

# Seattle-King County Annual Tuberculosis Report

## 2004

A report prepared by the Tuberculosis Control Program, Public Health - Seattle & King County

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## Executive Summary

In 2004, King County reported 133 new cases of confirmed tuberculosis (TB; please see glossary at end) (7.4 cases per 100,000 population). This represents a decline of 14% from the 2003 rate. This decrease in new cases comes after the TB Control Program's intensive efforts to reduce the TB burden among at-risk populations, particularly through intensified screenings and treatment aimed at the homeless population.

With TB outbreaks over the past few years, the TB Control Program at Public Health - Seattle & King County has intensified its effort through:

- Enhanced case management and contact investigations
- Continued collaborative efforts with a number of public health and community partners

TB cases in 2004 were largely male (59%), with high rates reported among Asians, Blacks and American Indians. The largest proportion of cases occurred in the 25-44 year age group (29%). The TB case count among children under 5 years continues to be low, comprising 3% of cases in 2004. The number of foreign-born TB cases increased to 97 in 2004. The highest case numbers came from Vietnam, Ethiopia, the Philippines, Somalia and Sudan. The increase in numbers among East African countries can largely be traced to a TB outbreak among mostly young males of East African origin.

HIV is a major risk factor for TB. However, the number of TB cases co-infected with HIV in Seattle-King County remains small, and decreased from 5-6% in previous years to just 2% of cases reported in 2004. In addition, reporting of HIV status, as well as HIV testing among TB cases in the county has improved considerably over the past five years.

Multi-drug resistant TB (MDR-TB) is exceedingly costly and difficult to treat. In 2004, two cases (2% of cases) of MDR-TB were reported. Eight percent of cases exhibited primary resistance to isoniazid (INH) in 2004, compared to 7% the year before. This is important due to the use of INH in prevention regimens for people infected with TB who are at risk of developing TB disease. If their infection is caused by an INH-resistant strain of TB then INH may be ineffective in preventing disease.

The program continues to face many ongoing challenges, among which are the estimated 100,000 people living in King County with latent TB infection, the high proportion of the population that is under poverty thresholds and is from diverse background, and the transient and migratory nature of many of those individuals at high risk for TB.

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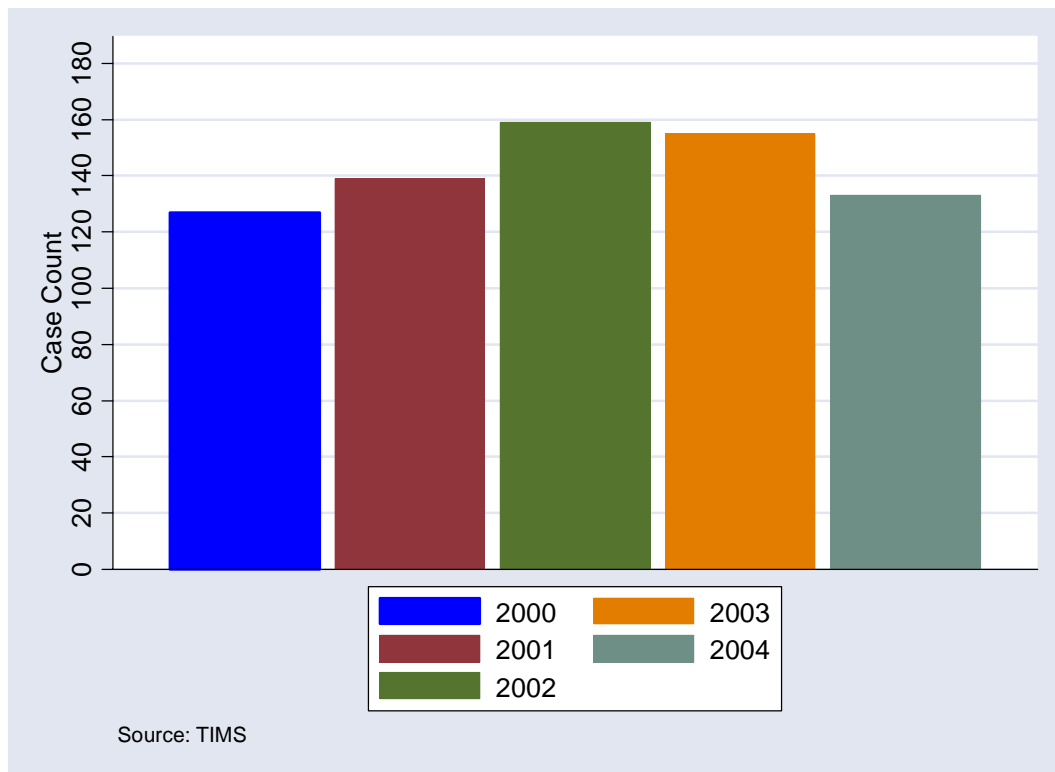
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# 1. TB in King County

## *Tuberculosis Morbidity 2004*

The incidence rate (the ratio of new cases to the average size of the population in 2004) of TB in Seattle-King County was 7.4 per 100,000 in 2004, a decrease from the case rate of 8.7 per 100,000 in 2003. The number of TB cases decreased from 155 reported in 2003 to 133 reported in 2004. This decrease in numbers is consistent with a trend that began in 2003. The decrease represents a 14.2% decrease in TB cases from 2003.

**FIGURE 1: TUBERCULOSIS CASES, KING COUNTY, 2000-2004**



In Washington State, the case rate also continues to decline, with an incidence of 3.9/100,000 in 2004.

**TABLE 1: TUBERCULOSIS CASE RATES 2000-2004 FOR WASHINGTON AND SEATTLE & KING COUNTY**

		2000	2001	2002	2003	2004
<b>Washington State</b>	<b>Count</b>	258	261	252	250	244
	<b>rate/100,000</b>	4.4	4.3	4.1	4.0	3.9
<b>Seattle &amp; King County</b>	<b>Count</b>	127	139	158	155	133
	<b>rate/100,000</b>	7.3	7.9	8.9	8.7	7.4

The latest available national rates (2004, NCHS) are slightly higher than that of Washington, with a case rate of 4.9/100,000 for 2004, down from 5.8/100,000 from 2000.

14,511 cases of TB were reported in the United States in 2004, with the 5 five highest metropolitan statistical area rates in 2003 in San Francisco, CA (13.6), San Jose, CA (13.5), Fresno, CA (13.1), New York City (13.0) and Jersey City, NJ (12.8).

## 2. Who gets TB?

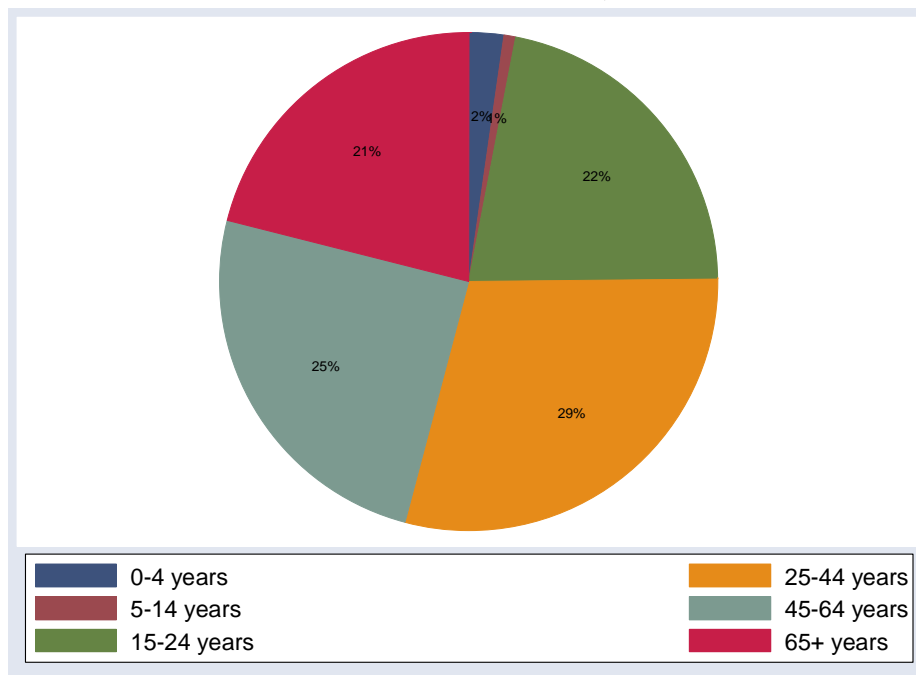
### *Age Groups*

29% of King County's TB cases were made up of individuals aged 25-44. However, while this group has historically represented the majority of TB cases, this year's numbers are down compared to the last few years. TB disproportionately affected younger individuals in their late teens and the 65+ year age group, with proportions up for the first time in over five years.

