# Profile of Tuberculosis in San Francisco 2003

## Disease Incidence:

In 2003, 162 (20.4 per 100,000) new cases of active tuberculosis (TB) were diagnosed in San Francisco. This represents an 11% increase in cases from 2002. Despite this slight increase, TB incidence in San Francisco has steadily declined over the last decade. Prior to 1993 TB incidence in San Francisco peaked due to the AIDS epidemic, homelessness, and increased immigration from countries with high rates of TB. While this decline is encouraging, the rate of TB in San Francisco is still 4 times the 2002 national average of 5.2 per 100,000 and far from the Healthy People 2010 goal of 1 case per 100,000.

## Demographic Characteristics:

**Age Groups:** In 2002, there was a significant increase in the proportion of cases reported among 25-44 year olds due to an increase in homeless cases that year. In 2003, TB declined among the homeless, and as a result, the proportion of cases reported among 25-44 year olds also declined. Age trends in 2003 are similar to those in 2000 and 2001 with approximately 25% of cases reported among 25-44 year olds, 25% among 45-66 year olds, and 37% of cases being over the age of 65. There were 2 cases of pediatric TB this year. Both were U.S. born. One was identified through contact investigation (transmission from a family member). No source case could be found for the other case but the child was likely infected during a trip to Mexico.

**Race and Ethnicity:** In 2003, the highest rate of TB (40.1 per 100,000) occurred in the Asian/Pacific Islander population. The disease rate among Black, non-Hispanics declined 50% from 2002, most likely due to the decline in homeless and HIV-positive cases in 2003. In 2002, 80% of all cases in black, non-Hispanics were homeless, 60% were HIV-infected, and 52% were both homeless and HIV-infected. In 2003, 46% were homeless and 30% were HIV-infected and homeless. TB rates in Hispanics have remained steady in over the last 5 years. Among White, non-Hispanics, the rate of TB in 2003 was less than 4 per 100,000.

**Place of birth:** In 2002, there was a significant decline in both the number and the proportion of foreign-born cases reported. In 2003, however, foreign-born cases increased back to numbers seen prior to 2002. Two factors may have played a role in the decrease in foreign-born cases seen in 2002. First, the increase in homeless, U.S.-born cases lowered the proportion of foreign-born cases contributing to the overall disease burden. Second, the decrease in cases may have been due to a decline in immigration in recent years. In 2002, the number of immigrants entering the United States through the Class A/B TB Notification Program declined as well. However, the number of cases reported among new arrivals in the U.S. remained constant (approximately 20% reported within 1 year of arrival and 36% reported within 5 years of arrival). Because of the lag time in the availability of immigration data, it is difficult to assess the affect of immigration trends on TB incidence in San Francisco over the last several years. This will be an area of focus in the future.

## Social Factors:

**Homelessness:** The number of homeless cases reported in 2003 declined by almost 50% and is back to the pre-2002 baseline of approximately 20 homeless cases per year. DNA fingerprinting of *Mycobacterium tuberculosis* isolates revealed that an outbreak accounting for 25-30% of all homeless cases in 2002 were due to a single strain.

**Substance abuse:** In 2003, 14.2% of cases reported excess alcohol use, 7% reported non-injection drug use, and 6% reported injection drug use. While declines were observed in the use of all three substances, only non-injection drug use returned to baseline levels of 2001. A slight decrease was observed in alcohol abuse (15% in 2002, 14% in 2003) and injection drug use decrease by approximately 50%.

## Medical Factors:

**AIDS:** Although the overall number of cases with AIDS had declined annually since the peak in 1991, in 2002, the number of TB cases reported with AIDS more than doubled from the previous year, increasing from 13 cases in 2001 to 29 cases in 2002. This increase was associated with the increase in homeless cases reported that year. In 2003, approximately 10% of reported TB cases were co-infected with HIV, a 50% decrease in the number of AIDS cases reported in 2002.

## Drug Resistance:

For the last several years, drug resistance has remained relatively steady. Fifteen percent (15%) of all culture-positive TB cases were resistant to a least one drug. Sixty percent of resistant isolates were resistant to isoniazid (INH) and 15% were resistant to rifampin (RIF). There were 2 cases of multi-drug resistant TB (resistance to INH and RIF). However none of these cases were due to acquired drug-resistance. In the last 3 years, 10 MDR cases were reported. While the number of MDR cases has remained relatively low (2-4 cases per year, and 1-3% of all cases reported annually), these TB strains are highly resistant (4 or more drugs) and difficult and costly to manage.

