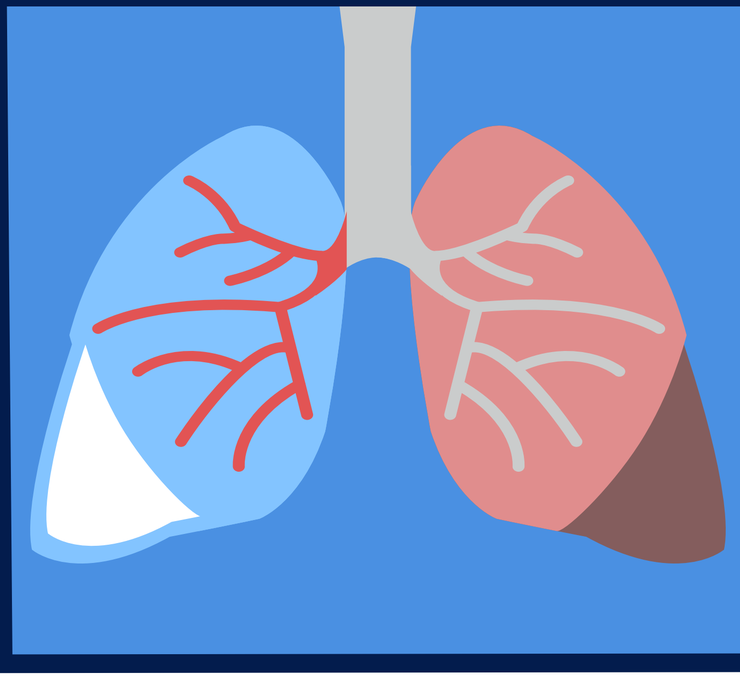
2018 Virginia Tuberculosis Surveillance Report

VDH VIRGINIA DEPARTMENT OF HEALTH

To protect the health and promote the well-being of all people in Virginia.

The Virginia Department of Health TB Program within The Division of Clinical Epidemiology works to assist local health districts with identification and appropriate treatment and management of all individuals with presumptive and confirmed tuberculosis disease.



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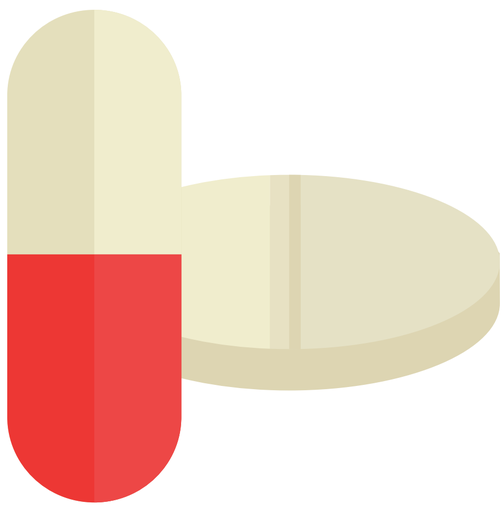

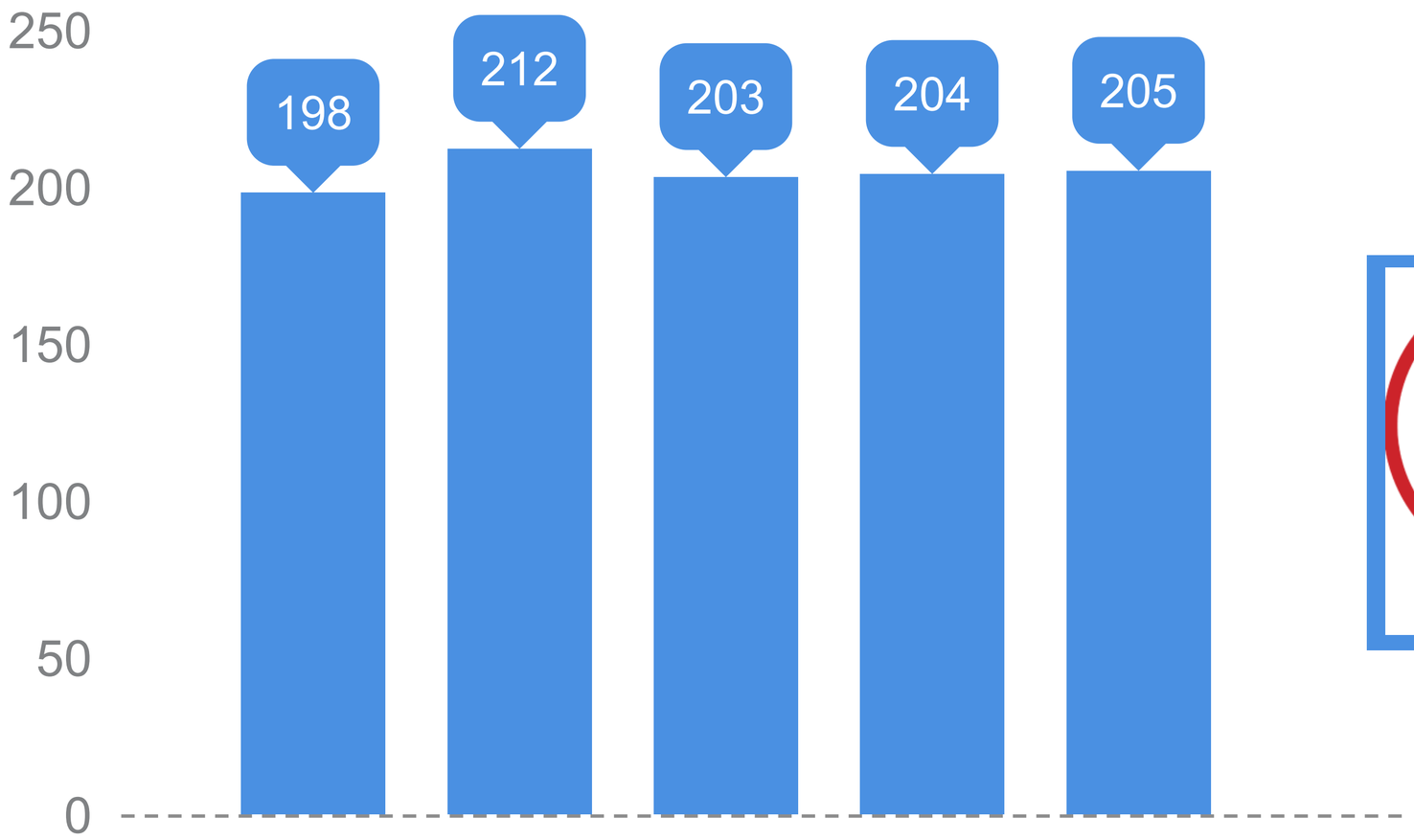

TB Cases in Virginia, 2014-2018

IT'S TIME! END TB

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Acknowledgements

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The Division of Clinical Epidemiology TB Program acknowledges and appreciates the public health nurses, outreach workers, and other staff who provide direct services to patients and who provide the information and data summarized in this report. Without their dedication, the goal of TB elimination would be impossibly far away.

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Tuberculosis (TB) Reporting Requirements

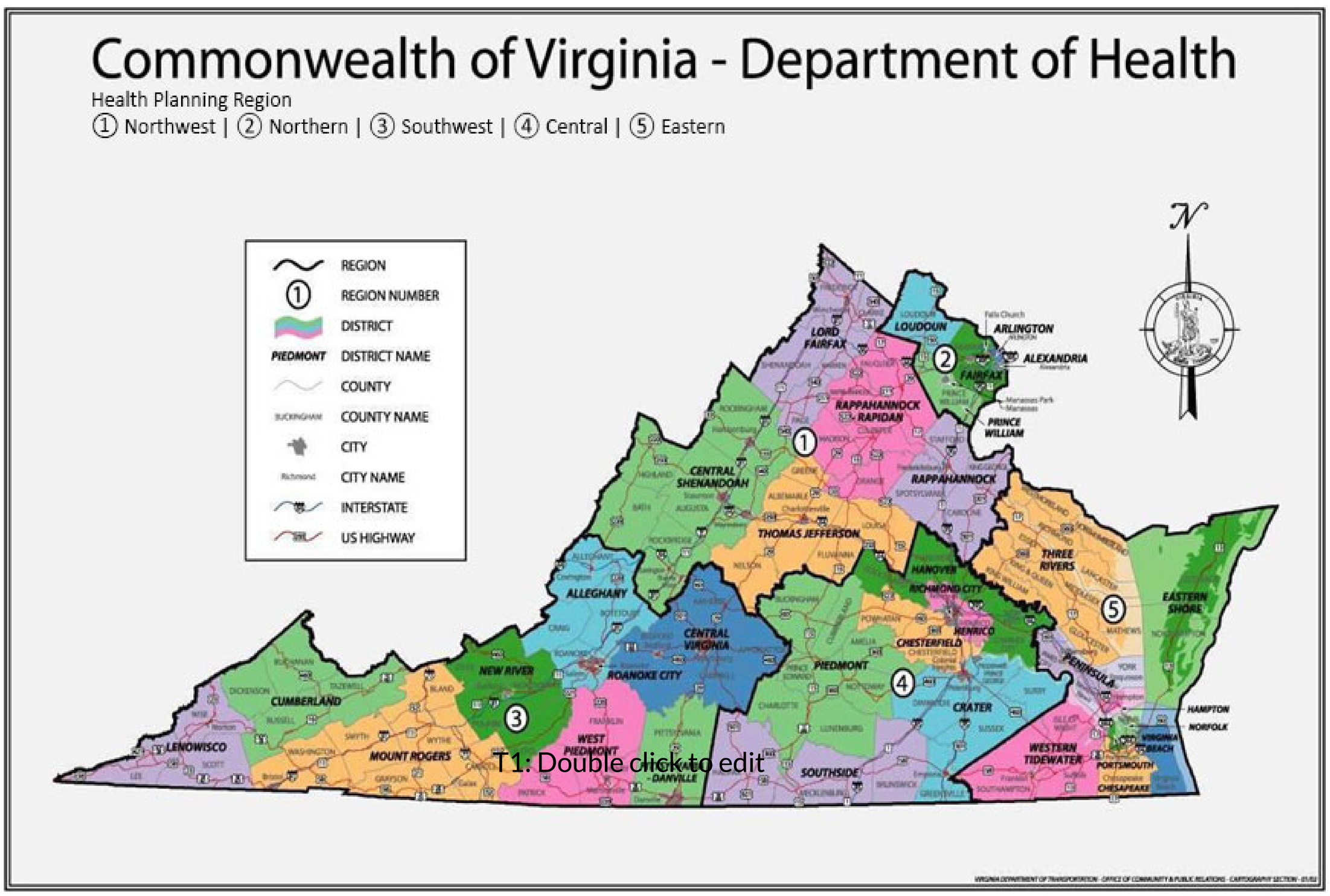
Healthcare providers and laboratories are required to report to the Virginia Department of Health:

1. All patients with confirmed TB disease
2. Anyone presumed to have TB disease
3. Anyone diagnosed with latent TB infection (LTBI)

Reports should be made to your local health department immediately for patients with presumed or confirmed active TB and within three days for those diagnosed with LTBI.

Reporting is required by state law (Sections 32.1-36 and 32.1-37 of the *Code of Virginia* and 12 VAC 5-90-80 and 12 VAC 5-90-90 of the Board of Health *Regulations for Disease Reporting and Control)*.