Incidence by age groups was as follows:

0-4 years of age	2.8/100,000
5-14 years of age	0.5/100,000
15-25 years of age	12.2/100,000
25-44 years of age	6.6/100,000
45-64 years of age	7.4/100,000
65+ years of age	15.0/100,000

**FIGURE 2: TUBERCULOSIS CASES BY AGE GROUP, 2004**

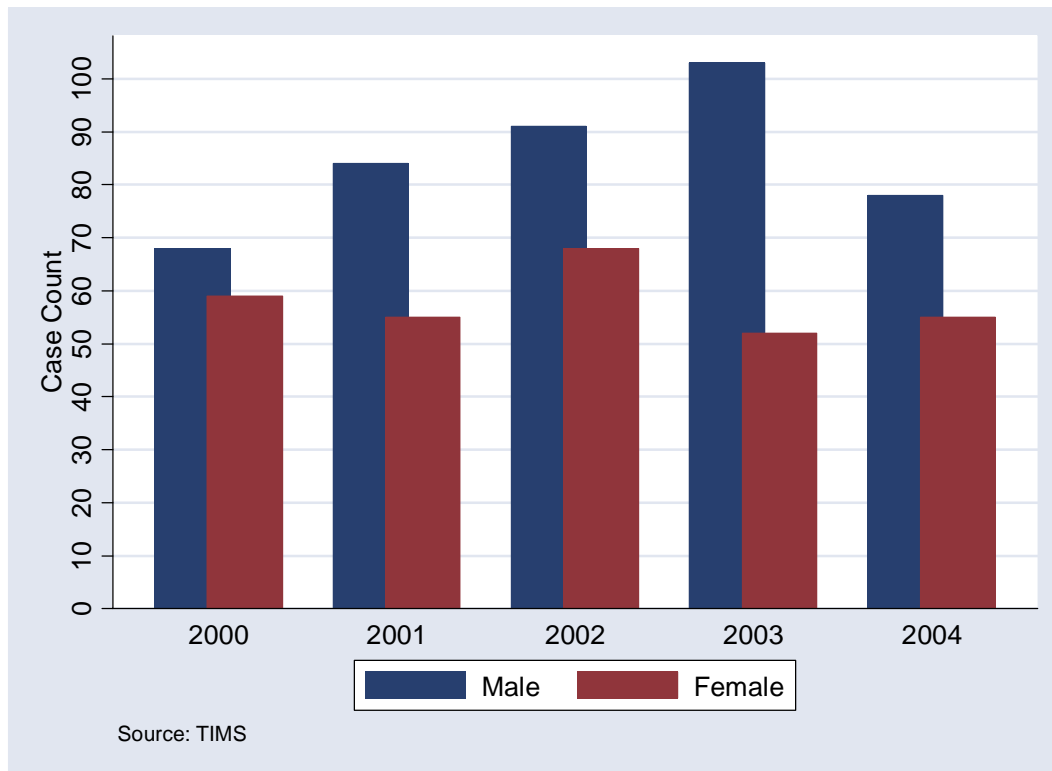


Statewide, a third of cases occurred among 25-44 year-olds. 44-64 year-olds made up 28% of cases, and those 65 and over made up slightly over 20%. Nationally, the proportions were fairly similar: 34% of cases came from the 45-64 age group, with 29% from those 25-44 and 20% from those 65+ years of age. While the national trend has been fairly constant, numbers have gradually increased among 45-64 year-olds, as well as among 15-24 year-olds, while decreasing among the 25-44 and 65+ age groups.

### *Gender*

Males continue to represent approximately 60% of all TB cases. The incidence rate among males was 8.8/100,000; among females 6.2/100,000.

**FIGURE 3: TUBERCULOSIS BY GENDER, 2000-2004**

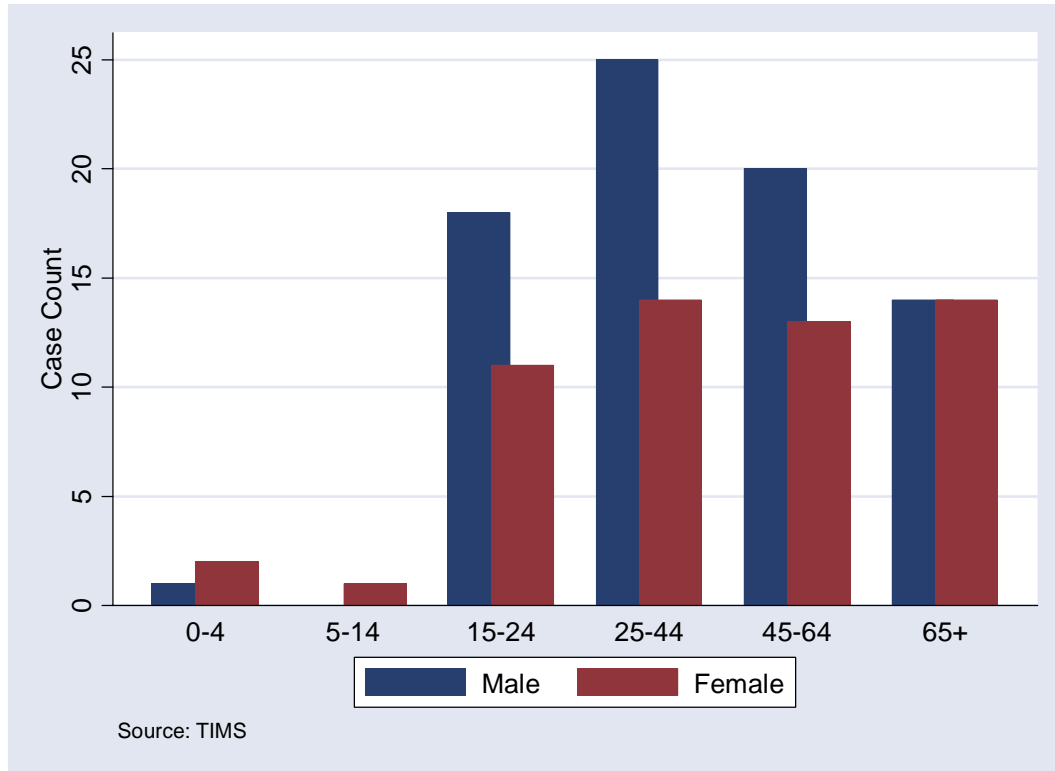


In Washington as a whole, males represented 59% of all cases in 2004 and nationally, males constituted approximately 61% of all TB cases in 2003.



### *Age and Gender*

**FIGURE 4: TUBERCULOSIS BY AGE AND GENDER, 2004**



Among individuals 15-64 years of age, case counts were greater for males than for females. The trend of seeing a larger number of cases in the 15 year old and higher age groups as compared to younger individuals appeared to be the case for both males and females.