## 2003 Highlights:

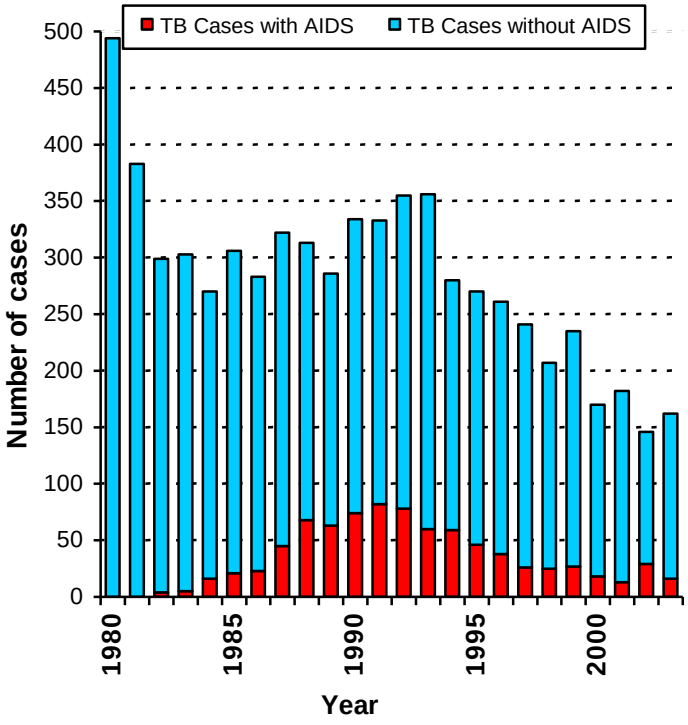
**Tuberculosis Screening using the QuantiFERON Blood Test:**

In November 2003, San Francisco TB Control began to change the routine TB screening test used for targeted testing of high-risk populations. Instead of screening by tuberculin skin testing (TST), patients are now evaluated with an FDA approved blood test (the whole blood interferon-gamma release assay, also known by the trade name QuantiFERON™). Using QuantiFERON removes problems with inappropriate TST placement, reading, boosting, and missed TST reading appointments. At the SFDPH laboratory, one full-time laboratory technician has been dedicated to performing this assay to meet the rapidly increasing community demand. From November 2003 to March 2004 SFDPH evaluated specimens from 675 high-risk patients by QuantiFERON, including 332 in the month of February alone. Among these specimens, 132 (20%) have been positive, and 8 (1.2%) have been indeterminate. Ongoing operational research is underway to establish the cost-effectiveness of this new TB diagnostic aide.

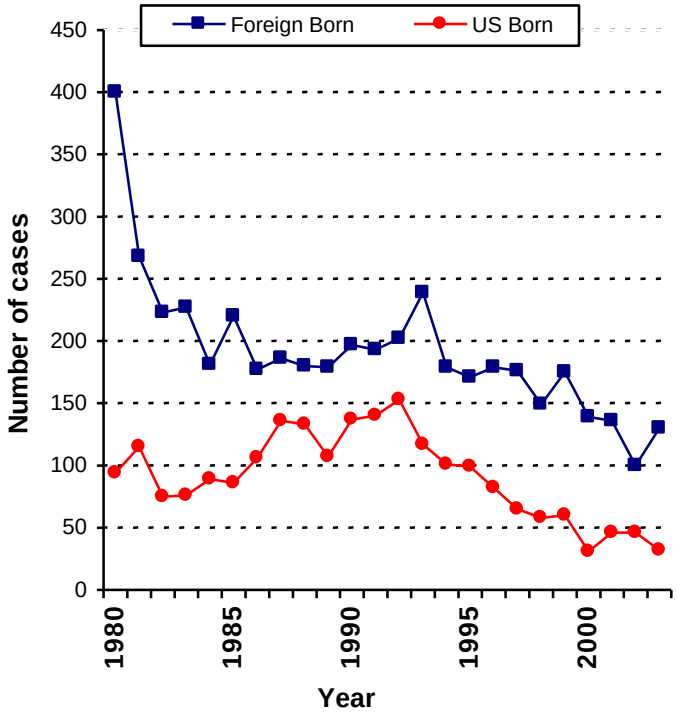
**Tuberculosis Screening Guidelines for Homeless Populations:**

As a result of outbreaks in San Francisco's homeless population in 2002, the health department adopted screening guidelines calling for mandatory TB screening of persons entering shelters and a "cough alert" protocol to notify TB control staff of potential symptomatic shelter residents. Implementation of these guidelines is being phased in during 2004. Control in the homeless population in 2003 was established through contact investigation and treatment of infected persons to stop the cycle of transmission.