If active TB disease is suspected, reporting should never be delayed pending identification of *Mycobacterium tuberculosis* with a nucleic acid amplification (NAA) test or positive culture.



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To locate contact information for your local health department, please refer to the following resource:

http://www.vdh.virginia.gov/local-health-districts/

For additional information on the Virginia Reportable Disease List, please refer to the following resource:

http://www.vdh.virginia.gov/content/uploads/sites/13/2018/11/Reportable_Disease_List.pdf

Tuberculosis in Virginia, 2018

Overview

NUMBER OF VERIFIED CASES

205

TB RATE PER 100,000 POPULATION

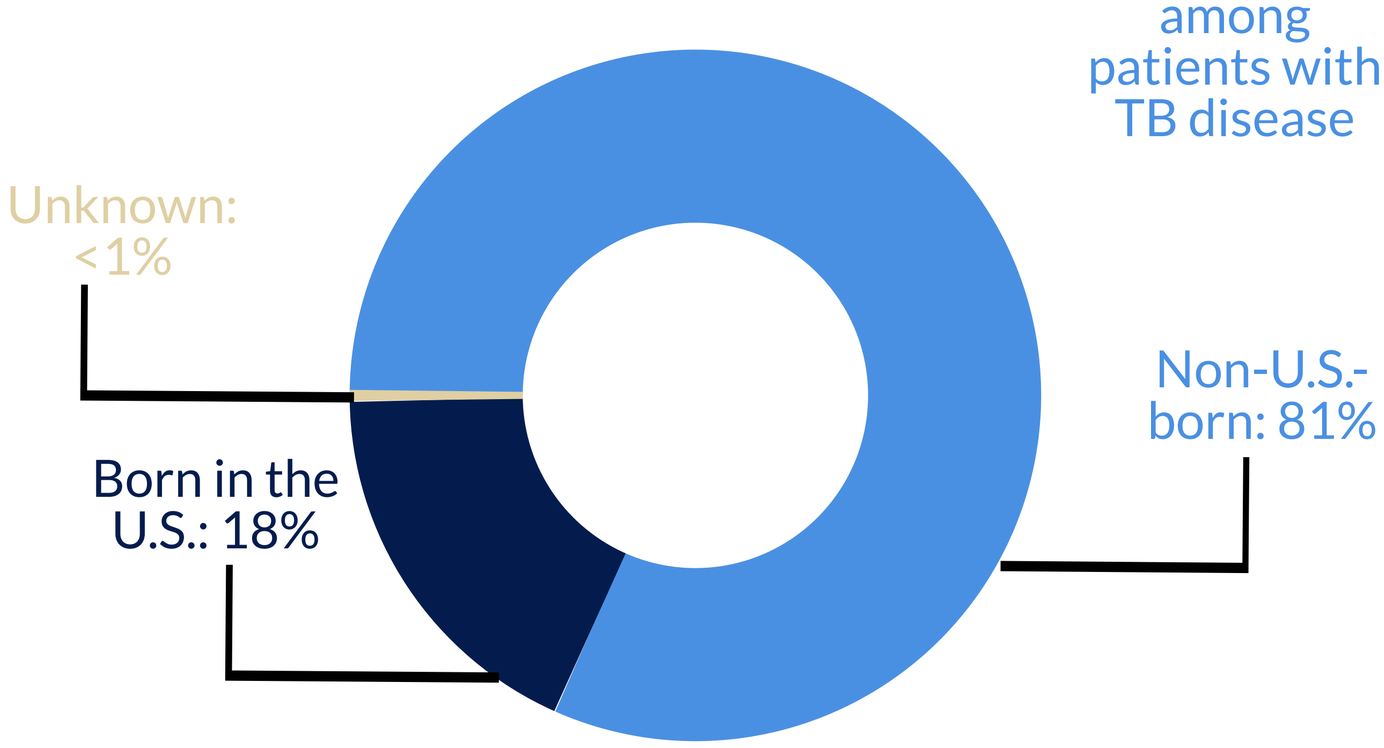
2.4

HEALTH DISTRICTS WITH TB CASES

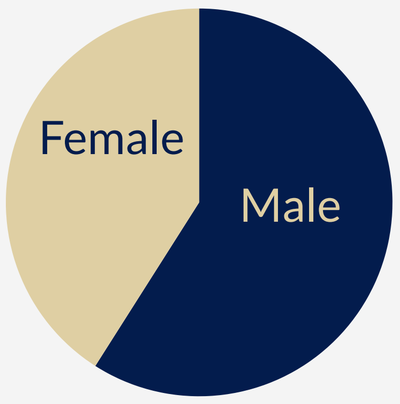
29

Country of Birth

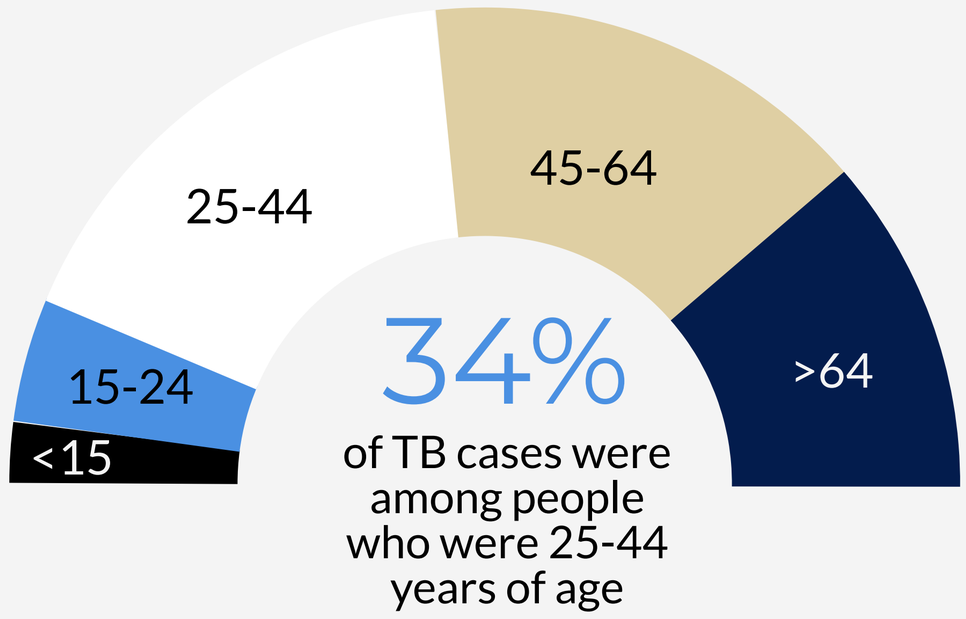
40 — Number of countries represented among patients with TB disease



