	18	13.0	13	12.5	(27.8)
Health care worker within past 2 years	5	3.6	4	3.8	(20.0)

a. Denver metro includes: Adams, Arapahoe, Denver, Douglas, and Jefferson counties.  
Beginning in 2001, Boulder and Broomfield Counties are included as part of Denver metro.

## Incidence

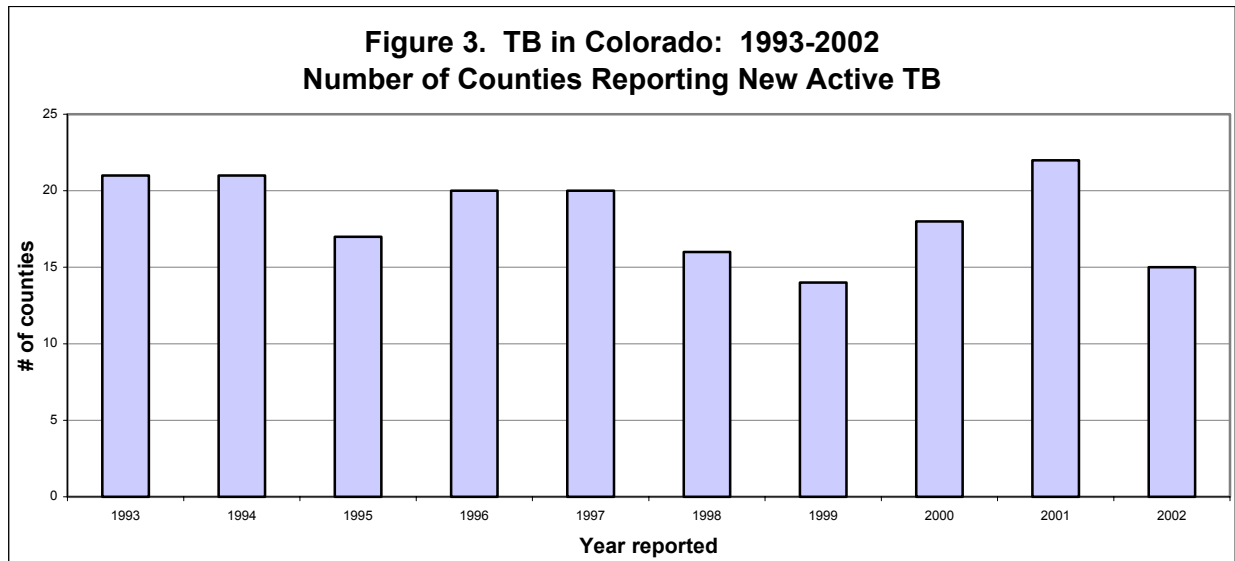
In 2002, the overall case rate for TB in Colorado was 2.3 per 100,000 population (**Figure 2**). Colorado continues to be categorized as a low incidence state (case rate of less than 3.5 per 100,000 population), though the case rates in Black, Hispanic, and Asian/Pacific Islander populations all exceed 'low incidence' threshold (**Table 2**). The incidence in the Asian/Pacific Islander population is more than 47 times the incidence in the majority population. Colorado will need to reduce the number of new cases of TB by half to achieve the "Healthy People 2010" goal of 1.0 or fewer cases per 100,000 population.



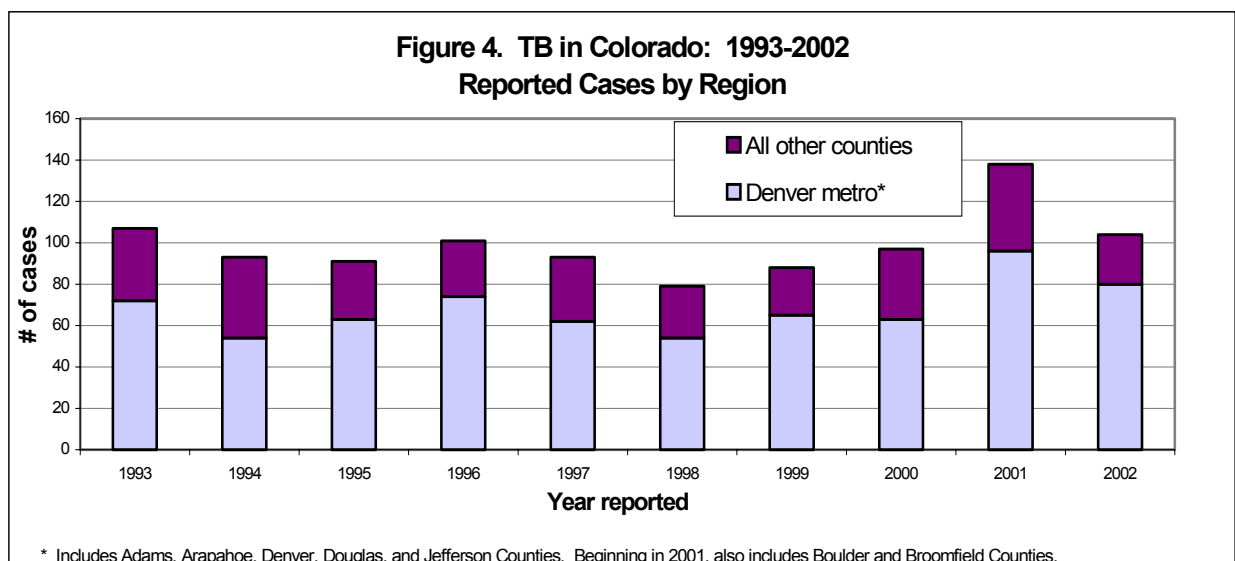
Race/ethnicity	2002		
	# cases	Pop est.	Rate
White	20	3,346,424	0.6
Black	10	181,497	5.5
Hispanic	41	818,469	5.0
Asian/Pacific Islander	32	112,173	28.5
Amer Ind/AK native	1	53,727	1.9
<b>TOTAL</b>	<b>104</b>	<b>4,512,290</b>	<b>2.3</b>
<b>Year 2010 goal: &lt;=1.0 cases per 100,000 population</b>			

## Location

In 2002, 15 of Colorado's 64 counties (23 percent) reported new active cases of TB. The number of cases in Arapahoe County nearly doubled from 11 cases in 2001 to 20 cases in 2002. Twenty counties reporting at least one case during the previous five years did not report any new cases in 2002 (**Figure 3, Table 3**).