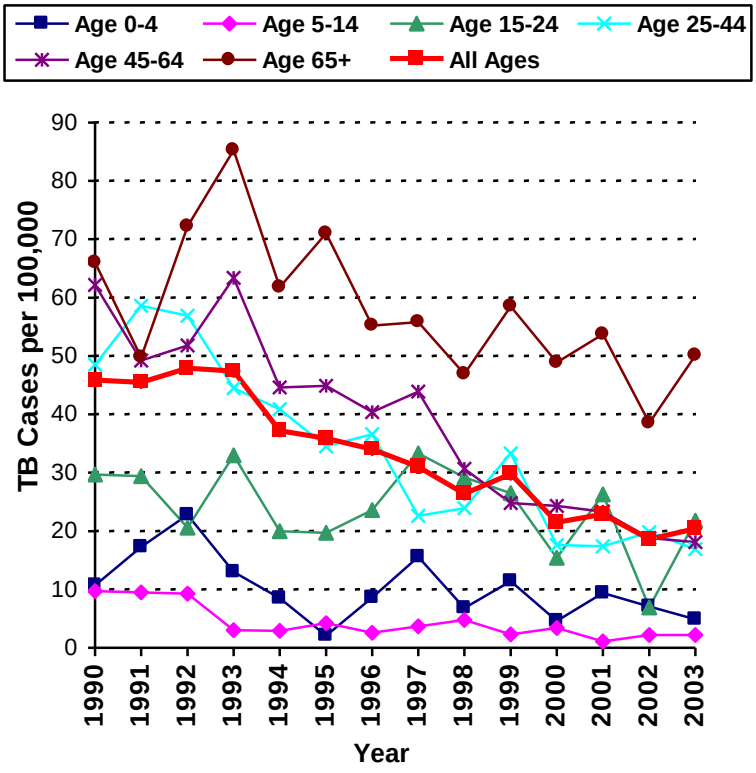
## TB Cases in San Francisco by AIDS Status, 1980-2003