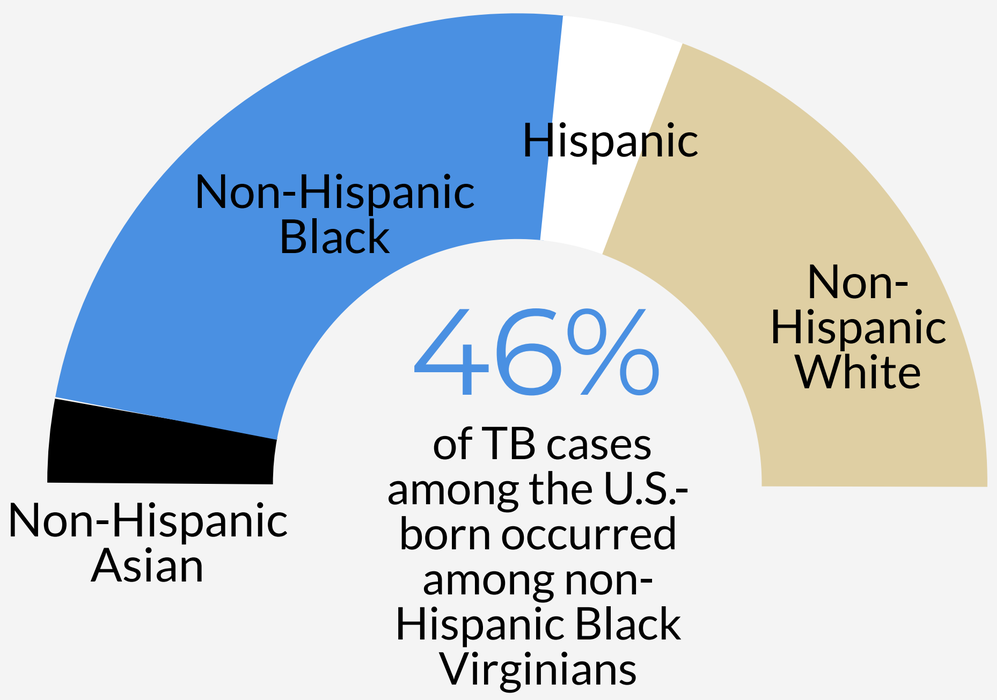
Demographics



59% of TB cases occurred among males

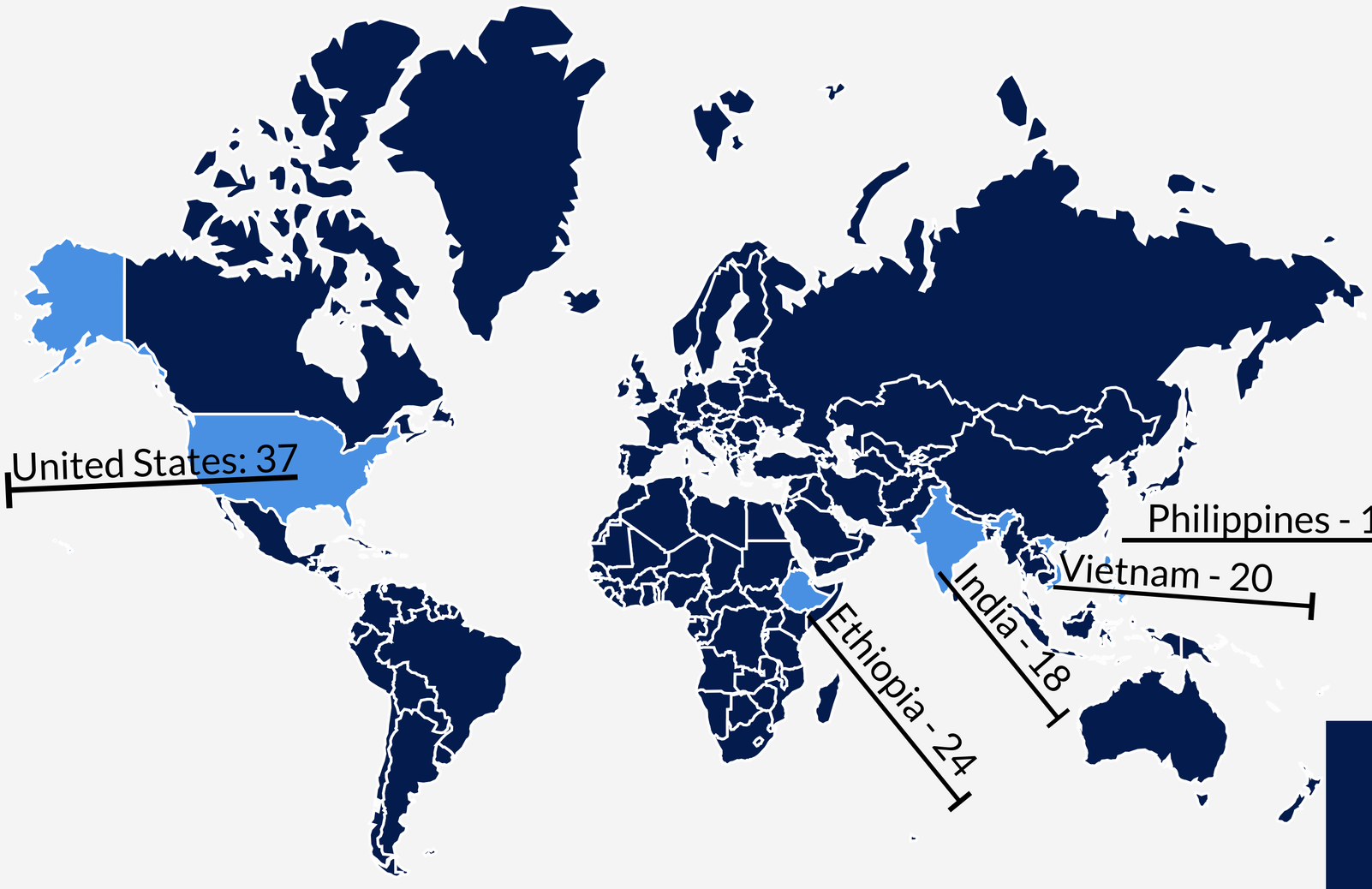


34% of TB cases were among people who were 25-44 years of age



46% of TB cases among the U.S.-born occurred among non-Hispanic Black Virginians

Most Common Countries of Birth Among Patients



Clinical Characteristics

2% | Proportion of TB cases with HIV co-infection

9% | Proportion of TB cases with resistance to any first line drug

17% | Proportion of TB cases with diabetes

74% | Proportion of TB cases with a pulmonary site of disease

Time in the U.S.

9 — Median number of years in the U.S. at time of diagnosis among non-U.S.-born patients

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Profile of Tuberculosis Cases in Virginia

In 2018, Virginia reported 205 cases of tuberculosis (TB), a 0.5% increase from the 204 cases reported in 2017. Nationally, the Centers for Disease Control and Prevention (CDC) reported 9,029 TB cases for 2018, a 0.7% decrease from 2017. Although TB incidence in the United States in 2018 is the lowest ever reported, recent models predict that the U.S. TB elimination goal (annual incidence of <1 case per 1 million persons) will not be attained in this century without significantly increased efforts. When compared to other states in 2018, Virginia ranked 10th by number of cases and 18th by rate, with a rate of 2.4 per 100,000 population. Virginia's TB case rate has consistently stayed below the national rate, but has plateaued in recent years after a slight increase from the state's lowest rate in 2013 of 2.2 per 100,000.

Figure 1: Tuberculosis Rates, Virginia and the United States, 1988-2018

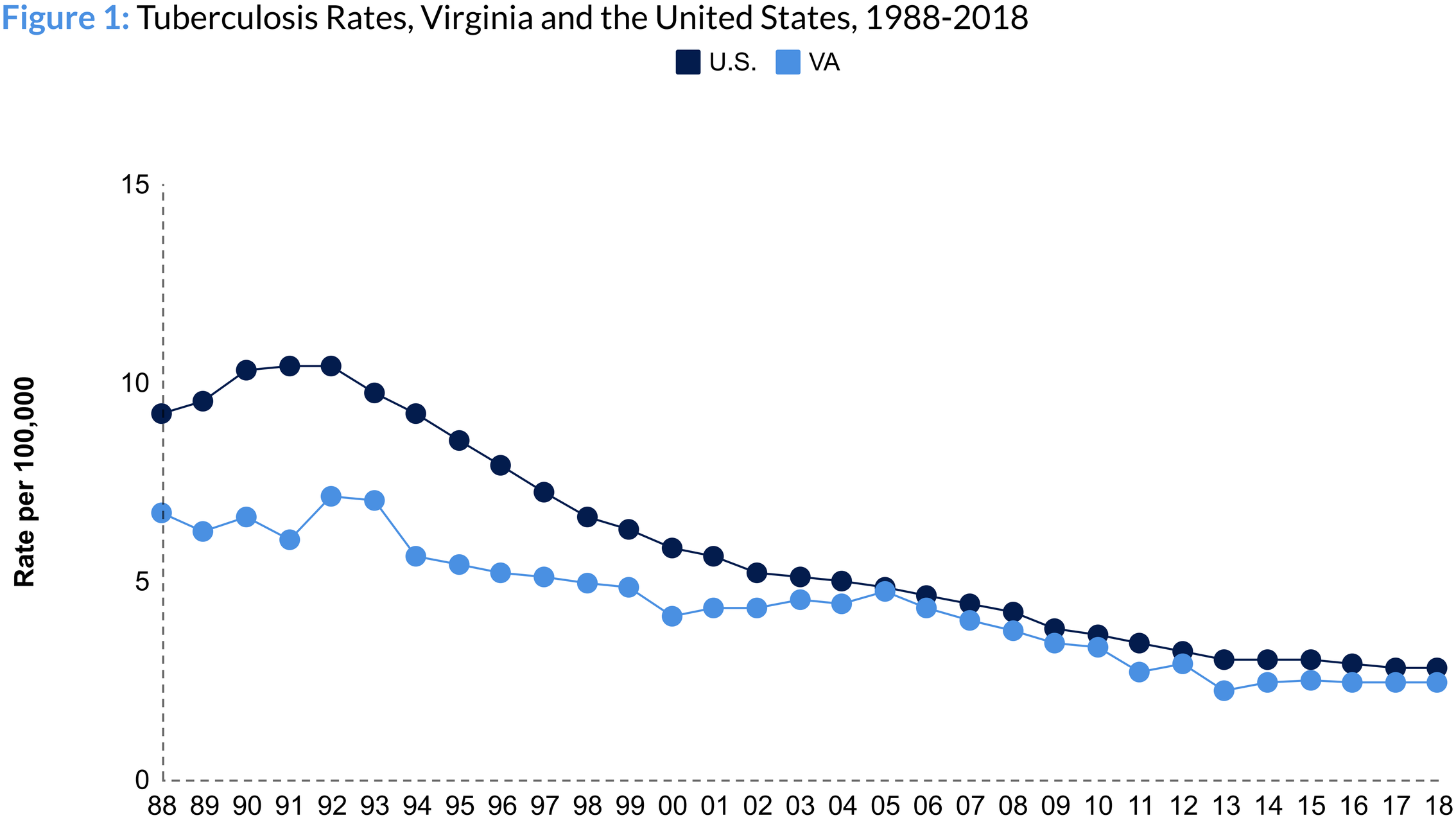
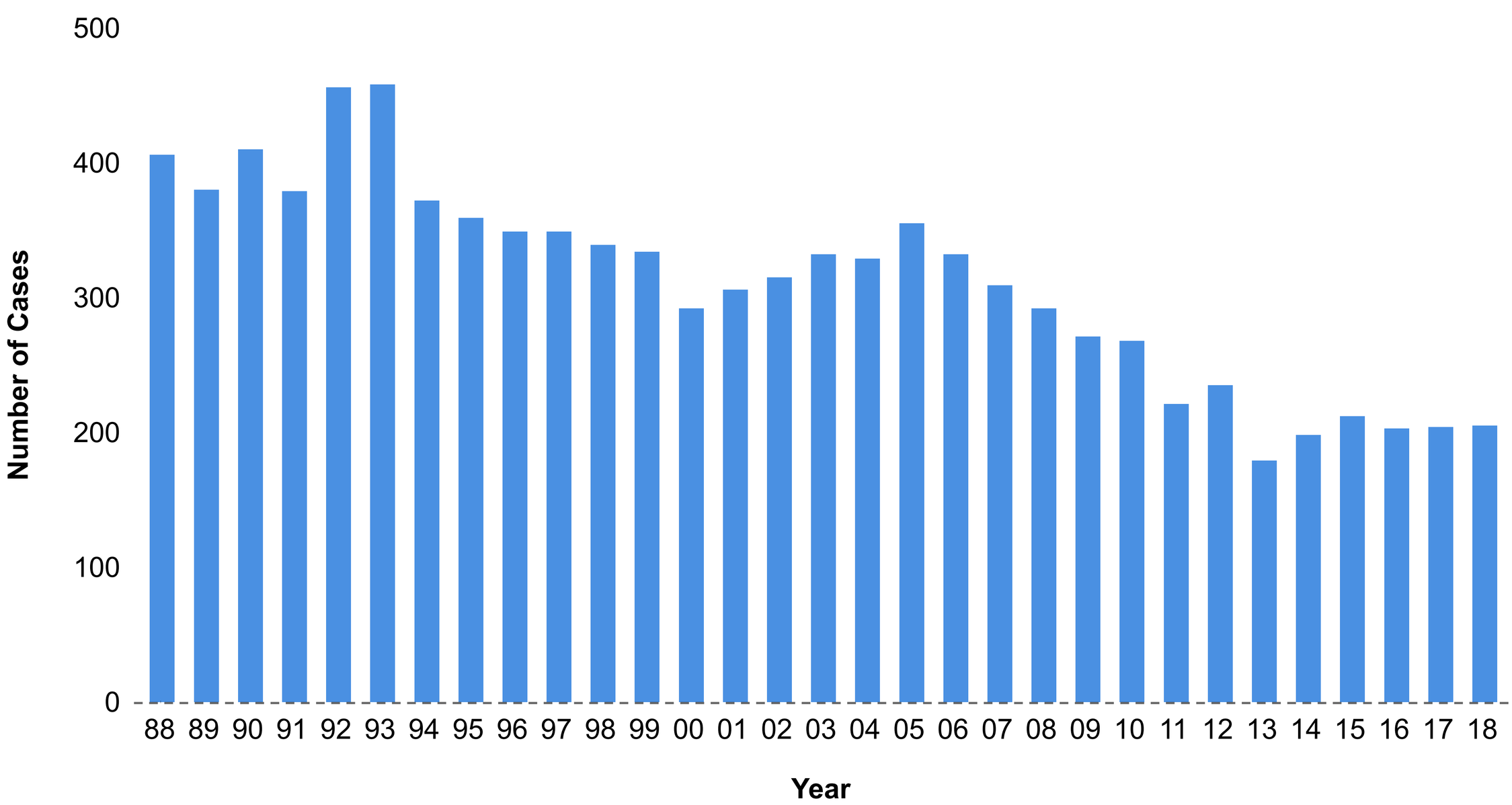
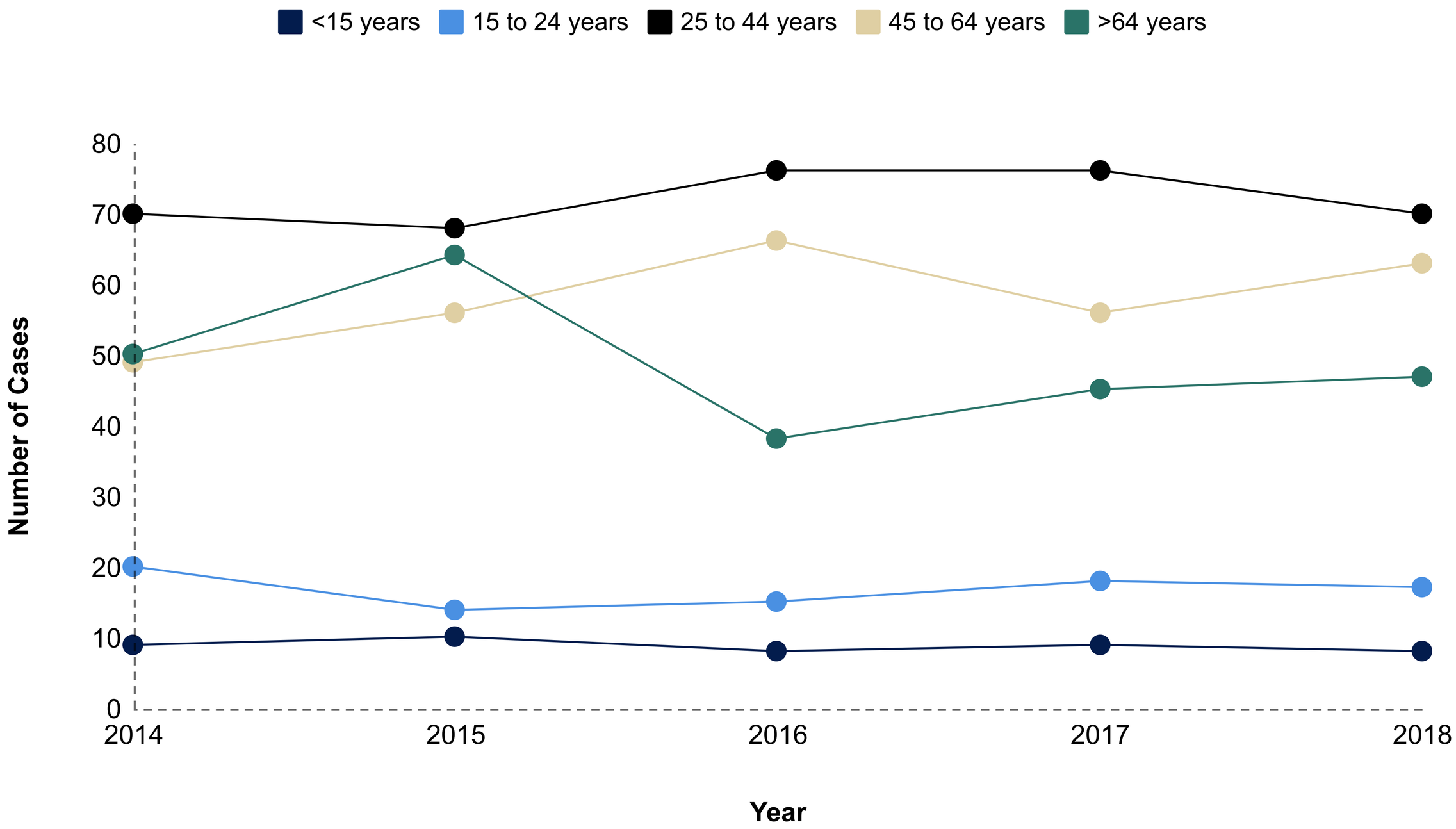