### 3. Racial disparities and TB

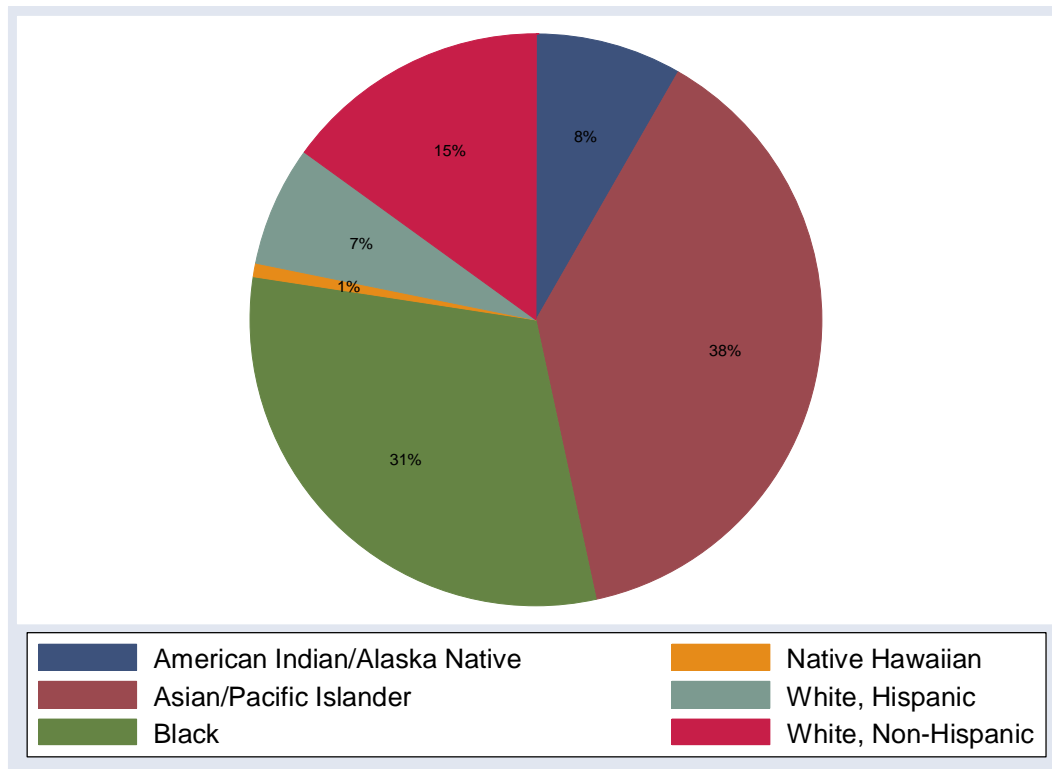
#### *Race and Ethnicity*

Asians and Blacks continue to disproportionately represent more than two-thirds of TB cases in Seattle-King County. The case rate among American Indians continues to be disproportionately high, largely due to the representation of American Indians among the homeless (8 of 11 American Indians with TB were homeless in 2004). 7% of 2004 TB cases were Hispanic, all White, (9/133), a decrease from 11% the year before (17/155).

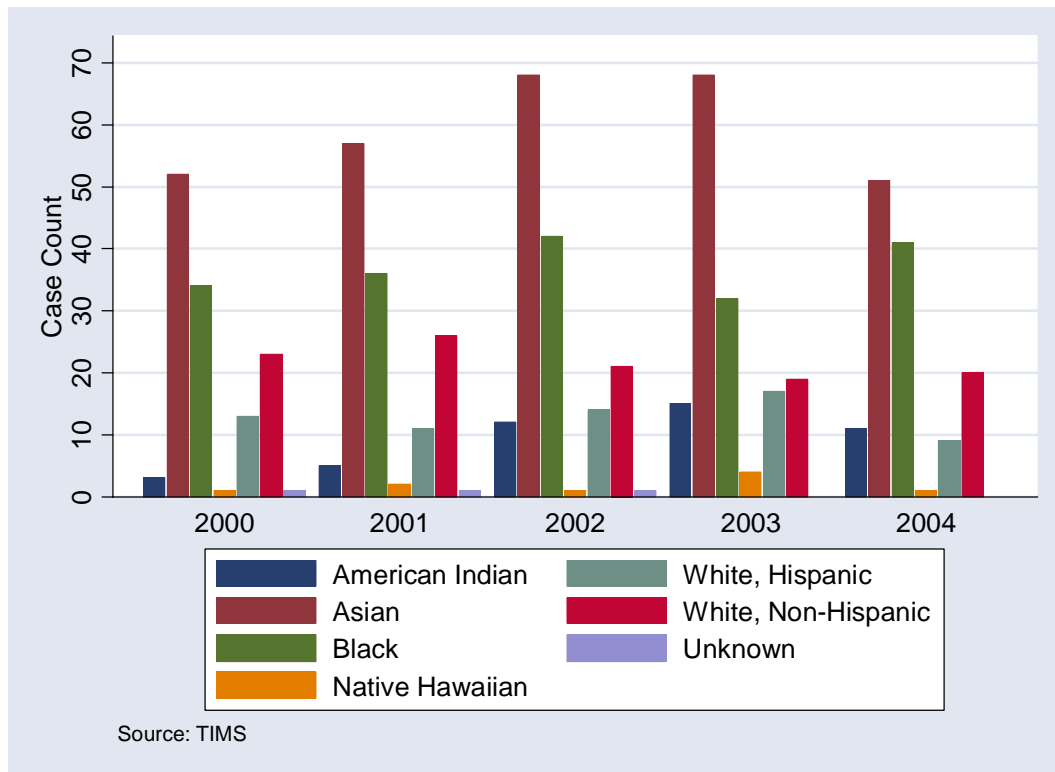
Incidence by race was as follows:

American Indian	61.9/100,000
Asian	22.6/100,000
Black	36.5/100,000
Native Hawaiian	11.1/100,000
White, Hispanic	20.4/100,000
White, Non-Hispanic	1.5/100,000

**FIGURE 5: TUBERCULOSIS BY RACE, 2004**



**FIGURE 6: TUBERCULOSIS BY RACE, 2000-2004**



As the proportion of White cases continues to decline, TB is more often occurring among Asians and Blacks. However, the number of cases among Asians decreased in 2004 (from 68 in 2003, to 51 in 2004). The increased number of Black cases appeared to be due to an outbreak among East African immigrants.

Nationally, the highest case rates are seen among Black, Asian and Hispanic populations, among whom national case rates are currently around 40, 20, and 20 per 100,000 respectively. Statewide, about one third of cases occur among Asians and one third among Whites respectively. One-fifth of cases in Washington occur among Blacks.

## **4. Do children get TB?**

Rarely. In 2004 in King County only 3 children under 5 years of age were reported to have TB, and there was only 1 case other among 5-14 year-olds. Together, these make up 3% of King County TB cases in 2004. Nationally, this proportion is closer to 6%.

Pediatric TB may represent a failure of TB control, because an adult TB case is almost always the original source for transmission and thus unrecognized active TB cases and ineffective contact investigation may result in a child with active TB. The TB Control Program initiates a careful and rapid contact investigation involving certain settings, such as day cares and schools.

## 5. TB-HIV co-infection

The number of individuals tested and found to be HIV-positive have hit a 5-year low. In 2004, HIV tests were offered to a greater proportion of TB cases than throughout the previous five years. Of those TB cases offered and given a test (approximately 76% of all cases), 2% were co-infected with HIV. Statewide, the rate has stayed around 3-5% for the past five years. Nationally, approximately half of all cases were given an HIV test, with the HIV infection rate at 9% in 2003.

**TABLE 2: HIV TEST RESULTS AMONG TB CASES, 2004**

<b>HIV Status</b>	<b>Number</b>	<b>Percent</b>
<b>Negative</b>	96	73.3
<b>Positive</b>	3	2.3
<b>Refused</b>	18	13.7
<b>Not offered</b>	11	8.4
<b>Unknown</b>	3	2.3
<b>Total</b>	131	100.00

**TABLE 3: TREND OF HIV INFECTION AMONG TB CASES, 2000-2004**

<b>Year</b>	<b>N (%) with HIV Infection</b>
2000	6 (4.7)
2001	9 (6.5)
2002	11 (6.9)
2003	9 (5.8)
2004	3 (2.3)

## 6. Multi-drug resistant TB

### *Multi-Drug Resistant TB*

Only 2 individuals were observed with Multi-Drug Resistant TB (MDR-TB—defined as resistance to at least isoniazid and rifampin) in 2004. In 2003, no MDR-TB had been observed, although there are 1-2 cases of MDR-TB a year. As a state, Washington did not see any other cases of MDR-TB.

One case in 2004 had monoresistance to rifampin (resistance to rifamycin only). When a TB strain is resistant to rifampin, treatment generally lasts for 18-24 months or more, as compared to a usual course of 6-9 months.

Nationally, 114 cases (or 1.0% of all cases with drug-susceptibility results reported) were diagnosed with MDR-TB in 2003. This proportion of MDR cases has been relatively stable for the last few years.

### *Primary drug resistance*

Primary drug resistance is a drug resistance based on initial isolates from persons with no prior history of TB.

**TABLE 5: PRIMARY DRUG RESISTANCE, 2004\***

<b>Drug</b>	<b>N (%)</b>
Isoniazid	8 (7.8)
Rifampin	3 (2.9)
Pyrazinamide	0 (0)
Ethambutol	4 (3.9)
Streptomycin	9 (8.8)

\*Includes both monoresistance and resistance to more than one drug.