## TB Cases in San Francisco by Place of Birth, 1980-2003




## Rates of TB in San Francisco by Age Group, 1990-2003




## Rates of TB in San Francisco by Race and Ethnicity, 1990-2003

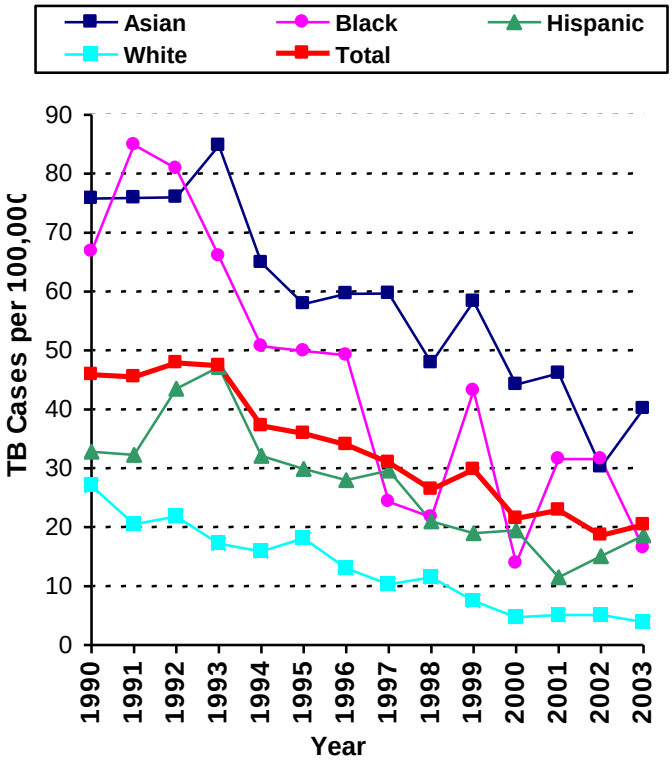


**Table 1. Demographic and Social Characteristics of Tuberculosis Cases in San Francisco, 1999 - 2003**

| | 1999 | | | 2000 | | | 2001 | | | 2002 | | | 2003 | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | N | %[1] | Rate[2] | N | %[1] | Rate[2] | N | %[1] | Rate[2] | N | %[1] | Rate[2] | N | %[1] | Rate[2] |
| **Total** | **235** | | **29.8** | **170** | | **21.5** | **182** | | **22.9** | **146** | | **18.4** | **162** | | **20.4** |
| **Age Group** | | | | | | | | | | | | | | | |
| **Age 0-4** | **5** | (2.1) | **11.4** | **2** | (1.2) | **4.6** | **4** | (2.2) | **9.4** | **3** | (2.1) | **7.1** | **2** | (1.2) | **4.9** |
| **Age 5-14** | **2** | (0.9) | **2.3** | **3** | (1.8) | **3.4** | **1** | (0.5) | **1.1** | **2** | (1.4) | **2.2** | **2** | (1.2) | **2.2** |
| **Age 15-24** | **19** | (8.1) | **26.5** | **11** | (6.5) | **15.4** | **19** | (10.4) | **26.3** | **5** | (3.4) | **6.9** | **16** | (9.9) | **21.8** |
| **Age 25-44** | **93** | (39.6) | **33.3** | **48** | (28.2) | **17.6** | **46** | (25.3) | **17.4** | **51** | (34.9) | **19.8** | **42** | (25.9) | **16.9** |
| **Age 45-64** | **47** | (20.0) | **24.8** | **48** | (28.2) | **24.3** | **48** | (26.4) | **23.3** | **39** | (26.7) | **18.3** | **40** | (24.7) | **18.1** |
| **Age 65+** | **69** | (29.4) | **58.5** | **58** | (34.1) | **48.9** | **64** | (35.2) | **53.7** | **46** | (31.5) | **38.5** | **60** | (37.0) | **50.1** |
| **Gender** | | | | | | | | | | | | | | | |
| **Male** | **133** | (56.6) | **34.0** | **113** | (66.5) | **28.7** | **115** | (63.2) | **29.1** | **98** | (67.1) | **24.8** | **104** | (64.2) | **26.3** |
| **Female** | **102** | (43.4) | **25.7** | **57** | (33.5) | **14.3** | **67** | (36.8) | **16.8** | **48** | (32.9) | **12.0** | **58** | (35.8) | **14.5** |
| **Race/ Ethnicity** | | | | | | | | | | | | | | | |
| **American Indian/ Alaskan Native** | **0** | (0.0) | **0.0** | **2** | (1.2) | **73.7** | **3** | (1.6) | **N/A** | **1** | (0.7) | **37.1** | **1** | (0.6) | **37.1** |
| **Asian/ Pacific Islander** | **153** | (65.1) | **58.3** | **117** | (68.8) | **44.2** | **123** | (67.6) | **46.1** | **81** | (55.5) | **30.2** | **108** | (66.7) | **40.1** |
| *Chinese[3]* | *76* | *(49.7)* | ___ | *66* | *(56.4)* | ___ | *76* | *(61.8)* | ___ | *45* | *(55.6)* | ___ | *53* | *(49.1)* | ___ |