Figure 2: Tuberculosis Cases, Virginia, 1988-2018



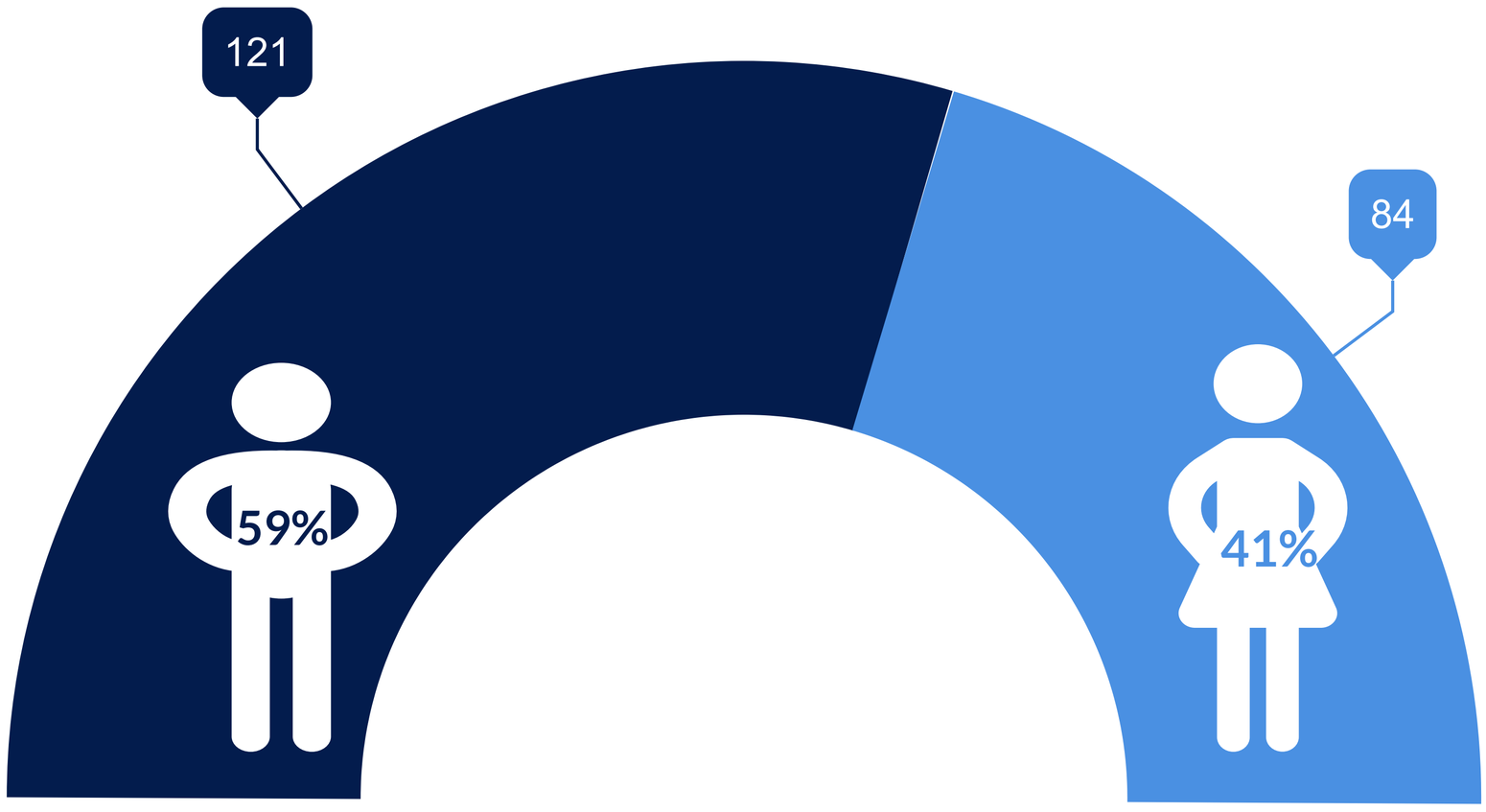
Age and Sex

Figure 3: Tuberculosis Cases by Age Group in Years, Virginia, 2014-2018



In 2018, Virginia's TB cases ranged in age from less than one to 96 years old. Consistent with previous years, the highest percentage of cases was identified in the 25-44 year age group representing 34.2% of 2018 cases. Seventy cases were identified in this age group, an 8.6% decrease from 2017. The highest rate of TB was identified in the 65 year and older group with a rate of 3.6 cases per 100,000 population. Ten children under the age of 18 were diagnosed with TB in Virginia in 2018. Eight of those children were younger than 15 and two were below the age of two. Young children have the potential for significant negative outcomes from TB. Young adults age 15-24 saw a 5.6% decrease in cases, although this represented a difference of only one case. There was a 12.5% increase in cases aged 45-64 from 56 cases in 2017 to 63 cases in 2018 and a 4.4% increase among the oldest age group of those patients 65 years and older. In 2018, 59% of Virginia's TB cases were male and 41% were female.

Figure 4: Tuberculosis Cases by Sex, Virginia, 2018



Birth in the United States

In 2018, 167 or 81% of Virginia's TB cases were reported among non-U.S.-born persons. Nativity information was not available for one 2018 case. In Virginia, TB rates among non-U.S.-born persons are significantly higher than among U.S.-born persons*. In 2018, the U.S.-born rate was 0.5 cases per 100,000 persons while the rate among the non-U.S.-born was 16.5 cases per 100, 000 persons**. In the U.S. as a whole, the rate among non–U.S.-born persons was greater than 14 times that in U.S.-born persons in 2018.

In 2018, TB cases identified in Virginia represented people born in 39 countries other than the United States and reflects the diversity of Virginia's population. Although no single country of origin surpasses the United States among Virginia's cases, Ethiopia, Vietnam, India and the Philippines represented countries of origin with the most cases in 2018. One or more cases over the past five years has represented 76 countries of origin including the United States.