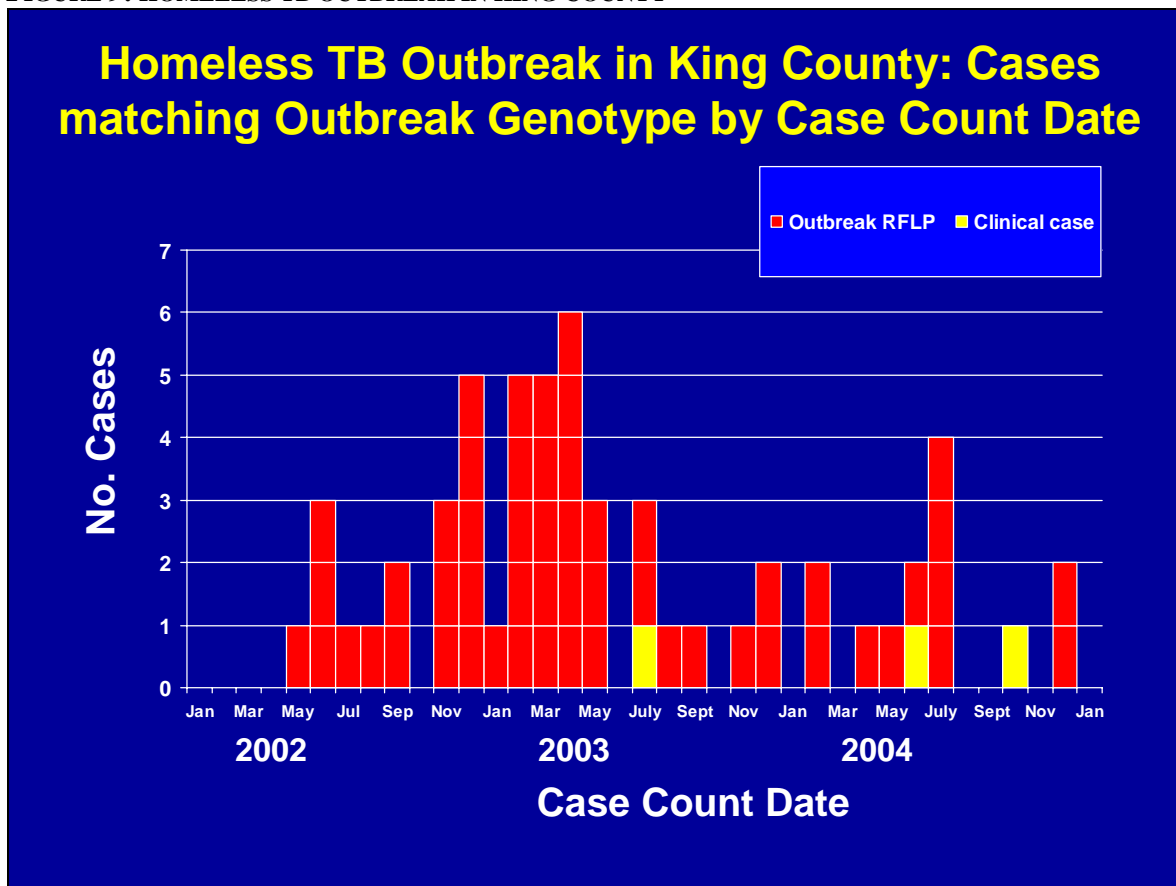
Nationally, close to 8% of cases showed resistance to isoniazid in 2003.

## 7. Homeless TB outbreak

We had an outbreak that affected mostly Native American Indians living in congregate settings (TB spread in shelter and dorm-type environments). A number of people were exposed in a confined environment for prolonged hours with TB cases.

While a large number of homeless TB cases matching the outbreak strain had been recorded in 2002 and 2003, these numbers dropped considerably in 2004. In 2003, one strain (the outbreak strain) was responsible for 77% (27 cases) of the homeless TB cases. In 2004, 11 cases (46% of homeless) matched the outbreak strain type.

**FIGURE 9: HOMELESS TB OUTBREAK IN KING COUNTY**



\*Outbreak RFLP indicates a genotypic match to the outbreak strain; Clinical cases indicate cases of TB where no culture was available for stain typing (approximately 10% of TB cases are culture-negative TB, but are clinically consistent with active TB), but these cases were epidemiologically linked to the outbreak.

## **Outbreak history**

Typically, there are 12 - 15 cases of active tuberculosis (TB) among homeless people each year in Seattle-King County. But over the course of 2002, an increased number (a total of 30 cases of TB) was observed. The Centers for Disease Control (CDC) and the Washington Department of Health (DOH) TB Program assisted the King County TB Control Program to create a plan to address the outbreak. In February 2003, the TB Control Program started hiring health care and administrative staff specifically to work on the outbreak. In 2003, an additional 35 homeless people were diagnosed with active TB disease in Seattle and King County. Genetic fingerprinting (RFLP) was conducted for all of the bacteriologically-confirmed homeless TB cases starting in 2002. Of the homeless cases in 2002 and 2003, 17 of 30 and 27 of 35 were genotypically associated with this outbreak. In 2004, the numbers of active cases caused by the outbreak strain decreased substantially, with 11 diagnosed (23 total homeless diagnosed).

Community partners have worked hard with the TB Control Program and created a community TB coalition. Partnership with the Health Care for the Homeless Network (HCHN), REACH, Jail Health, Harborview, homeless service sites, and others have been enormously helpful in our searches and in offering additional information and insight on behaviors and patterns that help us refine our approach. Furthermore, TB laboratories from Washington DOH, Harborview, King County and Seattle Biomedical Research Institute (SBRI) have used advanced technology to identify the outbreak strain.

### **How does the outbreak in 2004 compare to 2003 and 2004?**

- The numbers of cases in 2002 were high; they grew in 2003, and appear to be dropping in 2004.
- In 2002, the rate of HIV among TB cases was very high, but dropped significantly in 2003 and further in 2004, indicating that those who were HIV+ were first to contract TB, due to compromised immune systems.
- Proportionally large numbers of Native American people continue to be part of the outbreak. In 2004, there are smaller overall numbers, but a majority of Native American cases continue to match the outbreak strain, just as they did in 2003.
- Over half of the outbreak cases in 2004 were on our “hot list” of named or site contacts we had been following since December, 2002. All 6 had been screened negative for disease at least once during this period. Then, this year they developed active disease.
- Large numbers of the 2002 cases and 2003 cases had known, frequent ties to the Sobering Center and/or Chief Seattle Club, but in 2004, half of the cases did not. They were scattered elsewhere.

### **Why can't we say the outbreak is over?**

- Transmission of the outbreak strain is still taking place, as indicated by genotyping results.
- Many, many people were exposed to infectious people with active disease in 2002 and 2003, and many of those exposed acquired latent TB infection.



- Not all with latent TB infection have either started or finished treatment for latent infection.
- Many people have been exposed repeatedly to infectious people with active TB.
- The greatest probability of developing active TB disease from latent infection is in the first 2 years after infection, and we are still within the 2 year period for people infected during 2002 and 2003.
- Since people are more likely to be indoors at homeless service sites during colder, wetter months, we expect more transmission to take place in winter, so the rate of new cases will likely increase.

## 8. Other outbreaks in 2004

We had an outbreak of TB among mostly young men of East African origin. 12 cases were diagnosed with TB matching the outbreak strain. This group was generally involved in drug selling and use, and had a history of incarceration and hospitalizations due to gun or knife injuries.

The diagnosis of TB in a young East African male in February 2004, followed by the hospitalization of a second East African case in early April with similar demographics, alerted TB case managers to the possibility of a cluster of cases. In the following few months, 3 more East African cases were diagnosed with TB. As of January 2005, 11 outbreak-associated patients with dates of diagnosis ranging from December 2003-September 2004 have been identified. Patients were mostly male, East African immigrants in their 20s, of Amharic, Eritrean, Ethiopian, Oromo, Somali, or Tigrinyan ancestry. Most had a combination of social risk factors such as drug use, incarceration history, and unemployment. All had pulmonary disease, and one was infected with HIV. Cases generally showed a very rapid progression to disease and overt TB symptoms, including cough and weight loss. All cases were either genotypically linked with a matching strain type, or had an epidemiologic link to a patient with an isolate matching the outbreak pattern.