Approximately 56 percent of the state's population resides in the Denver metropolitan counties of Adams, Arapahoe, Boulder, Broomfield, Denver, Douglas, and Jefferson. However, 77 percent of all the cases of TB in Colorado are from those metropolitan counties (**Figure 4**).



**Table 3. TB in Colorado: 1997-2002  
Cases by County and Year of Report**

*NOTE: Only counties reporting cases are listed.*

<b>County</b>	<b>1997</b>	<b>1998</b>	<b>1999</b>	<b>2000</b>	<b>2001</b>	<b>5-year mean</b>	<b>2002 cases</b>
Adams	10	7	8	5	15	9.0	10
Alamosa	1	0	0	0	0	0.2	0
Arapahoe	10	6	12	10	11	9.8	20
Bent	0	1	0	0	0	0.2	0
Boulder	6	4	3	6	5	4.8	5
Broomfield	NA	NA	NA	NA	1	1.0	0
Costilla	0	0	0	0	1	0.2	0
Delta	0	0	0	2	1	0.6	0
Denver	37	34	39	42	55	41.4	38
Douglas	1	1	1	0	0	0.6	2
Eagle	3	0	0	2	0	1.0	1
El Paso	5	4	9	7	7	6.4	5
Elbert	0	0	0	0	1	0.2	0
Fremont	1	1	0	0	0	0.4	0
Garfield	1	1	0	0	0	0.4	1
Gunnison	1	0	0	0	2	0.6	0
Jefferson	4	6	5	6	9	6.0	5
La Plata	0	0	0	1	1	0.4	1
Larimer	3	1	0	2	3	1.8	3
Las Animas	2	0	1	0	1	0.8	0
Lincoln	0	1	0	0	0	0.2	0
Mesa	1	2	0	2	4	1.8	2
Moffat	0	0	1	0	0	0.2	0
Montezuma	0	0	0	1	0	0.2	0
Montrose	1	0	0	2	1	0.8	0
Morgan	1	0	0	1	0	0.4	1
Otero	1	2	1	1	3	1.6	0
Phillips	0	0	1	0	0	0.2	0
Pitkin	0	0	0	1	1	0.4	0
Pueblo	1	5	5	0	3	2.8	6
Rio Grande	0	0	1	0	1	0.4	0
Routt	1	0	0	0	0	0.2	0
Saguache	0	0	0	0	2	0.4	0
Summit	0	0	0	2	0	0.4	0
Weld	3	3	1	4	10	4.2	4
<b>TOTAL</b>	<b>94</b>	<b>79</b>	<b>88</b>	<b>97</b>	<b>138</b>	<b>99.2</b>	<b>104</b>

The rates in counties with small populations may vary considerably from year to year although the frequency of reports may change by only one or two cases. In order to make a more realistic comparison, the average incidence for counties during the past five years is listed in **Table 4**. At 3.2 cases per 100,000 per year, the incidence for the metropolitan Denver counties combined was nearly twice the incidence in the rest of the state (1.4 per 100,000 per year).

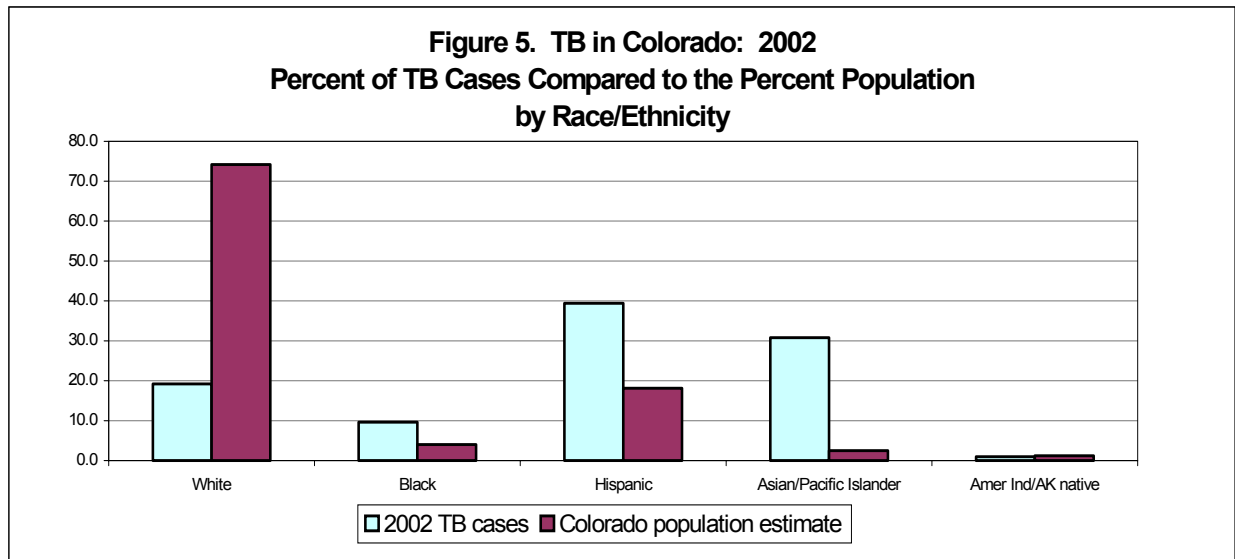
**Table 4. Tuberculosis in Colorado: 1998-2002  
Mean Case Rates by County**