Figure 5: Non-U.S.-born and U.S.-born* Tuberculosis Cases, Virginia, 2014-2018

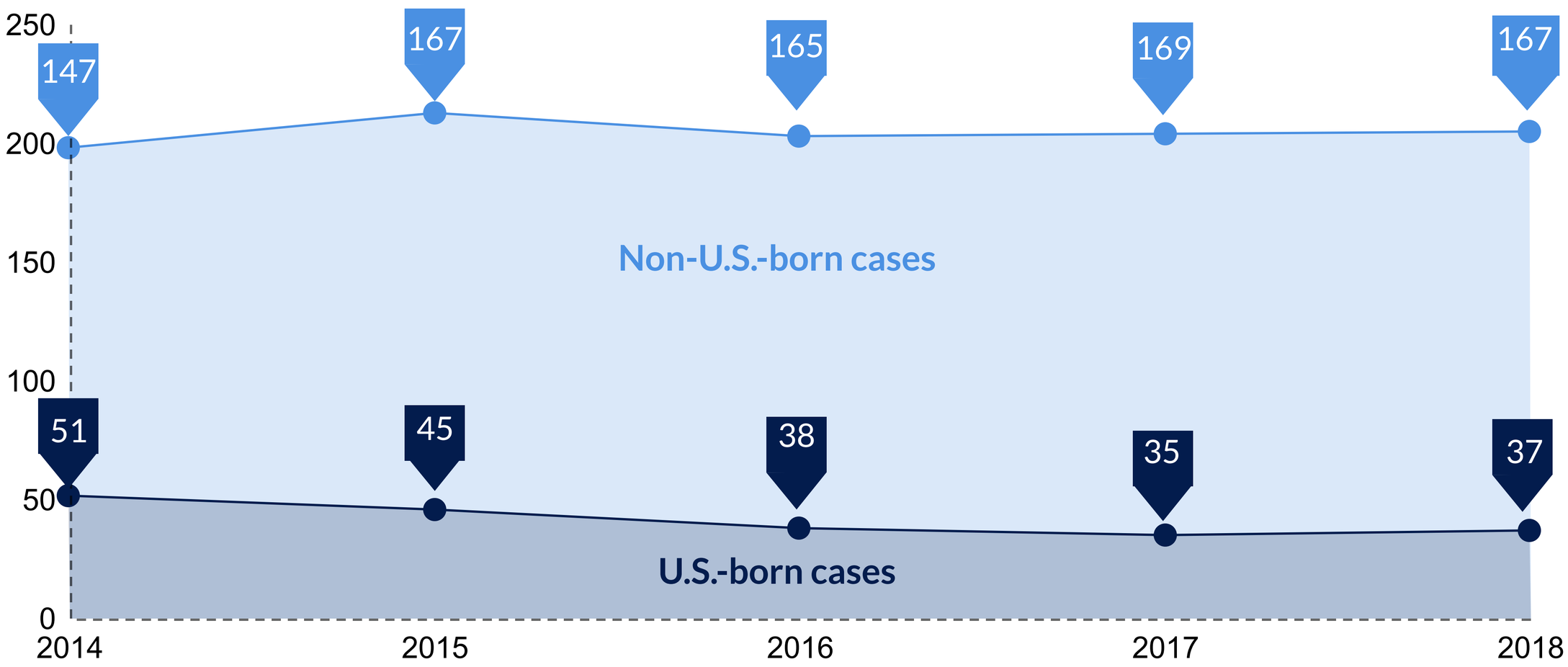
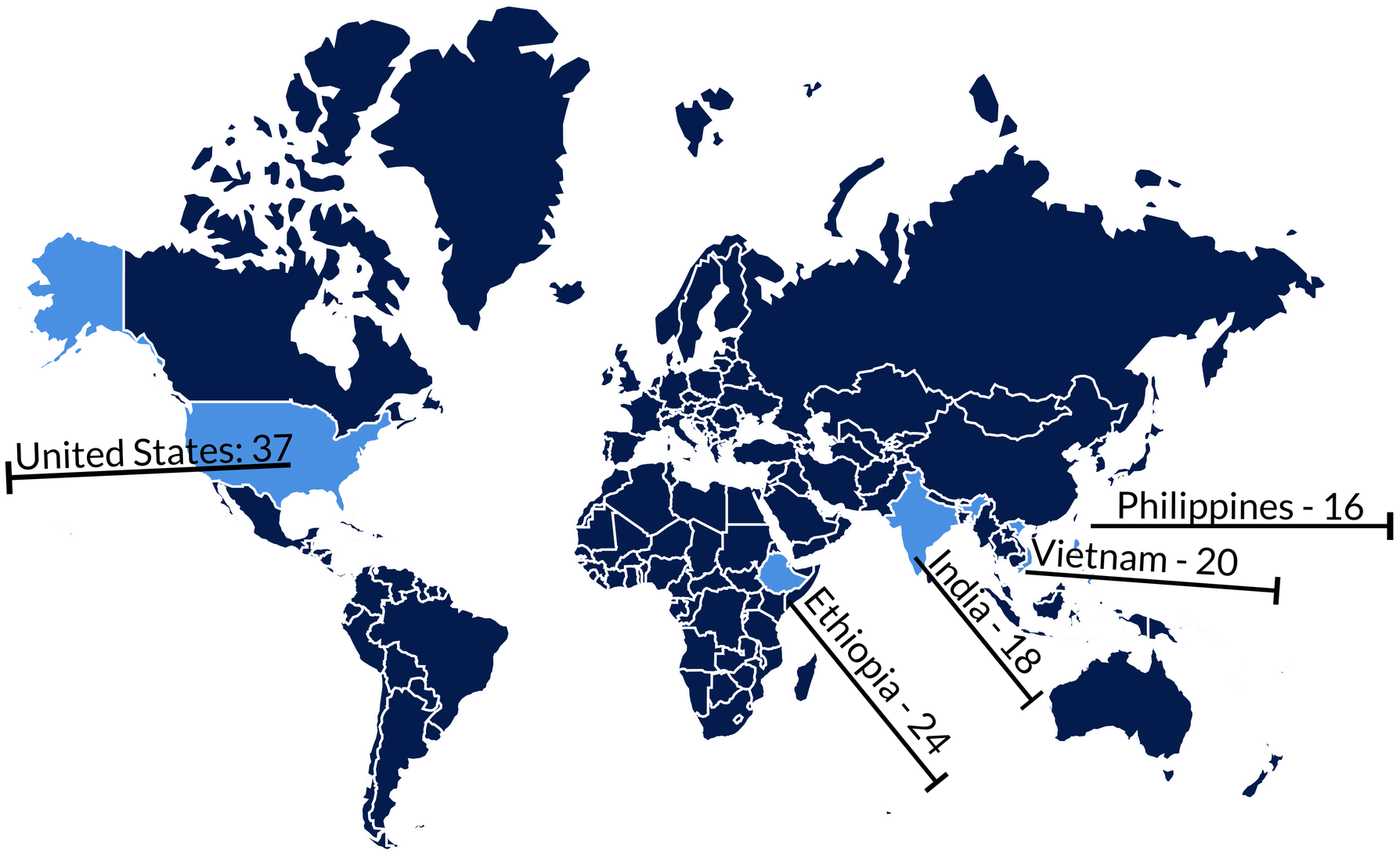


Figure 6: Top Five Countries of Birth of Tuberculosis Cases, Virginia, 2018



Time in the U.S.

9

Median number of years in the U.S. at time of diagnosis among non-U.S.-born patients

Origin

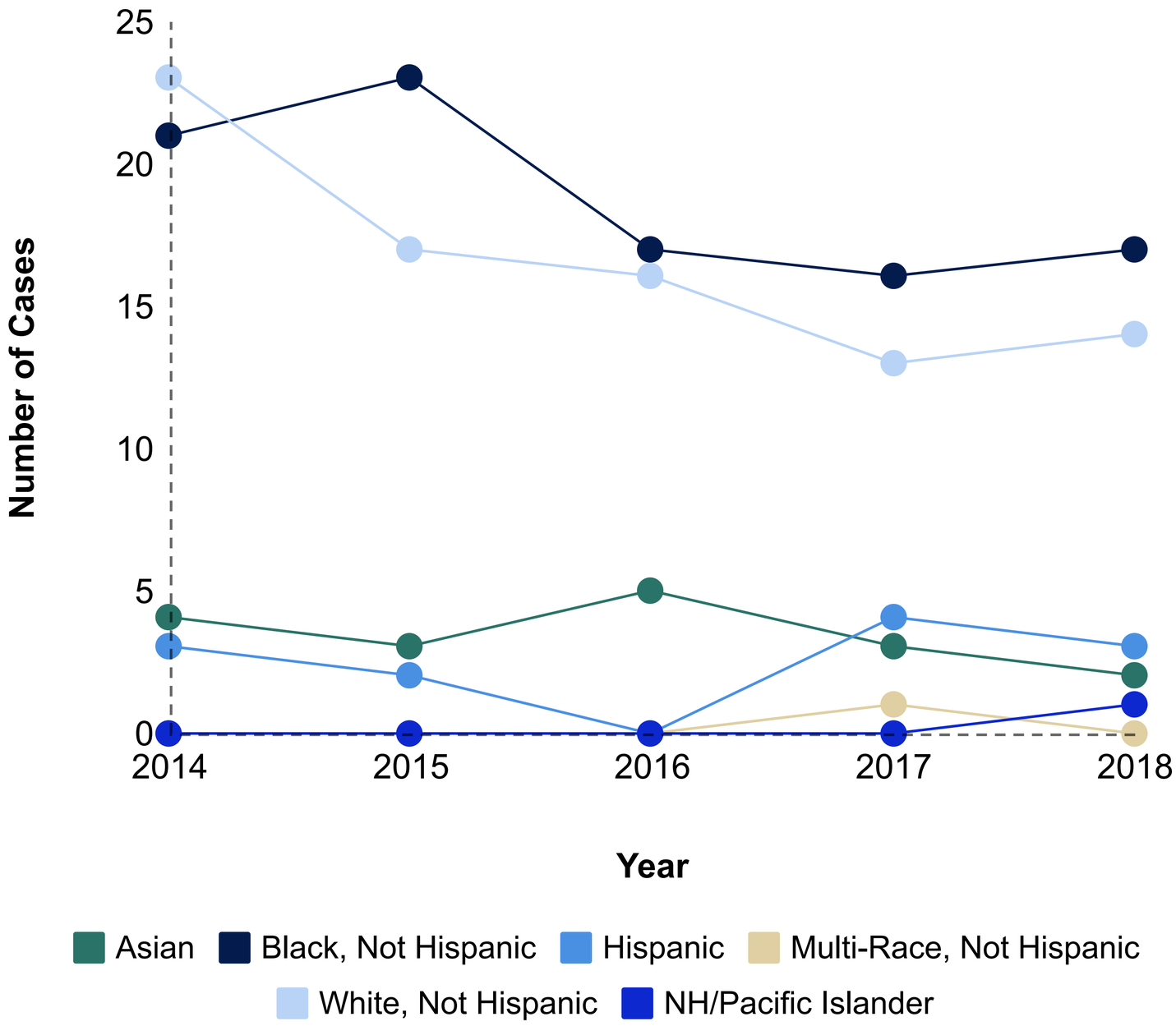
81%

Proportion of non-U.S.-born TB cases in 2018

*U.S.-born is defined as someone born in 1 of the 50 states or the District of Columbia or someone born outside of the U.S. to at least one parent who was a U.S. citizen.
**U.S. Census Bureau, 2013-2017 American Community Survey 5-Year Estimates

Race and Ethnicity

Figure 7: Race and Ethnicity of U.S.-born TB cases, Virginia, 2014-2018



2018

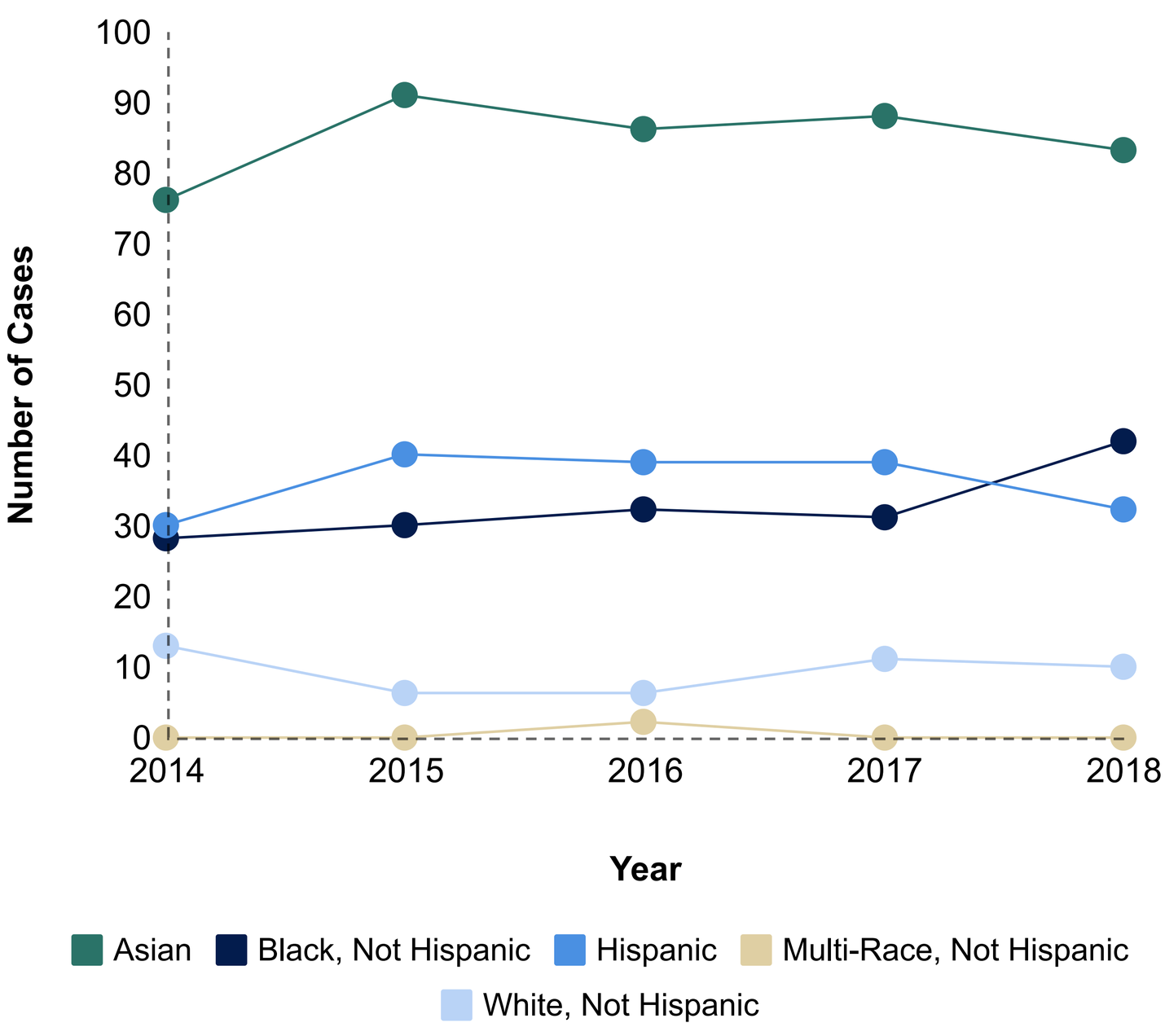
46% Proportion of U.S.-born TB cases in Virginia among non-Hispanic Blacks