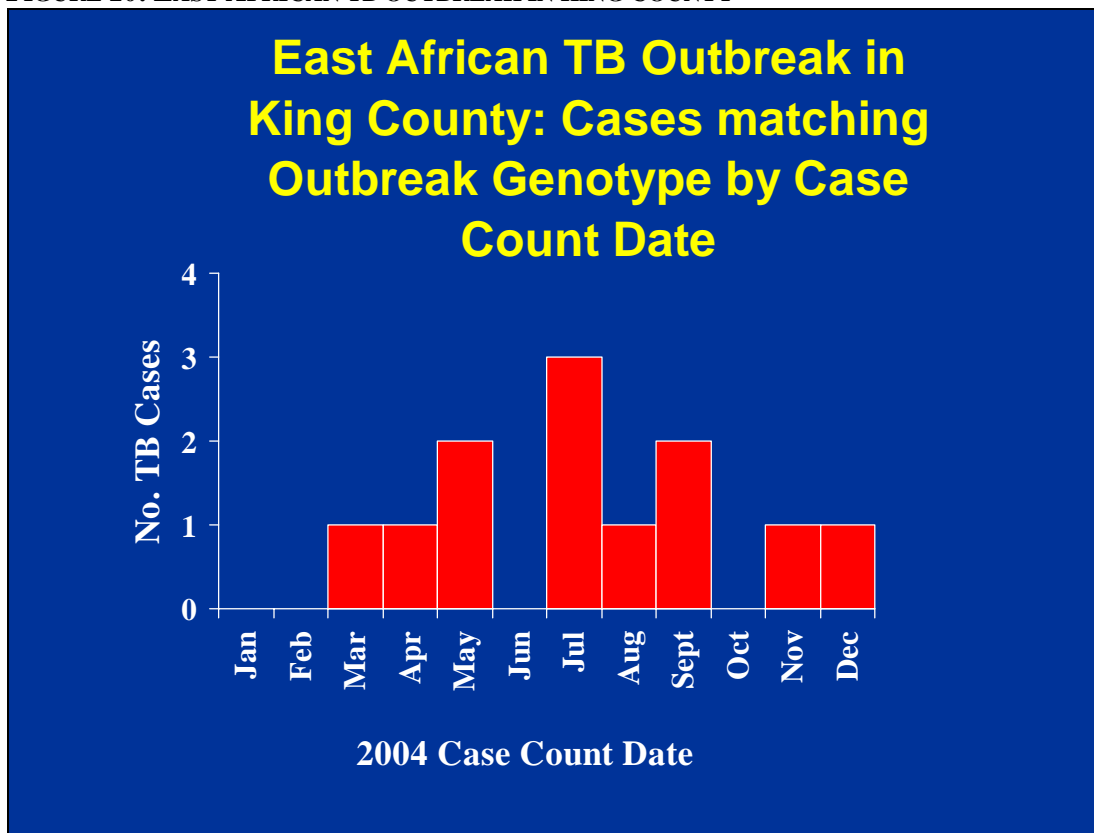
**TABLE 4: DEMOGRAPHIC AND DISEASE CHARACTERISTICS AMONG THE 12 OUTBREAK CASES**

<b>Patient Characteristics</b>	<b>N</b>
Male	10
East African origin	10
Foreign birth	9
Incarceration history	12
Recent victim of assault	7
Illicit drug use	12
Unemployed	12
<b>Disease Characteristics</b>	<b>N</b>
Culture-confirmed	11
Pulmonary disease	12

Cavitary	7
Sputum smear-positive for AFB	8
Symptomatic at diagnosis	10
HIV infection <sup>1</sup>	1

<sup>1</sup>unknown for one patient

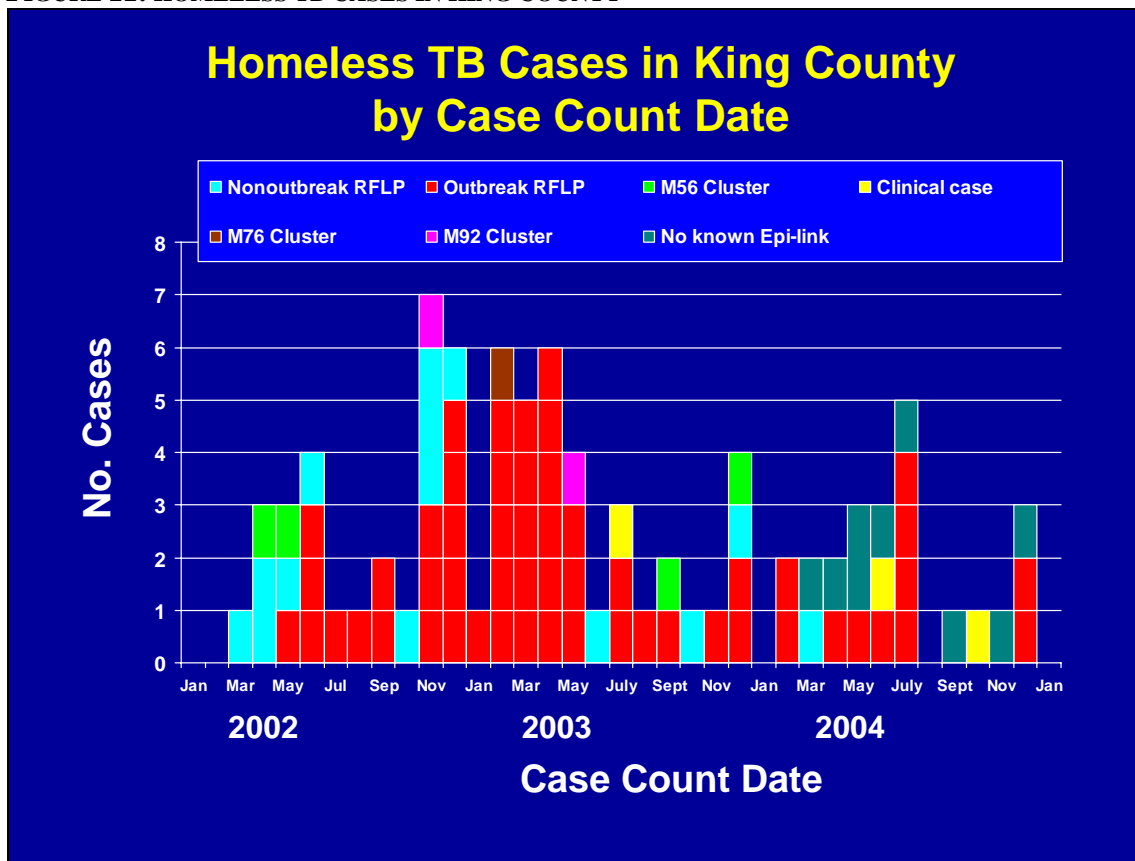
**FIGURE 10: EAST AFRICAN TB OUTBREAK IN KING COUNTY**



## 9. TB among the homeless

There were 23 homeless cases in 2004, that is, people who lacked a fixed, regular, and adequate night-time residence or whose primary night-time residence was a supervised shelter designed to provide temporary living accommodations. This represents 17% of the 2004 TB cases, and a decrease from 22% the year before. Homeless cases represent many of the outbreak-related cases, including homeless individuals congregating in shelters, as well as others who did not have a stable home within the last year. Homeless cases made up about half of the US-born cases in 2004. About 15% of TB cases in Washington State are homeless. Nationwide, homeless cases currently represent about 6% of all TB cases, although rates fluctuate widely by state, depending on the state's racial and ethnic makeup.