County	Mean cases 1998-2002	2000 population	Cases per 100,000 persons per year	County	Mean cases 1998-2002	2000 population	Cases per 100,000 persons per year
Denver	41.6	545,514	7.6	Alamosa	0.0	14,823	0.0
Saguache	0.4	5,762	6.9	Archuleta	0.0	9,573	0.0
Otero	1.4	20,400	6.9	Baca	0.0	4,523	0.0
Costilla	0.2	3,680	5.4	Chaffee	0.0	15,937	0.0
Phillips	0.2	4,517	4.4	Cheyenne	0.0	2,281	0.0
Bent	0.2	5,995	3.3	Clear Creek	0.0	9,186	0.0
Lincoln	0.2	6,090	3.3	Conejos	0.0	8,308	0.0
Rio Grande	0.4	12,287	3.3	Crowley	0.0	4,996	0.0
Gunnison	0.4	13,737	2.9	Custer	0.0	3,366	0.0
Pueblo	3.8	139,715	2.7	Dolores	0.0	1,813	0.0
Pitkin	0.4	14,832	2.7	Gilpin	0.0	4,544	0.0
Las Animas	0.4	15,142	2.6	Grand	0.0	11,998	0.0
Adams	9.0	355,305	2.5	Hinsdale	0.0	785	0.0
Weld	4.4	177,268	2.5	Huerfano	0.0	7,825	0.0
Arapahoe	11.8	481,305	2.5	Jackson	0.0	1,581	0.0
Delta	0.6	27,400	2.2	Kiowa	0.0	1,631	0.0
Montrose	0.6	32,742	1.8	Kit Carson	0.0	7,902	0.0
Summit	0.4	22,563	1.8	Lake	0.0	7,824	0.0
Mesa	2.0	114,574	1.7	Logan	0.0	20,287	0.0
Boulder <sup>a</sup>	4.8	283,929	1.7	Mineral	0.0	805	0.0
Moffat	0.2	13,021	1.5	Ouray	0.0	3,619	0.0
Eagle	0.6	39,912	1.5	Park	0.0	13,903	0.0
Morgan	0.4	26,953	1.5	Prowers	0.0	14,375	0.0
La Plata	0.6	42,758	1.4	Rio Blanco	0.0	6,098	0.0
El Paso	6.4	508,814	1.3	Routt	0.0	19,224	0.0
Jefferson	6.2	520,814	1.2	San Juan	0.0	554	0.0
Elbert	0.2	19,085	1.0	San Miguel	0.0	6,533	0.0
Garfield	0.4	42,689	0.9	Sedgwick	0.0	2,715	0.0
Montezuma	0.2	23,523	0.9	Teller	0.0	20,180	0.0
Larimer	1.8	246,156	0.7	Washington	0.0	5,024	0.0
Douglas	0.8	162,322	0.5	Yuma	0.0	9,820	0.0
Fremont	0.2	45,141	0.4	<b>TOTAL</b>	<b>101.2</b>	<b>4,215,978</b>	<b>2.4</b>

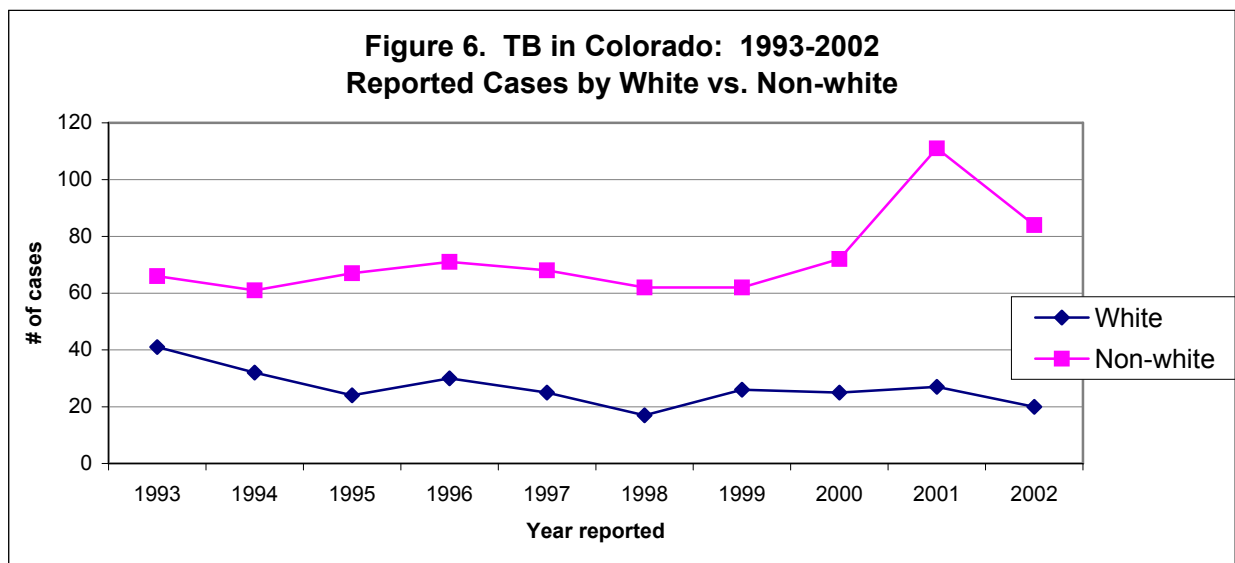
a. Includes Broomfield County.