| *Filipino[3]* | *45* | *(29.4)* | ___ | *33* | *(28.2)* | ___ | *32* | *(26.0)* | ___ | *22* | *(27.2)* | ___ | *29* | *(26.9)* | ___ |
| *South East Asian[3]* | *22* | *(14.4)* | ___ | *11* | *(9.4)* | ___ | *10* | *(8.1)* | ___ | *10* | *(12.3)* | ___ | *20* | *(18.5)* | ___ |
| *Other Asian[3]* | *10* | *(6.5)* | ___ | *7* | *(6.0)* | ___ | *5* | *(4.1)* | ___ | *5* | *(6.2)* | ___ | *6* | *(5.6)* | ___ |
| **Black** | **34** | (14.5) | **43.2** | **11** | (6.5) | **13.9** | **25** | (13.7) | **31.6** | **25** | (17.1) | **31.6** | **13** | (8.0) | **16.5** |
| **Hispanic** | **24** | (10.2) | **19.0** | **25** | (14.7) | **19.5** | **15** | (8.2) | **11.5** | **20** | (13.7) | **15.1** | **25** | (15.4) | **18.6** |
| **White** | **24** | (10.2) | **7.5** | **15** | (8.8) | **4.7** | **16** | (8.8) | **5.1** | **19** | (13.0) | **6.1** | **15** | (9.3) | **3.9** |
| **Place of Birth** | | | | | | | | | | | | | | | |
| **U.S.-born** | **60** | (25.5) | ___ | **31** | (18.2) | ___ | **46** | (25.3) | ___ | **46** | (31.5) | ___ | **32** | (19.8) | ___ |
| **Foreign-born** | **175** | (74.5) | ___ | **139** | (81.8) | ___ | **136** | (74.7) | ___ | **100** | (68.5) | ___ | **130** | (80.2) | ___ |
| *China[4]* | *50* | *(28.6)* | ___ | *54* | *(38.8)* | ___ | *62* | *(45.6)* | ___ | *38* | *(38.0)* | ___ | *46* | *(35.4)* | ___ |
| *Philippines[4]* | *42* | *(24.0)* | ___ | *31* | *(22.3)* | ___ | *32* | *(23.5)* | ___ | *20* | *(20.0)* | ___ | *29* | *(22.3)* | ___ |
| *Vietnam[4]* | *29* | *(16.6)* | ___ | *12* | *(8.6)* | ___ | *8* | *(5.9)* | ___ | *9* | *(9.0)* | ___ | *14* | *(10.8)* | ___ |
| *Mexico[4]* | *7* | *(4.0)* | ___ | *11* | *(7.9)* | ___ | *4* | *(2.9)* | ___ | *7* | *(7.0)* | ___ | *12* | *(9.2)* | ___ |
| *Other Countries[4]* | *47* | *(26.9)* | ___ | *31* | *(22.3)* | ___ | *30* | *(22.1)* | ___ | *26* | *(26.0)* | ___ | *29* | *(22.3)* | ___ |
| **Social Factors** | | | | | | | | | | | | | | | |
| **Homelessness** | **33** | (14.0) | ___ | **24** | (14.1) | ___ | **23** | (12.6) | ___ | **38** | (26.0) | ___ | **21** | (13.0) | ___ |
| **Alcohol Abuse** | **22** | (9.4) | ___ | **18** | (10.6) | ___ | **10** | (5.5) | ___ | **22** | (15.1) | ___ | **23** | (14.2) | ___ |
| **Non-injection Drug Use** | **25** | (10.6) | ___ | **12** | (7.1) | ___ | **14** | (7.7) | ___ | **18** | (12.3) | ___ | **12** | (7.4) | ___ |
| **Injection Drug Use** | **9** | (3.8) | ___ | **8** | (4.7) | ___ | **8** | (4.4) | ___ | **16** | (11.0) | ___ | **10** | (6.2) | ___ |