38% Proportion of U.S.-born TB cases in Virginia among non-Hispanic Whites

8% Proportion of U.S.-born TB cases in Virginia among Hispanics

5% Proportion of U.S.-born TB cases in Virginia among Asians

Figure 8: Race and Ethnicity of Non-U.S.-born TB cases, Virginia, 2014-2018



2018

50% Proportion of non-U.S.-born TB cases in Virginia among Asians

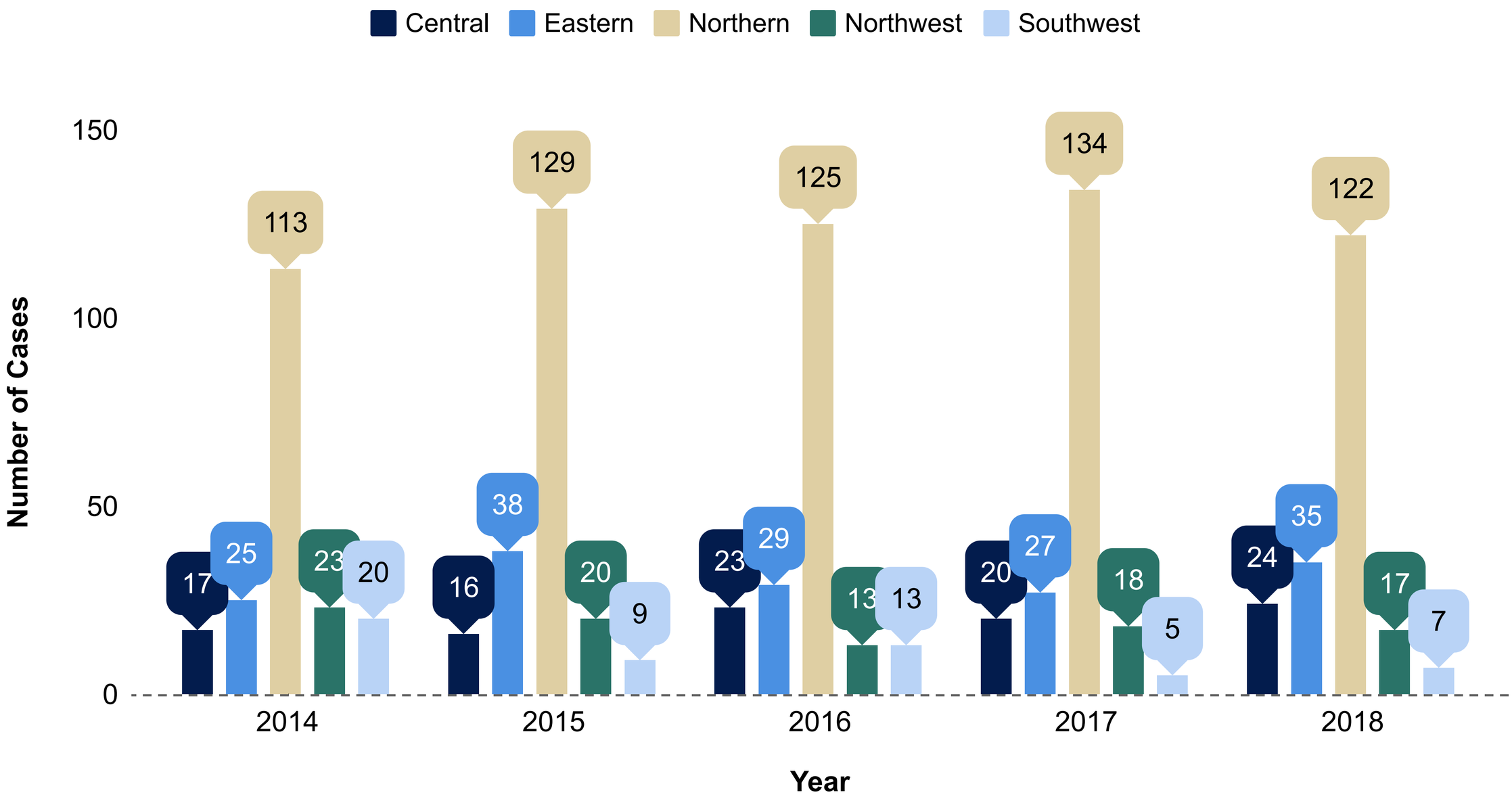
25% Proportion of non-U.S.-born TB cases in Virginia among non-Hispanic Blacks

19% Proportion of non-U.S.-born TB cases in Virginia among Hispanics

6% Proportion of non-U.S.-born TB cases in Virginia among non-Hispanic Whites

TB in Virginia Regions

Figure 9: Tuberculosis Cases by Region, Virginia, 2014-2018



In 2018, the Central, Eastern and Southwest regions saw increases in cases while the Northern and Northwest regions saw decreases. Even with a nine percent decrease in cases in the Northern region, this region still reported 59.5% (122) of Virginia's TB cases in 2018. This region has accounted for a minimum of 57% of the state's cases over the past five years. A single district within the Northern region accounted for one third of the state's total cases in 2018. The Eastern region reported 35 cases in 2018, 17% of the state's cases. This was a 30% increase from the Eastern region's 27 cases reported in 2017. The Central region reported a 20% increase in cases since 2017 from 20 to 24 cases. These 24 cases represent 12% of the state's total 2018 cases. The Northwest region saw a decrease from 18 cases in 2017 to 17 cases in 2018. This region accounted for eight percent of Virginia's 2018 cases. Although few cases are seen in the Southwest region of the state, this region reported an increase from five cases in 2017 to seven cases in 2018. This region represented 3% of Virginia's 2018 cases.

The Northern region has reported TB rates higher than the state and national average over the past five years. All other regions have been below the state and national average during this time period.

Figure 10: Tuberculosis Case Rates by Region, Virginia, 2014-2018

Selected Risk Factors

Several risk factors are associated with TB exposure and risk of progression to disease including occupational risk, congregate living, co-infection with HIV, homelessness, substance use and diabetes. Diabetes is consistently the most frequently observed risk factor among TB cases in Virginia. In 2018, 35 cases (17%) with diabetes were reported. Virginia tests TB cases for diabetes as a standard of care. In 2018, eight healthcare workers were reported with TB, one long-term care resident, one person in prison/jail, and one person who was currently or had in the past year experienced homelessness. Excessive consumption of alcohol was reported among nine cases, with one case reporting the use of injection drugs and six cases reporting the use of non-injection drugs.