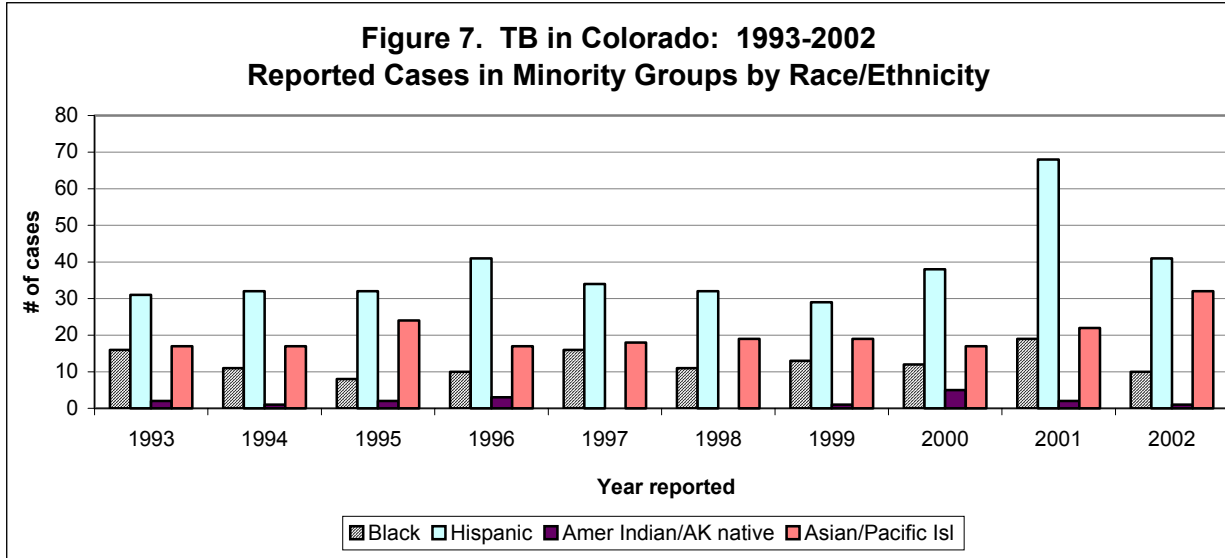
## Race/Ethnicity

Of the 104 cases reported in 2002, 41 (39 percent) were Hispanic, 32 (31 percent) were Asian/Pacific Islander, 20 (19 percent) were non-Hispanic white, 10 (10 percent) were Black, and 1 (1 percent) was American Indian/Alaskan native. As compared to Colorado's population, which is approximately 74 percent non-Hispanic white, minorities are over-represented among TB cases (**Figure 5**).



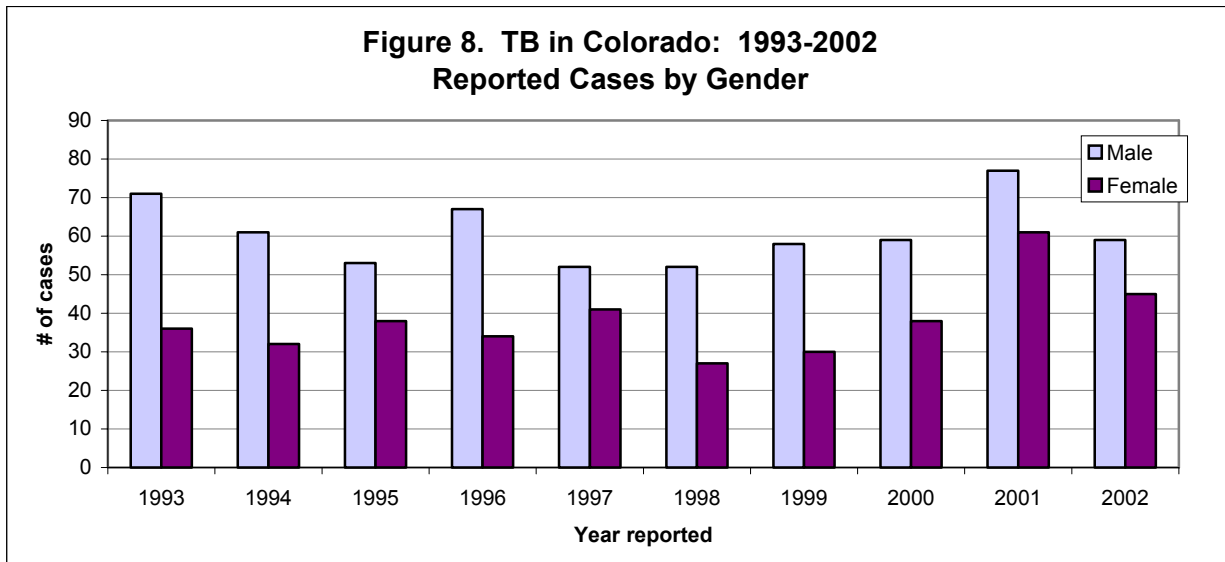
Since 1991, there has been an overall decrease in cases among the white race/ethnicity group, while cases among the non-white race/ethnicity groups are increasing (**Figure 6**). The number of cases by race/ethnicity among minority groups since 1993 is shown in **Figure 7**.