**FIGURE 11: HOMELESS TB CASES IN KING COUNTY**



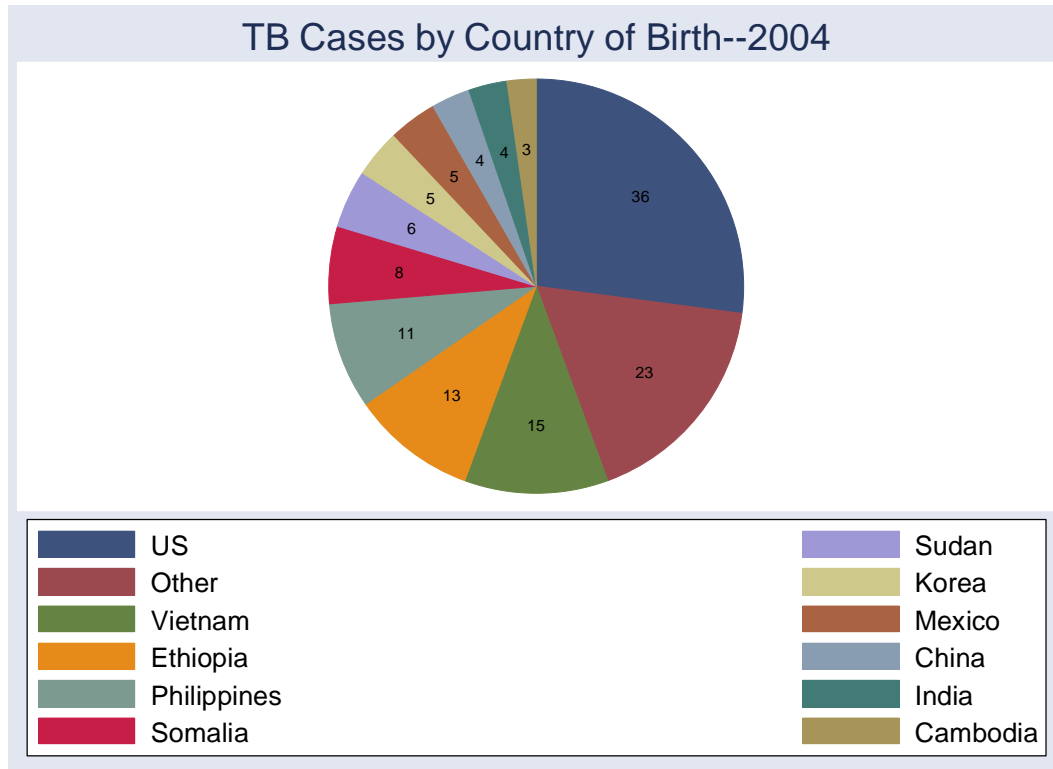
**TABLE 5: WHO ARE THE HOMELESS CASES?**

	Year Case Counted				
	<b>2000</b>	<b>2001</b>	<b>2002</b>	<b>2003</b>	<b>2004</b>
	(n=16)	(n=12)	(n=30)	(n=35)	(n=23)
	N(%)	N(%)	N(%)	N(%)	N(%)
<b>Gender</b>					
Male	14 (88)	12 (100)	26 (87)	28 (80)	20 (87)
Female	2 (12)	0 (0)	4 (13)	7 (20)	3 (13)
<b>Age Group</b>					
0-4	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)
5-14	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)
15-24	0 (0)	0 (0)	0 (0)	2 (6)	7 (31)
25-44	7 (44)	4 (33)	16 (53)	15 (43)	6 (26)
45-64	9 (56)	7 (58)	14 (47)	16 (45)	9 (39)
65+	0 (0)	1 (9)	0 (0)	2 (6)	1 (4)
<b>Race/Ethnicity</b>					
White, non-Hispanic	10 (63)	8 (67)	3 (10)	8 (20)	3 (13)
Black, non-Hispanic	4 (25)	2 (16)	12 (40)	10 (31)	10 (44)
Hispanic	0 (0)	0 (0)	3 (10)	3 (9)	1 (4)
Asian/Pacific Islander	0 (0)	1 (8)	1 (3)	0 (0)	1 (4)
American Indian/Alaska Native	2 (12)	1 (8)	11 (37)	14 (40)	8 (35)
<b>US-born</b>					
Yes	11 (69)	8 (67)	25 (83)	33 (94)	12 (52)
No	5 (31)	4 (33)	5 (17)	2 (6)	11 (48)
<b>HIV Result</b>					
Positive	3 (18)	3 (25)	9 (30)	2 (6)	0 (0)
Refused	1 (12)	0 (0)	1 (3)	0 (0)	3 (13)
<b>Genotyping</b>					
RFLP Match	0 (0)	0 (0)	17 (57)	27 (77)	11 (48)
Non-outbreak RFLP	1 (6)	10 (83)	13 (43)	7 (20)	10 (43)
Pending	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)
Clinical Case	0 (0)	0 (0)	0 (0)	1 (3)	2 (9)
No RFLP done	15 (94)	2 (16)	0 (0)	0 (0)	0 (0)
 American Indian RFLP match	 N/A	 0 (0)	 9 (82)	 13 (93)	 7 (88)

## 10. TB among foreign-born

*Country of Origin*

**FIGURE 12: TB CASES BY COUNTRY OF BIRTH, 2004**



Foreign-born TB cases made up almost three-quarters of all cases in 2004. It is also important to note that 78% of non-homeless cases were foreign-born. The majority of foreign-born cases came from either South Asia or East Africa. In the last five years, the countries of birth with the most foreign born cases have been Vietnam, Ethiopia, the Philippines, Somalia and Mexico. However, in contrast with previous years, more cases were observed from Sudan and fewer from China and India. Nationwide, in 2003, slightly more than half of cases were among foreign-born persons; the top 5 countries of origin for foreign-born cases in the US were Mexico, the Philippines, Vietnam, India and China.

**TABLE 6: TRENDS IN COUNTRY OF ORIGIN OF TB CASES 2000 - 2004**

	<b>2000</b>	<b>2001</b>	<b>2002</b>	<b>2003</b>	<b>2004</b>
<b>African Horn (Ethiopia, Somalia)</b>	18 18%	24 22%	24 21%	13 12%	21 22%
<b>Philippines</b>	15 15%	16 16%	18 18%	12 12%	15 15%
<b>Vietnam</b>	16 16%	17 17%	17 17%	12 12%	12 12%
<b>Sudan</b>	0 0%	0 0%	1 1%	0 0%	6 6%
<b>Mexico</b>	8 8%	8 7%	8 7%	12 11%	5 5%
<b>Korea</b>	3 3%	3 3%	1 1%	8 8%	5 5%
<b>China</b>	6 6%	4 4%	5 5%	10 10%	4 4%
<b>India</b>	9 9%	9 9%	11 11%	10 10%	4 4%
<b>Cambodia</b>	2 2%	3 3%	5 5%	5 5%	3 3%
<b>Total Foreign Born Cases</b>	100	107	116	105	97

*Duration of stay in US*

While almost half of the foreign-born cases were diagnosed within the first 10 years after arrival in the US in 2004, 20% of foreign-born TB cases have been in the US for over 20 years. Nationwide, in 2003, about 40% of cases were diagnosed within the first 10 years, and 15% after 20 years or more.

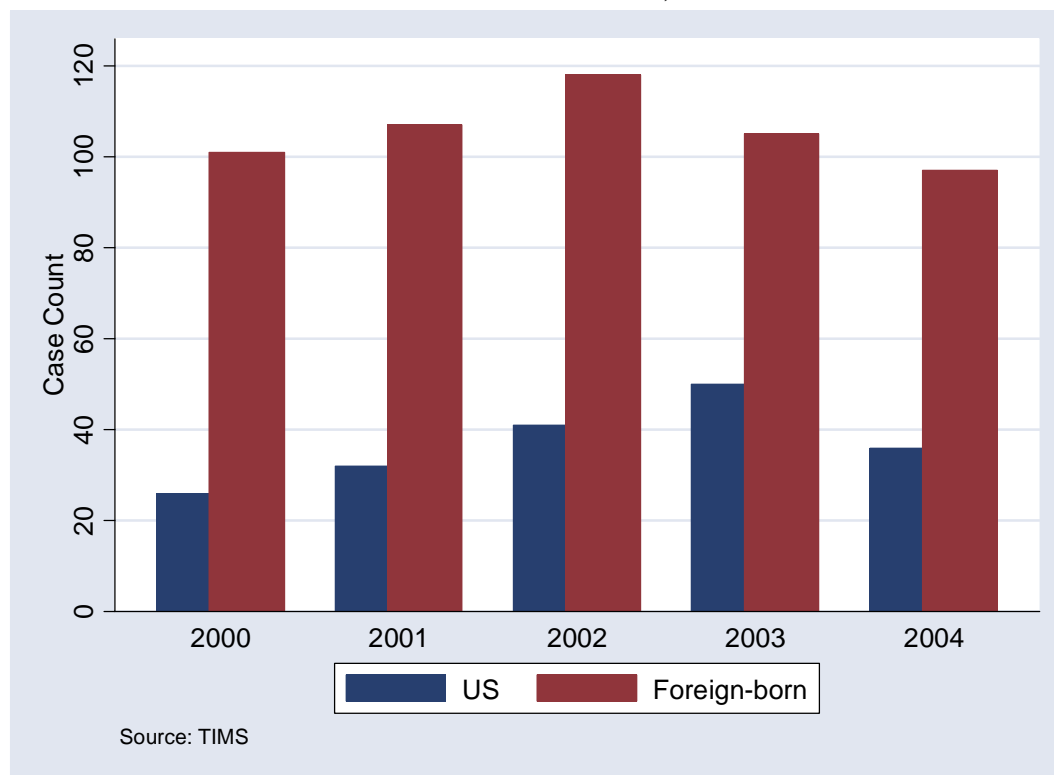
While cases from East African countries such as Ethiopia and Somalia are diagnosed shortly after arrival in the US due to efficient screening procedures in the home country, cases from Asia and Mexico are often not diagnosed until they have been in the US for many more years. This data is consistent with the national trend.