Figure 11: Selected Risk Factors of Tuberculosis Cases, Virginia, 2014-2018

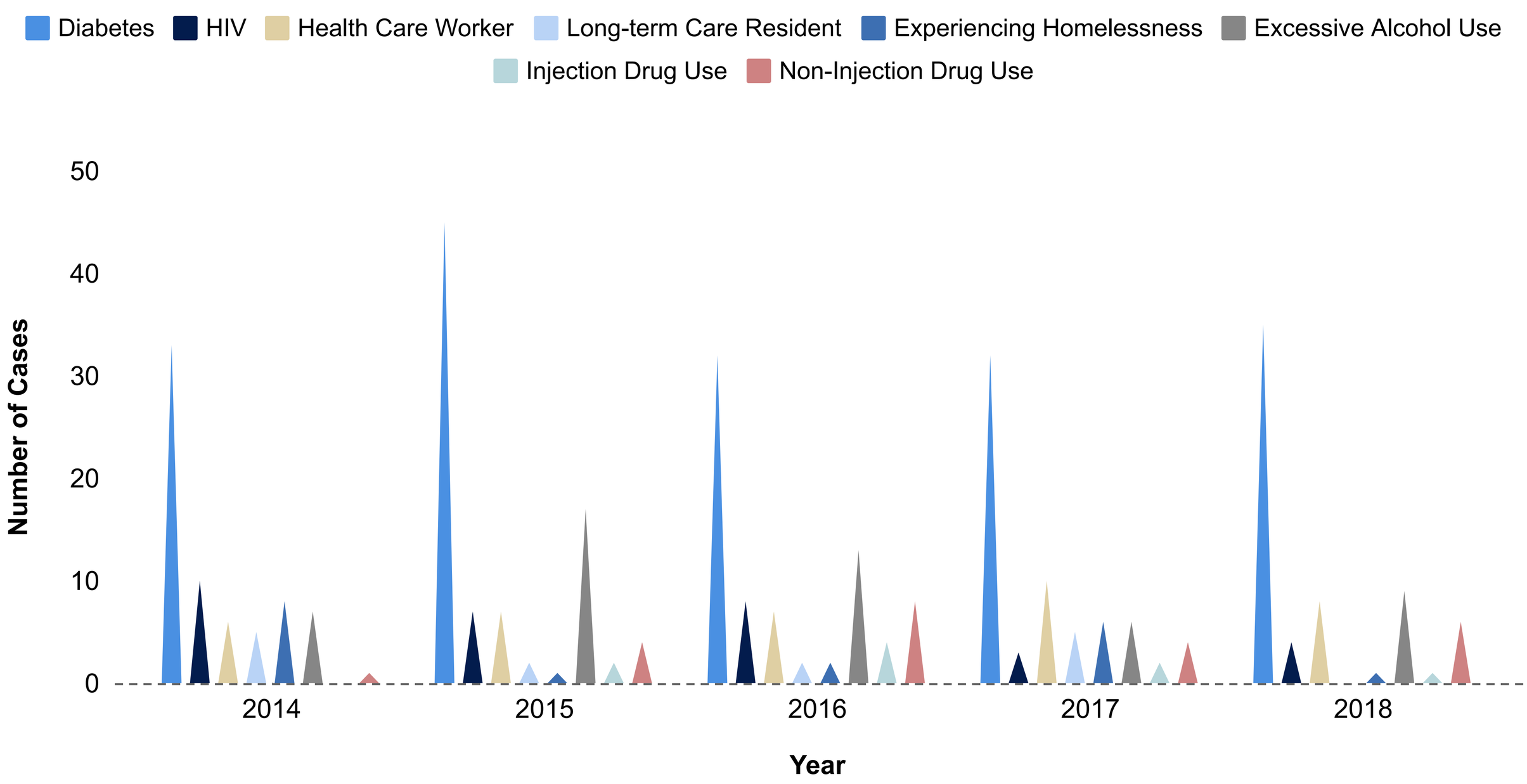


Table 1: Selected Risk Factors of Tuberculosis Cases, Virginia, 2014-2018

	2013		2014		2015		2016		2017		2018	
Total Cases	**179**		**198**		**212**		**203**		**204**		**205**	
	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%
Occupation												
Health Care	6	3.4	6	3.0	7	3.3	7	3.4	10	4.9	8	3.9
Migrant	0	0.0	1	0.5	0	0.0	0	0.0	0	0.0	1	0.5
Corrections	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0
Type of Residence												
Long Term Care	4	2.2	5	2.5	2	0.9	2	1.0	5	2.5	0	0.0
Prison/Jail	0	0.0	0	0.0	1	0.5	2	1.0	2	1.0	1	0.5
Homeless	10	5.6	8	4.0	1	0.5	2	1.0	6	2.9	1	0.5
Co-Morbidity												
Diabetes	26	14.5	33	16.7	45	21.2	32	15.8	33	16.2	35	17.1
HIV	10	5.6	10	5.1	7	3.3	8	3.9	4	2.0	3	1.5
Substance Use												
Alcohol	14	7.8	7	3.5	17	8.0	13	6.4	9	4.4	6	2.9
IDU	2	1.1	0	0.0	2	0.9	4	2.0	1	0.5	2	1.0
Non-IDU	7	3.9	1	0.5	4	1.9	8	3.9	6	2.9	4	2.0

2%

Proportion of 2018 TB cases with HIV co-infection

17%

Proportion of 2018 TB cases with diabetes

Clinical Characteristics

Figure 12: Tuberculosis by Disease Site, Virginia, 2018

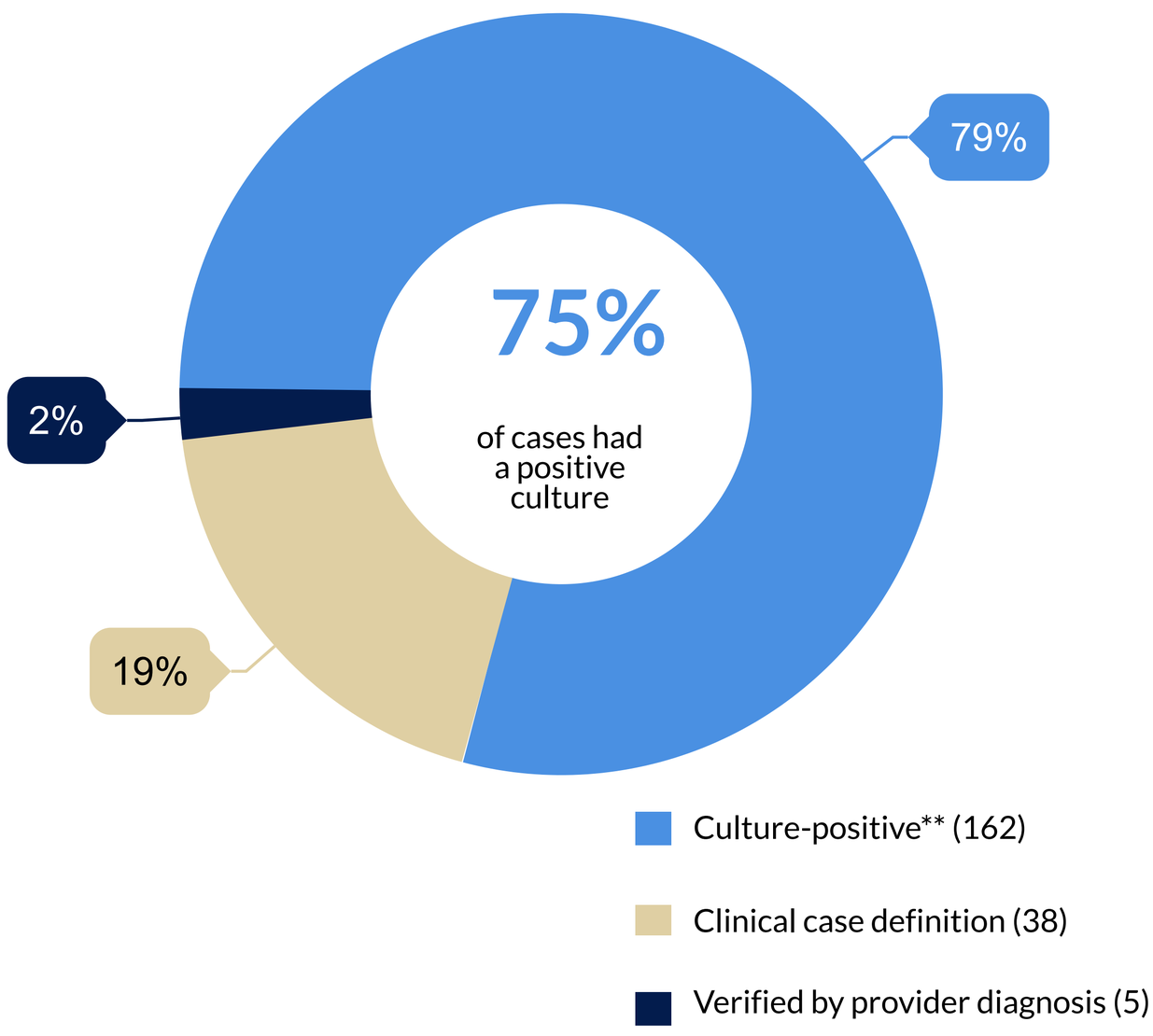
55 | Number of cases with an extrapulmonary site of disease

31 | Number of cases with a pulmonary and an extrapulmonary site of disease

119 | Number of cases with only a pulmonary site of disease

73% | Proportion of TB cases with a pulmonary site of disease

Figure 13: Tuberculosis Cases by Confirmation Method, Virginia, 2018



78% | Proportion of TB cases evaluated primarily for TB symptoms

11% | Proportion of TB cases evaluated primarily due to an abnormal chest radiograph

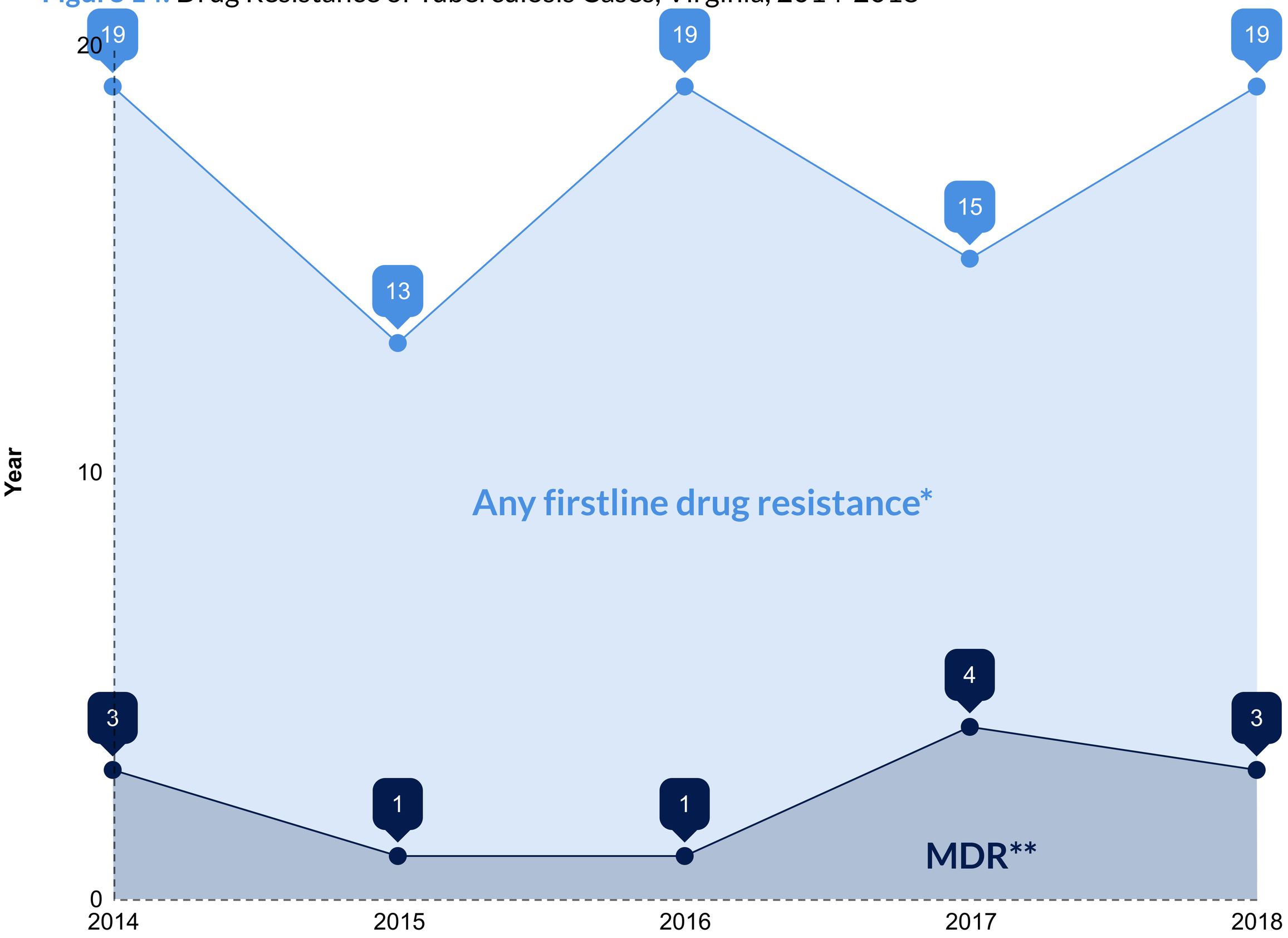
1.5% | Proportion of TB cases evaluated primarily due to a TB contact investigtaion

*Refer to Appendix I for surveillance case definitions.
**Culture-positive cases include those with a positive nucleic acid amplification test when a standard culture was not available (2 in 2018).

Drug Resistance

Drug resistance poses challenges to TB prevention and care efforts. Treatment for drug-resistant TB is expensive, takes longer, has the potential for life-threatening side effects, and can significantly disrupt a patient's life. In 2018, drug-susceptibility tests were performed on all culture positive specimens (160). Sixteen patients showed resistance to one of the four first-line TB drugs. Three additional patients diagnosed in Virginia in 2018 had multidrug-resistant (MDR)TB, defined as a TB strain resistant to the two most effective drugs in the TB treatment regimen: isoniazid and rifampin. No patients in Virginia had extensively drug-resistant (XDR) TB. XDR TB is defined as resistance to isoniazid and rifampin as well as resistance to a second-line injectable drug and a fluoroquinolone. The CDC estimates that the cost of treatment for MDR TB, including productivity loss during treatment, drugs, diagnostics, case management, social work, housing, transportation and hospitalization is more than six times that of drug-susceptible TB. MDR TB can take 20-26 months to complete treatment compared to the six to nine months for drug-susceptible TB.