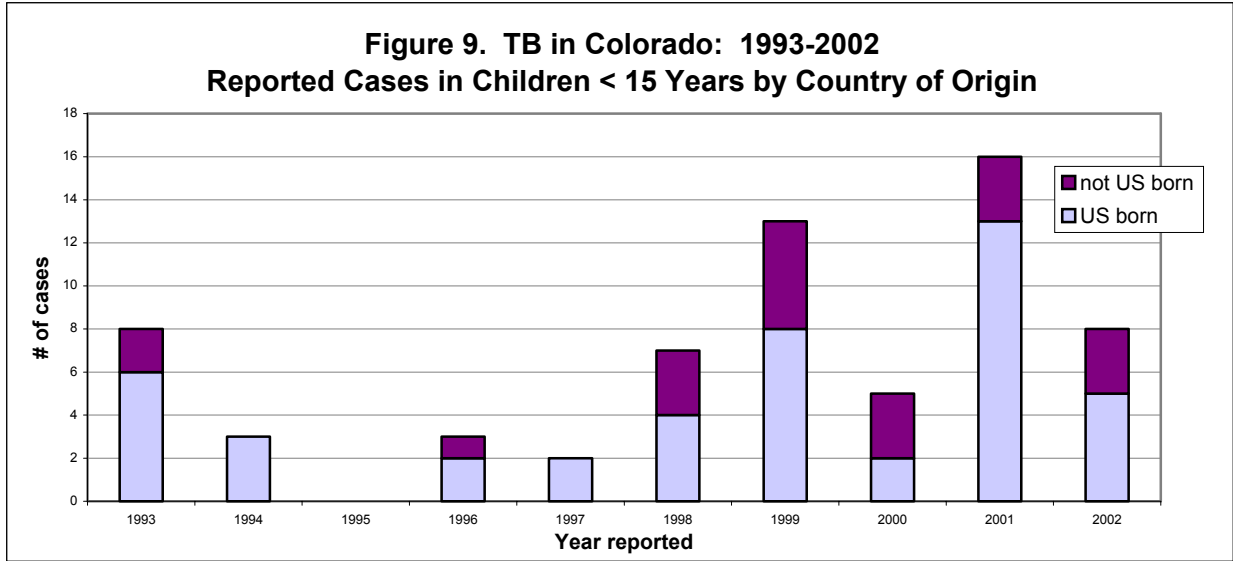


**Gender/Age**

The number of cases of TB occurring among males is 1.3 times that occurring among females (**Figure 8**).



The ages of persons reported with TB in 2002 ranged from less than one year to 87 years with an average of 44 years. In 2002, eight (7.7 percent) of the cases were reported in children less than 15 years of age. Three of the eight children were born outside of the United States (**Figure 9**). Cases in this age group are an indicator of recent disease transmission.



Similar to 2001, in 2002 the largest number of cases was in the 25-34 years age group, and the 65-74 years age group had the highest incidence with 7.3 cases per 100,000 population (**Table 5**).

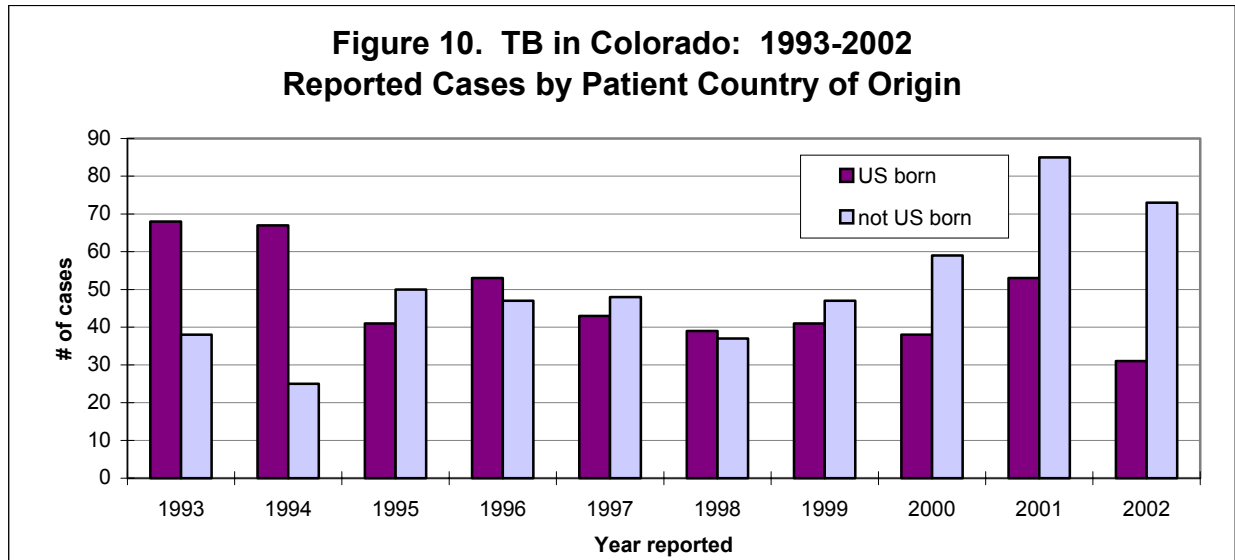
**Table 5. TB in Colorado: 2002**  
**Cases and Case Rates by Age Group and Gender**

Age group	2002			Pop.est.	Rate*
	Male	Female	Total		
0-14	8	0	8	954,067	0.8
15-24	4	9	13	648,814	2.0
25-34	8	12	20	682,266	2.9
35-44	7	5	12	740,031	1.6
45-54	11	6	17	670,705	2.5
55-64	7	4	11	387,595	2.8
65-74	11	6	17	232,642	7.3
75-84	3	2	5	146,837	3.4
85+	0	1	1	49,334	2.0
<b>TOTAL</b>	<b>59</b>	<b>45</b>	<b>104</b>	<b>4,512,291</b>	<b>2.3</b>

\* Cases per 100,000 persons.