[1] Percent calculations based on total number of cases reported unless otherwise indicated.

[2] Rate per 100,000. (Population Estimate Source: State of California, Department of Finance, *Race and Ethnic Population with Age and Sex Detail, 1970-2040.* Sacramento, CA, December 1998.)

[3] Percent of Asian/ Pacific Islander cases.

[4] Percent of foreign-born cases.

**Table 2. Clinical Characteristics of Tuberculosis Cases in San Francisco, 1999 - 2003**

| | 1999 | | 2000 | | 2001 | | 2002 | | 2003 | |
|---|---|---|---|---|---|---|---|---|---|---|
| | N | %[1] | N | %[1] | N | %[1] | N | %[1] | N | %[1] |
| **Total** | **235** | | **170** | | **182** | | **146** | | **162** | |
| **AIDS Status** | | | | | | | | | | |
| **Verified by AIDS Match** | **27** | (11.5) | **18** | (10.6) | **13** | (7.1) | **29** | (19.9) | **16** | (9.9) |
| **Major Site of Disease** | | | | | | | | | | |
| **Pulmonary** | **200** | (85.1) | **143** | (84.1) | **151** | (83.0) | **121** | (82.9) | **128** | (79.0) |
| **Extrapulmonary** | **35** | (14.9) | **27** | (15.9) | **31** | (17.0) | **25** | (17.1) | **34** | (21.0) |
| **Sputum Smear** | | | | | | | | | | |
| **Positive** | **69** | (29.4) | **41** | (24.1) | **51** | (28.0) | **45** | (30.8) | **45** | (27.8) |
| **Negative** | **136** | (57.9) | **102** | (60.0) | **99** | (54.4) | **86** | (58.9) | **91** | (56.2) |
| **Not Done** | **30** | (12.8) | **27** | (15.9) | **32** | (17.6) | **15** | (10.3) | **26** | (16.0) |
| **Culture Result** | | | | | | | | | | |
| **Positive** | **186** | (79.1) | **135** | (79.4) | **143** | (78.6) | **120** | (82.2) | **139** | (85.8) |
| **Negative** | **47** | (20.0) | **33** | (19.4) | **39** | (21.4) | **23** | (15.8) | **19** | (11.7) |
| **Not Done** | **2** | (0.9) | **2** | (1.2) | **0** | (0.0) | **3** | (2.1) | **4** | (2.5) |
| **Drug Sensitivity[2]** | | | | | | | | | | |
| **Susceptible** | **155** | (83.3) | **118** | (87.4) | **125** | (87.4) | **101** | (84.2) | **119** | (85.6) |
| **Any Resistance** | **29** | (15.6) | **17** | (12.6) | **18** | (12.6) | **18** | (15.0) | **20** | (14.4) |
| *INH[3]* | *20* | *(69.0)* | *9* | *(52.9)* | *13* | *(72.2)* | *11* | *(61.1)* | *12* | *(60.0)* |
| *RIF[3]* | *3* | *(10.3)* | *3* | *(17.6)* | *6* | *(33.3)* | *4* | *(22.2)* | *3* | *(15.0)* |
| *PZA[3]* | *4* | *(13.8)* | *1* | *(5.9)* | *2* | *(11.1)* | *5* | *(27.8)* | *2* | *(10.0)* |
| *EMB[3]* | *1* | *(3.4)* | *1* | *(5.9)* | *1* | *(5.6)* | *3* | *(16.7)* | *2* | *(10.0)* |
| *SM[3]* | *14* | *(48.3)* | *6* | *(35.3)* | *10* | *(55.6)* | *8* | *(44.4)* | *10* | *(50.0)* |
| *Other[3]* | *2* | *(6.9)* | *1* | *(5.9)* | *0* | *(0.0)* | *4* | *(22.2)* | *3* | *(15.0)* |
| *MDR (INH+RIF)[3]* | *3* | *(10.3)* | *0* | *(0.0)* | *4* | *(22.2)* | *4* | *(22.2)* | *2* | *(10.0)* |
| **Unknown** | **7** | (3.8) | **6** | (4.4) | **5** | (3.5) | **1** | (0.8) | **0** | (0.0) |
| **Provider Type** | | | | | | | | | | |
| **Health Department** | **157** | (66.8) | **111** | (65.3) | **135** | (74.2) | **118** | (80.8) | **122** | (75.3) |
| *Ward 94[4]* | *133* | *(84.7)* | *104* | *(93.7)* | *114* | *(84.4)* | *95* | *(80.5)* | *106* | *(86.9)* |
| *TOPS[4]* | *22* | *(14.0)* | *6* | *(5.4)* | *12* | *(8.9)* | *12* | *(10.2)* | *11* | *(9.0)* |
| *CHOPS[4]* | *2* | *(1.3)* | *1* | *(0.9)* | *9* | *(6.7)* | *11* | *(9.3)* | *5* | *(4.1)* |
| **Private Providers** | **78** | (33.2) | **59** | (34.7) | **45** | (24.7) | **24** | (16.4) | **38** | (23.5) |
| **Both** | **0** | (0.0) | **0** | (0.0) | **2** | (1.1) | **3** | (2.1) | **0** | (0.0) |
| **Unknown** | **0** | (0.0) | **0** | (0.0) | **0** | (0.0) | **1** | (0.7) | **2** | (1.2) |

[1] Percent calculations based on total number of cases reported unless otherwise indicated.

[2] Percent of culture-positive cases.

[3] Percent of culture-positive cases with any resistance.

[4] Percent of cases managed by the health department.