#### *Other Demographics*

While over a third of US-born cases were also homeless, the homeless comprised just 11% of foreign-born TB cases. However, this was an increase over an average of 5% that had been observed the previous number of years. As with the US-born, an HIV co-infection rate of 2% was observed among cases.

15-44 year-olds were more often diagnosed within the first few years after coming to the US, whereas over 75% of those 45 and older were diagnosed after having spent more than 10 years in the US.

**FIGURE 13: TUBERCULOSIS BY US VS FOREIGN-BORN, 2000-2004**





## 11. Treatment of TB cases

In 2004, over 90% of cases received an initial regimen consisting of 4-drug therapy, which is recommended by the CDC, the American Thoracic Society and the Infectious Diseases Society of America. Treating individuals with a combination of drugs prevents the occurrence of drug resistance.

### *Proportion of cases, completing therapy*

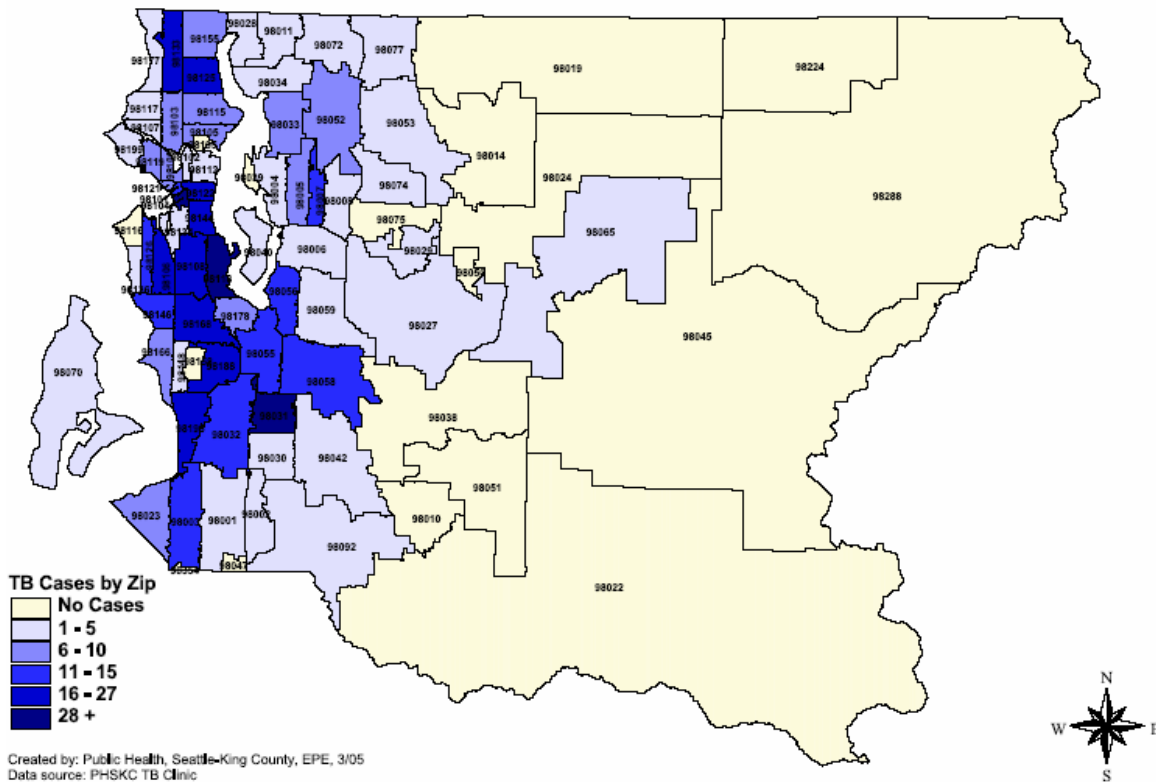
84% of TB cases that started on treatment in 2003 completed therapy within one year. Among the non-completers, 5% died, 2% were lost, and the remainder moved or had not yet completed. Nationwide, about 80% of TB cases complete treatment within one year (2001 data).

### *Mode of delivery*

Currently, over 90% of cases are on directly observed therapy (DOT) or a combination of DOT and self-administered therapy. Nationally, close to 80% are on DOT or a combination of DOT and self-administered therapy.

## 12. Distribution of local TB cases

### TB Cases in King County, 2000-2004, by Zip Code



### 13. TB cases in schools or other institutions

On an ongoing basis, the TB Control Program has to address cases of TB at schools, colleges, universities, worksites, nursing homes and other institutions. A contact investigation must often be conducted to determine whether any other students or staff were exposed to a case, and if so, whether transmission of TB took place.

In 2004, the TB Control Program conducted contact investigations at 18 different institutional sites, 8 of these at worksites, 6 at schools, colleges and universities, and 4 at nursing or retirement homes. Almost 1000 contacts were identified at these institutions, and almost 70% screened for either latent infection or active disease.

The TB Control Program uses a concentric circle approach to these contact investigations: Contacts are tested based on their characteristics or duration/environment of exposure. Contacts are then prioritized, with those at highest risk tested first. Depending on the results from this closest circle of contacts, the investigation might be expanded to the “second tier” contacts, and so on. Those individuals who are found to be PPD positive, but have a normal follow-up chest x-ray, are referred to start INH as treatment for latent infection.

**TABLE 7: 2004 INSTITUTIONAL INVESTIGATION SUMMARY**

	<b>Total</b>	<b>Workplace</b>	<b>School</b>	<b>Nursing home</b>
<b># Contacts Identified</b>	988	209	608	171
<b># PPD Placed</b>	695	170	413	112
<b># PPD Read</b>	672	168	394	110
<b># PPD Positive (excluding prior positives)</b>	93	35	53	5

## 14. The TB Control Program and research studies

### (1) TB Trials Consortium <TBTC>

The TB Control Program is involved in three CDC-sponsored research projects. The program serves as one of the study sites for the Tuberculosis Trials Consortium (TBTC). One of the active TBTC studies in which the program is involved is known as Study 26. This trial compares a 3-month once-weekly regimen of 2 drugs, isoniazid and rifapentine, as treatment for latent TB infection (LTBI), to standard 9-month therapy with isoniazid only.

The Study 26 summary for 2004 follows below:

**TABLE 8: STUDY 26 SUMMARY**

<b>STUDY 26-2004 DATA</b>							
<b>#/ ENROLLED</b>	<b>#/ IN PROGRESS</b>	<b># COMPLETED PER PROTOCOL</b>	<b># 9 mos. INH</b>	<b># 3 mos. INH/ RPT</b>	<b>#/ ALTERNATIVE THERAPY COMPLETERS (NOT PER PROTOCOL):</b>	<b>STOPPED DUE TO SIDE EFFECTS, (no add'l LTBI meds)</b>	<b># LOST, DIDN'T START, STOPPED W/O ATTRIBUTION</b>
38	5	22	5	17	2*	5**	4***

\* = 1/2 intolerant of rifapentine, completed 9 months isoniazid; 1/2 allergic to isoniazid, completed 4 months rifampin

\*\* = All initially on isoniazid/rifapentine; drug challenge done on 2/5—one intolerant of isoniazid, one tolerated each drug separately but not together. 1/5 on methadone, presumed rifapentine/methadone interaction. 2/5 complained of symptoms consistent with flu-like syndrome, but not rechallenged.

\*\*\*= 2/4 homeless outbreak; 1/4 East African Outbreak; 1 non-related converter

Further details regarding the TBTC can be found on:

[www.cdc.gov/nchstp/tb/tbtc/default.htm](http://www.cdc.gov/nchstp/tb/tbtc/default.htm)

## **(2) TB Epidemiologic Studies Consortium <TBESC>**

The TBESC consists of 21 sites across the U.S. and Canada (although funding cuts will eliminate five sites this year). These sites collaborate on multiple special studies, thereby providing access to diverse populations at highest risk for tuberculosis and assuring that findings are generalizable across the U.S. and Canada. Currently, the Seattle TBESC site participates in 5 projects, called Task Orders (TOs). A brief summary of each follows:

TO 5 (Prevalence of Latent TB among the Homeless)—We've interviewed and tested 189 persons in shelters, hygiene centers, feeding sites, and day employment sites.