## Foreign-born

In 2002, the percent of TB cases born outside the United States increased to 70 percent (**Figure 10**). Though approximately 40 percent of these individuals were born in Mexico, there were cases reported in persons born in 25 other countries (**Table 6**).



**Table 6. TB in Colorado: 2002  
Patient Country of Origin**

Country	# of cases	Country	# of cases
Afghanistan	2	Mali	1
Bosnia	1	Mexico	29
China	2	Mongolia	3
Ethiopia	2	Morocco	1
Guatemala	1	Nepal	1
Guinea	1	Peru	1
Haiti	1	Philippines	5
Hungary	1	Senegal	1
India	2	Somalia	1
Indonesia	1	Uganda	1
Iran	1	United Kingdom	1
Japan	1	Vietnam	6
Korea	4		
Laos	2	<b>TOTAL</b>	<b>73</b>

There are several differences between the characteristics of U.S.-born and foreign-born TB cases. In 2002:

- Seventy-seven percent of the U.S.-born cases were male and 23 percent female. The foreign-born cases were evenly distributed between male and female.
- Twenty-three percent of foreign-born cases were in the 25-34 year age group. Only ten percent of the U.S.-born cases were in that same age group.
- Five percent (four out of 73) of the foreign-born cases were of white race/ethnicity as compared to 52 percent (16 out of 31) of the U.S.-born cases.
- Only one of 73 (1.4 percent) of the foreign-born cases was homeless in the past year whereas seven of 31 (23 percent) of the U.S.-born cases were homeless.

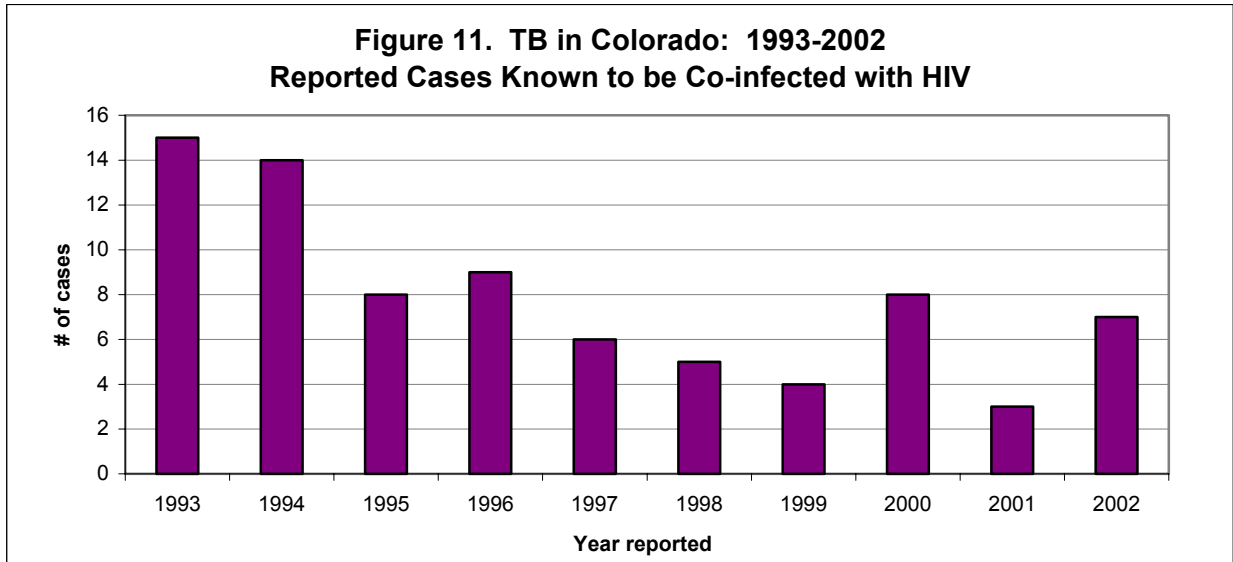
**Table 7** shows the number of cases by age group for those born in the United States and those born outside the United States.

<b>Age Group</b>	<b>USA</b>	<b>Foreign</b>	<b>Total</b>
0-4	4	1	5
5-14	1	2	3
15-24	1	12	13
25-34	3	17	20
35-44	4	8	12
45-54	6	11	17
55-64	7	4	11
65-74	4	13	17
75-84	1	4	5
85+	0	1	1
<b>TOTAL</b>	<b>31</b>	<b>73</b>	<b>104</b>

Elapsed time since entry into the U.S. was available for 71 of the 73 foreign-born cases reported in 2002. Fifteen (21 percent) were in the U.S. less than six months prior to diagnosis; 5 (7 percent) had been in the U.S. six to 12 months; 22 (31 percent) had been in the U.S. more than one year and less than five years; and 29 (41 percent) had been in the U.S. for more than five years.

## HIV/TB Co-infection

The number of cases of TB among persons who are at highest risk of developing active disease – those infected with HIV as well as TB – has been declining since 1993. However, in 2000 the number of persons with TB known to be HIV-positive doubled from 1999 with eight cases reported. In 2001, the number of cases decreased to three and in 2002 seven cases were co-infected with HIV (**Figure 11**). In 2002, HIV testing was done in 84 percent of the cases (87 of 104). The goal is to have HIV status reported for at least 75 percent of all newly reported cases age 25-44. Colorado exceeded this goal by reporting HIV status for 100 percent of cases age 25-44.

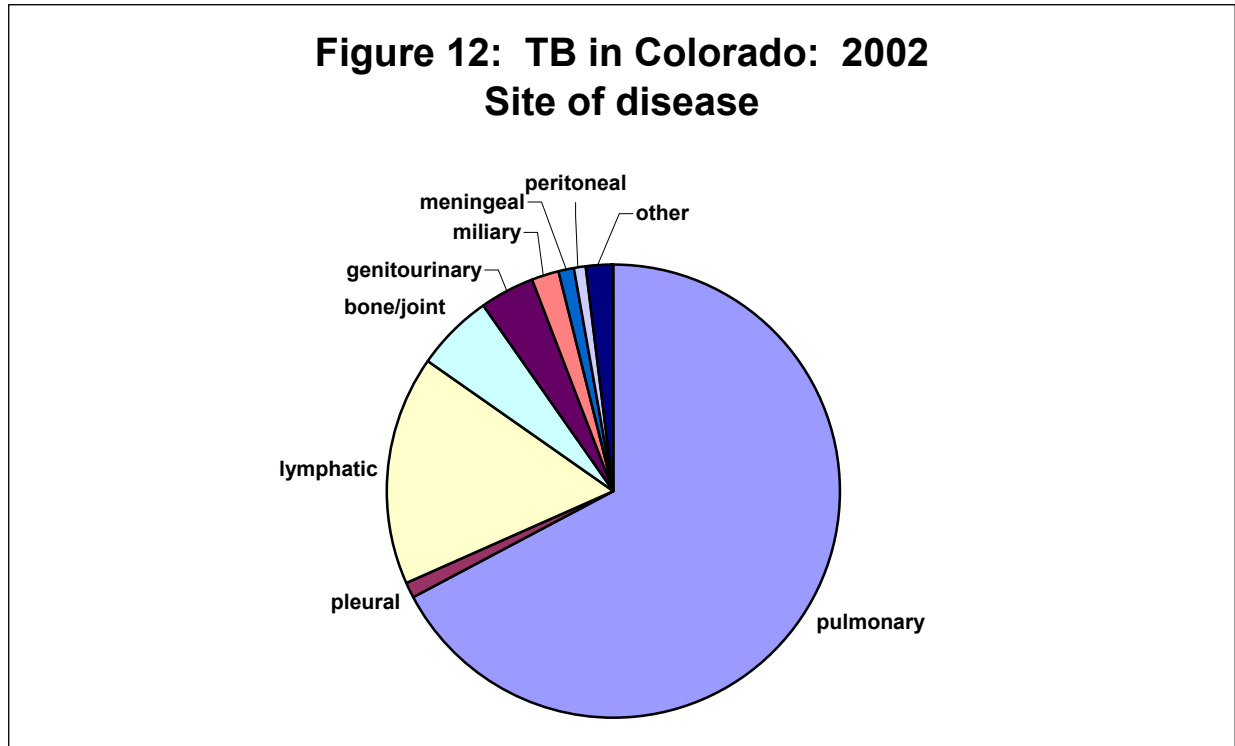


## Occupation

The occupational status is known for 103 of the 104 cases in 2002. Four cases were health care workers (currently or within the past two years); 49 were unemployed (including children and retired persons); and 50 worked at a variety of jobs not known to present a high risk for TB.

## Site of Disease

Though the majority of TB cases (67 percent) were pulmonary, TB caused disease in many other sites (**Figure 12**),



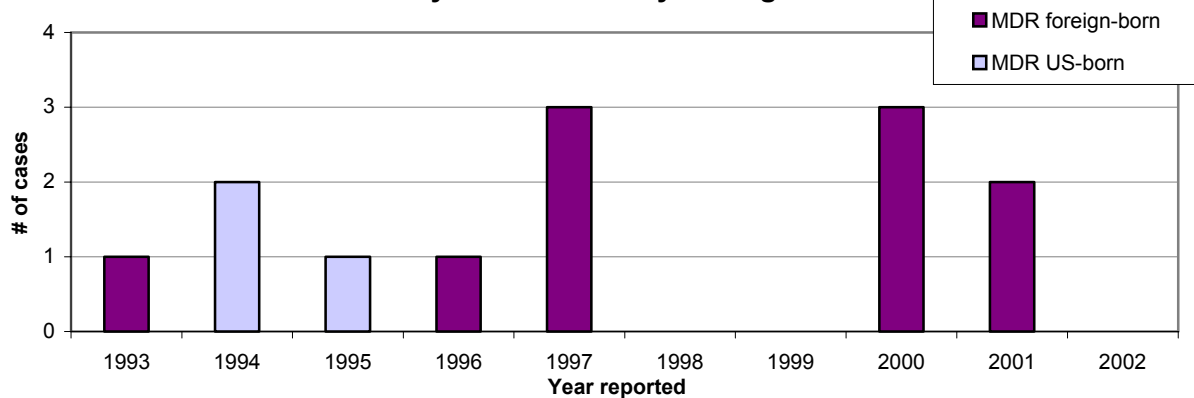
## Drug Susceptibilities

Drug susceptibility results were available for all culture-positive TB cases in 2002. Ten (12 percent) of the 81 culture-positive cases were resistant to one or more primary drugs. Seven of the 10 cases with drug resistance were foreign-born, and the other three were U.S.-born. The primary resistance patterns were as follows:

- 2 isoniazid (INH) only
- 4 streptomycin (SM) only
- 4 INH and SM

A total of six isolates were resistant to INH. There were no new cases of multi-drug resistant TB -- defined as being resistant to at least INH and rifampin (**Figure 13**).

**Figure 13. TB in Colorado: 1993-2002  
Multi-drug Resistant (MDR)<sup>a</sup> Cases  
by Patient Country of Origin**



a. Defined as resistance to at least isoniazid and rifampin.

**Table 8** describes the 16 cases of multi-drug resistant TB in Colorado from 1993 to 2002. Thirteen of the cases were diagnosed in Colorado and three were diagnosed in other countries.