Approximately one in four persons has tested positive for latent TB infection, meaning they were previously exposed to TB, but have not developed active disease.

TO 6 (Regional Capacity Building in Low Incidence TB Areas)—Former TB Control Officer Charles Nolan, MD, is working with the health departments in Montana, Idaho, Wyoming, and Utah to help them develop more effective surveillance and control efforts.

TO 8 (Multi-drug Resistant TB)—This project is being piloted. It will look for genetic similarities in the sputum samples we collect from persons with multi-drug resistant (MDR) TB, enabling us to better determine how MDR TB is acquired.

TO 9 (TB among the Foreign-Born)—Also just starting, this project will interview persons who have had active TB to determine how to better prevent TB disease among foreign-born persons living in the U.S.

TO 12 (Providers Who Care for Foreign-Born Persons)—In collaboration with the University of Washington (Carey Jackson, MD, MPH), we have interviewed physicians in Seattle, Boston, San Francisco, and Honolulu, and will interview physicians in Dallas and Orange County. These physicians, who care for persons born outside the U.S., are providing information that will help improve treatment of TB and latent TB infection among foreign-born persons.

Additional details on the TBESC can be found on <http://www.cdc.gov/nchstp/tb/TBESC/TOC.htm>

## Appendix 1: Glossary

**Acid-Fast Bacilli (AFB) smears:** Smears performed on sputum or other non-respiratory specimens to detect the presence of *Mycobacterium*.

**Bacille Calmette-Guerin (BCG):** A vaccine for TB named after the French scientists Calmette and Guérin. BCG is not widely used in the United States, but it is often given to infants and small children in other countries where TB is common.

**Cavity:** A hole in the lung resulting from destruction of pulmonary tissue. TB patients with cavities on chest X-rays are generally more infectious because of high bacterial load.

**Clinical Case:** In the absence of laboratory confirmation of *M. tuberculosis* after a diagnostic process has been completed, persons must have all of the following criteria for clinical TB case:

- Evidence of TB infection bases on a positive TB skin test
- AND
- One of the following:
    - (1) signs and symptoms compatible with current TB disease, such as an abnormal, unstable (worsening or improving) chest radiograph, or
    - (2) clinical evidence of current disease (such as fever, night sweats, cough, weight loss, hemoptysis).
- AND
- Current treatment with two-or more anti-TB medications.

**Contact:** An individual who has had some exposure to a source case. Contacts are often differentiated into ‘close contacts,’ that is, individuals who have shared the same air space with a person who has infectious TB disease for a prolonged time, or ‘casual contacts,’ those who did not have prolonged exposure.

**Culture:** Growth of bacteria in the laboratory, on either a liquid or solid medium, so that organisms can be identified based on specie.

**Directly Observed Therapy (DOT):** A health care worker or other designated person watched the TB patient swallow each dose of the prescribed drug.

**DNA Genotyping:** A laboratory approach that provides a description of the genetic makeup of a TB isolate.

**Drug Susceptibility Testing:** Tests done to determine which drugs will kill the bacteria that are causing the disease. Those bacteria killed by a particular drug are said to be susceptible to that drug, while those that grow in a drug’s presence are said to be resistant to it.

**Epidemiological (Epi) link:** A known epi-link is defined as either: a) one of the patients naming the other as a contact during one of the patient’s infectious period or b) the two

patients being at the same place at the same time during one of the patient's infectious period.

**Ethambutol (EMB):** One of the four first-line oral drugs used for TB treatment.

**Extrapulmonary TB:** TB disease in any part of the body other than the lungs (for example, the kidney or lymph nodes).

**Fingerprinting:** Refers to TB genotyping using a specific type of RFLP analysis.

**Genotyping:** A laboratory approach used to determine if TB isolates are genetically identical.

**Immunosuppression:** Medical conditions that reduce the body's usual immune response and as a result predispose a person to TB. Examples include HIV infection, diabetes, malnutrition and immunosuppressive therapy (such as steroids).

**Index case:** The first case identified.

**Infectious:** The stage of disease in which an individual transmits TB bacteria into the air.

**Isoniazid (INH):** One of the four first-line drugs used to treat TB, this drug is used either alone or in combination with other drugs as therapy for either TB disease or infection.

**Latent TB Infection:** Condition in which living TB bacteria are present in an individual, but do not produce clinically active disease. While the infected person usually has a positive tuberculin skin test, he/she does not have symptoms related to the infection, has a normal chest x-ray, and is not infectious. However, this individual remains at risk for developing TB disease.

**Multi-Drug Resistant TB (MDR-TB):** Drug resistance to both INH and Rifampin.

**Mycobacterial interspersed repetitive unit (MIRU):** A PCR-based genotyping assay performed on every isolate submitted for analysis.

**Mycobacterium Tuberculosis (*M. TB*, *M. tuberculosis*):** The mycobacterium organism that causes TB.

**Polymerase Chain Reaction (PCR):** A technique that allows for identification of TB strain types. Two PCR-based techniques are currently in use, spoligotyping and MIRU analysis.

**Pulmonary TB:** TB that occurs in the lungs.

**Purified Protein Derivative (PPD):** A type of purified tuberculin preparation derived in the 1930's. The standard (Mantoux) skin test uses 5 tuberculin units of this preparation. The test is thus also known as a 'PPD,' or 'TST,' which stands for Tuberculin Skin Test.

**Pyrazinamide (PZA):** One of the four first-line oral drugs used for TB treatment.

**Regimen:** The treatment plan specifying which drugs, dosages, schedule and length of therapy to use for TB.

**Resistance:** The ability of some strains of bacteria to grow even in the presence of certain drugs which normally kill them.

**Restriction Fragment Length Polymorphism (RFLP):** A lab technique used to “fingerprint” strains of TB to track patterns of transmission. The technique is based on measuring the number and length of specific DNA fragments that are cut using specific enzymes.

**Rifampin (RIF):** One of the four first-line oral drugs used for TB treatment.

**Screening:** Evaluation for TB including skin testing of individuals or groups.

**Spoligotyping:** A genotyping technique based on spacer sequences found in a specified region of the TB bacteria’s chromosome.

**Source case:** An infectious individual who has transmitted TB to other people.

**Susceptible:** Bacteria which can be killed by drugs used against them

**Tuberculin Skin Test (TST):** the test to see if someone has latent TB infection. PPD is injected under the skin on the lower part of your arm during a TB skin test. If you have latent TB infection, you will probably have a positive reaction to the tuberculin. [see Purified Protein Derivative].

**Tuberculosis Disease (TB):** The disease that is caused by the mycobacterium *M. tuberculosis*. Diseased persons have met one of the case definition criteria, be it either a laboratory or clinical case definition (or both).



## Appendix 2: TB Epidemiology Resources

Public Health Seattle-King County: <http://www.metrokc.gov/health>

Public Health Seattle-King County TB Control Program:  
<http://www.metrokc.gov/health/tb/>

CDC Division of TB Elimination: <http://www.cdc.gov/nchstp/tb/>

TB Education and Training Resources: <http://www.findtbresources.org/scripts/index.cfm>

WHO Stop TB Partnership: <http://stoptb.org/>  
<http://www.who.int/tb/en/>

## Sources for this report

All case data came from the Tuberculosis Information Management System database (TIMS). This database was designed to allow counties and states to report TB surveillance data to the Centers for Disease Control and Prevention.

All Charts and Tables are from the TB Control Program, Seattle King County Public Health.

2004 TB morbidity maps are provided courtesy of the Epidemiology, Planning and Evaluation unit (EPE), Seattle King County Public Health.

Denominator estimates are courtesy of the HIV/AIDS Epidemiology Unit, Seattle King County Public Health and VISTAPHw software, courtesy of the EPE unit. 2000 Census Data Summary Files used in preparing these population estimates can be found at: <http://www.census.gov/main/www/cen2000.html>

Washington State data for 2004 are courtesy of the Washington State Department of Health Infectious Disease and Reproductive Health Assessment Unit.

National data are from the surveillance reports at CDC's Division of TB Elimination website <http://www.cdc.gov/nchstp/tb/surv/Surv.htm>, and from <http://www.cdc.gov/mmwr/PDF/wk/mm5410.pdf>

Some percentages may not sum to 100 percent due to rounding.

For more information about tuberculosis in King County, please visit the TB Control Program's website at:

<http://www.metrokc.gov/health/tb/>

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