**Table 8. TB in Colorado: 1993-2002  
Cases of Multi-drug Resistance (MDR)<sup>a</sup>**

Report year	Age at diagnosis	Sex	County	Country of origin	Resistant to <sup>b</sup>	Completion of therapy
1993	90 years	F	Otero	Mexico	IRS	completed
1994	38 years	F	Jefferson	US	IRPES	completed (31 months)
1994	37 years	M	Jefferson	US	IRPES	died after 18 months of therapy
1995	63 years	M	Denver	US	IRS	completed (26 months)
1996	51 years	F	Arapahoe	Mexico	IRPE	died after 20 months of therapy
transfer <sup>c</sup> 1996	30 years	F	Boulder	China	IR	completed (22 months)
1997	24 years	F	Boulder	India	IRP	moved after 6 months of therapy outcome unknown
1997	48 years	M	Denver	Viet Nam	IRPES	completed (26 months)
1997	28 years	F	Adams	Mexico	IRPE	died after 11 months of therapy
2000	20 years	F	Boulder	Mexico	IRP	completed (26 months)
transfer <sup>c</sup> 2000	31 years	F	Larimer	Mexico	IR	completed (25 months)
2000	39 years	F	Adams	Mexico	IRPES	completed (26 months)
2000	36 years	M	Denver	Mexico	IR	completed (28 months)
2001	64 years	F	Denver	China	IRP	moved after 6 months of therapy outcome unknown
transfer <sup>c</sup> 2001	41 years	M	El Paso	Korea	IRPES	currently on therapy <sup>d</sup>
2001	65 years	M	Adams	Peru	IRS	currently on therapy <sup>d</sup>

a. Defined as resistance to at least isoniazid and rifampin.

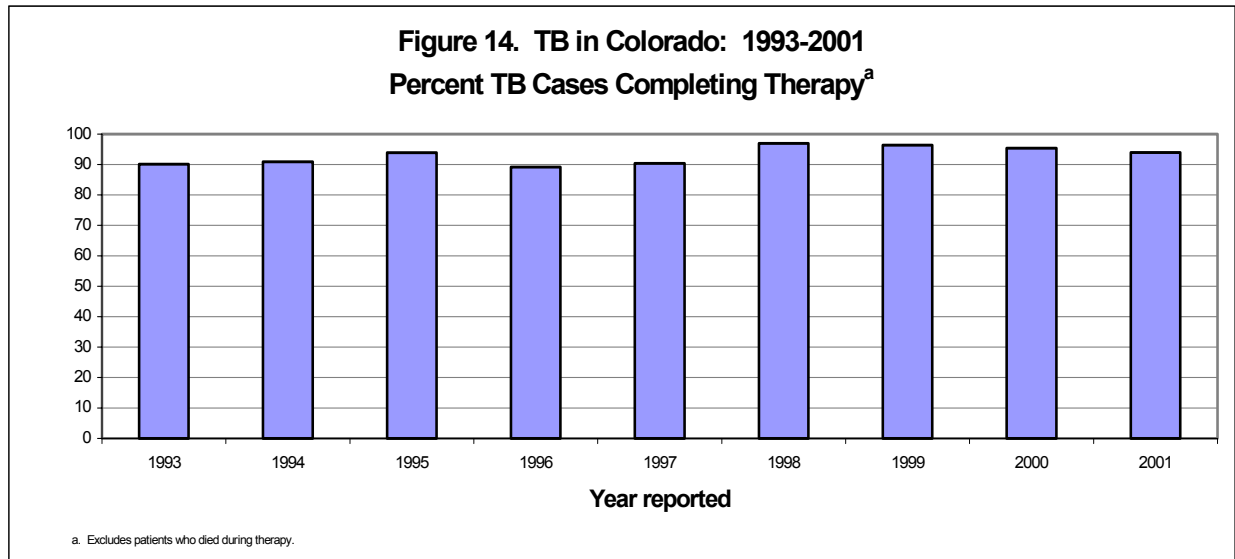
b. I=isoniazid, R=rifampin, P=pyrazinamide, E=ethambutol, S=streptomycin

c. Cases not included on graphs of MDR. Cases are counted in the reporting area where they are diagnosed.

d. As of 3/2003.

## Completion of Therapy

The usual treatment for TB is six months using isoniazid, rifampin, pyrazinamide, and ethambutol. The Colorado Board of Health requires directly-observed therapy for pulmonary TB. As shown in **Figure 14**, over 90 percent of patients reported in 2001 completed an appropriate course of therapy. All new cases reported in 2002, who were alive at diagnosis, have started therapy.



## Contact Investigations

It is a public health responsibility to conduct contact investigations on all cases of infectious (pulmonary and laryngeal) TB. Contacts to infectious cases are evaluated for the presence of latent or active TB. Contacts are 75 times more likely to be infected with TB than the general public. Thus it is critical to find, evaluate, and treat infected contacts when appropriate. **Table 9** gives a summary of contact investigations from 1999 to 2001. Preliminary data for 2002 are not available until August 2003.

**Table 9. TB in Colorado: 1999-2001  
Follow-up and Treatment for Contacts to Tuberculosis Cases**

	<b>1999</b>	<b>2000</b>	<b>2001<sup>a</sup></b>
Avg contacts per infectious case	12.6	16.2	14.4
Total contacts	643	860	1107
# (%) of contacts evaluated	474 (74%)	529 (62%)	864 (78%)
# (%) of contacts with latent TB infection	145 (31%)	229 (43%)	329 (38%)
# (%) of infected contacts starting treatment	115 (79%)	153 (67%)	233 (71%)
# (%) of contacts starting treatment who finished treatment	102 (89%)	86 (56%)	145 (62%)
# (%) of contacts with active TB	0	1 (<1%)	15 (2%)
a. Preliminary data			