Figure 14: Drug Resistance of Tuberculosis Cases, Virginia, 2014-2018

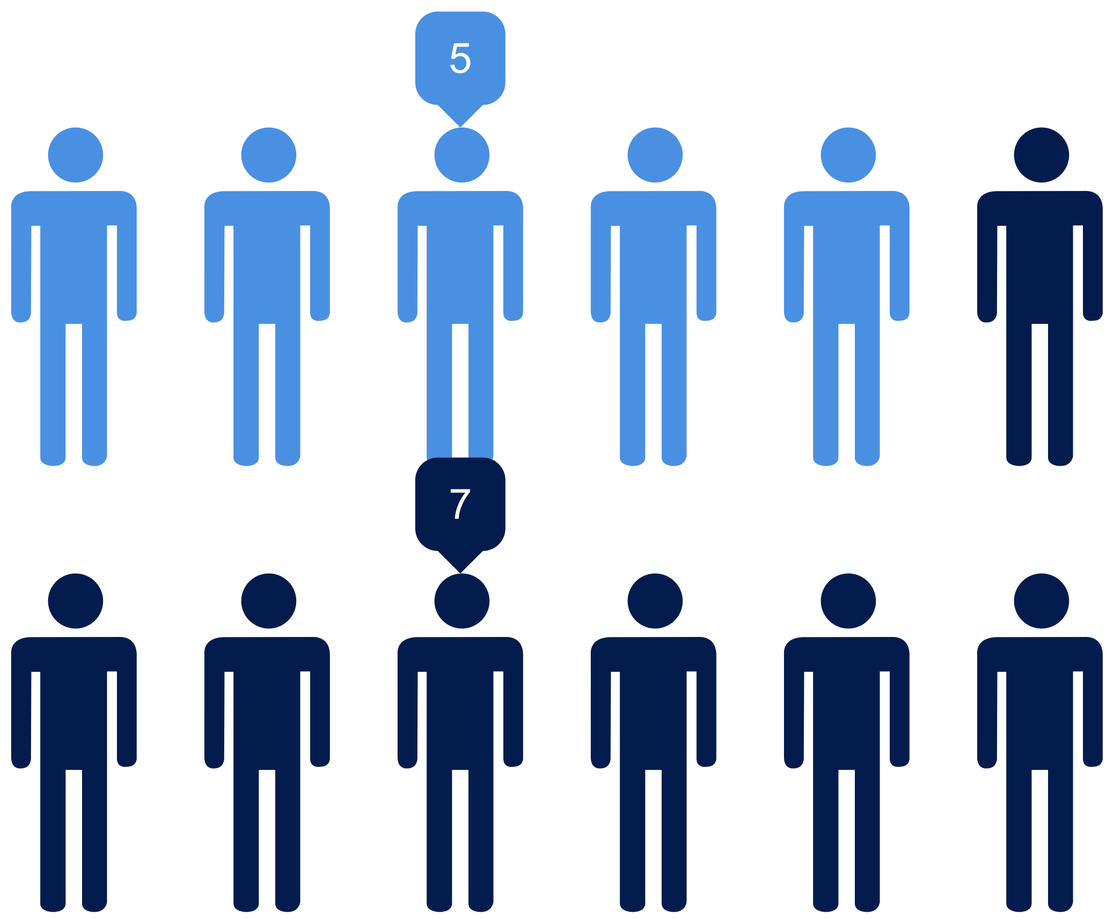


*Firstline drug resistance is defined as resistance to any of the primary TB drugs: rifampin, isoniazid, pyrazidamine and ethambutol

**MDR TB is defined as resistance to at least isoniazid and rifampin

Mortality and Treatment Completion

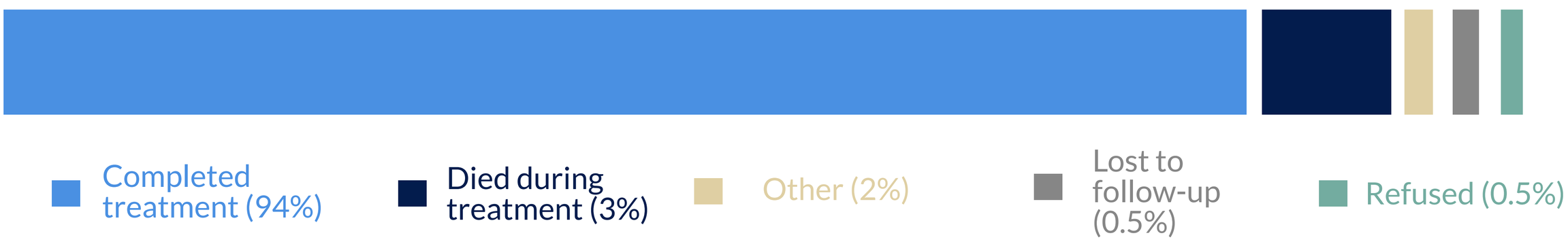
Figure 15: Mortality Among Tuberculosis Cases, Virginia, 2017*



6% | Proportion of all 2017* Virginia TB cases who died

In 2017, the most recent year for which complete data is available, 12 Virginia TB cases passed away. Five cases were deceased at the time of diagnosis and seven cases died during TB treatment. The majority of Virginia's 2017 TB cases, 94%, completed TB treatment. Treatment completion requires diligence and collaboration between the TB patient, the local health department staff and the patient's provider.

Figure 16: Treatment outcomes for tuberculosis (TB) cases counted in 2017, Virginia (n=204)**

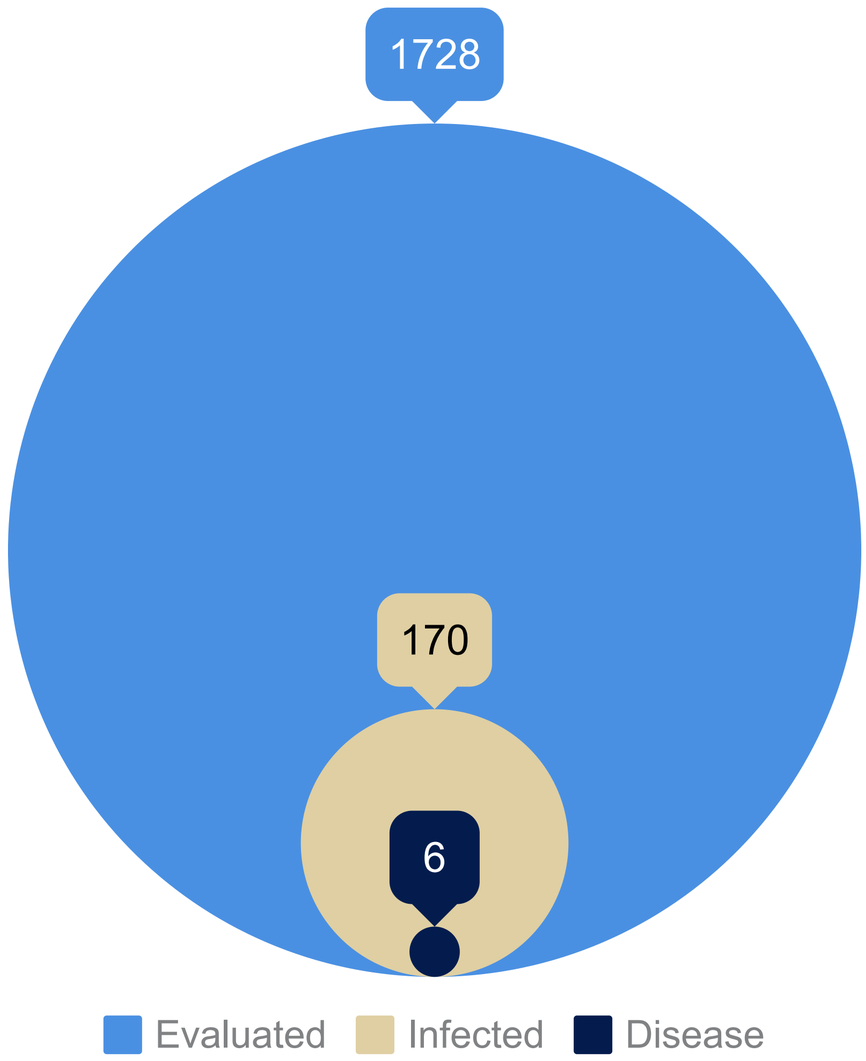


*2017 is the most recent year with complete data available for treatment completion and mortality
** Two 2017 cases are still being treated as of July 2019

Contact Investigations

In 2017, the most recent year for which completed contact investigation data is available, 1,950 contacts to TB cases were identified. Of these contacts, 1,728 were completely evaluated. These evaluations uncovered 6 cases of TB disease and 170 infections with latent tuberculosis (LTBI). Of the 170 persons identified with LTBI, 97 people began treatment and 83 people completed treatment. Contact investigations were conducted in many different locations including household settings, businesses, places of worship, schools and factories. The evaluation of contacts of active TB cases is essential to halting further transmission of TB disease through early identification and treatment.

Figure 17: Contact Investigation Outcomes, Virginia, 2017



10% Proportion of evaluated contacts for 2017 TB cases with LTBI

0.3% Proportion of evaluated contacts for 2017 TB cases with TB disease

Genotyping can also assist with contact investigations, confirming connections between cases. Genotyping also provides additional information when laboratory contamination is suspected or when a person is experiencing a second episode of TB, which may be recurrence or a new infection. Genotype results identify whether TB strains are genetically related. The Virginia Department of Health requires that an isolate be forwarded for all culture-positive TB patients to the Division of Consolidated Laboratory Services for genetic testing coordinated by the CDC. In 2017, 99.4% of Virginia's culture-positive TB cases had an isolate submitted for genotyping.

99.4% Proportion of culture-positive TB cases with an isolate submitted for genotyping for 2018 cases

Appendix I - Tuberculosis 2009 Case Definition

Clinical Description

A chronic bacterial infection caused by *Mycobacterium tuberculosis*, usually characterized pathologically by the formation of granulomas. The most common site of infection is the lung, but other organs may be involved.

Clinical Criteria

A case that meets all the following criteria:

-A positive tuberculin skin test or positive interferon gamma release assay for *M. tuberculosis*
-Other signs and symptoms compatible with tuberculosis (TB) (e.g., abnormal chest radiograph, abnormal chest computerized tomography scan or other chest imaging study, or clinical evidence of current disease)
-Treatment with two or more anti-TB medications
-A completed diagnostic evaluation

Laboratory Criteria for Diagnosis

Isolation of *M. tuberculosis* from a clinical specimen,* **OR** Demonstration of *M. tuberculosis* complex from a clinical specimen by nucleic acid amplification test,** **OR** Demonstration of acid-fast bacilli in a clinical specimen when a culture has not been or cannot be obtained or is falsely negative or contaminated.

Case Classification

Confirmed

A case that meets the clinical case definition or is laboratory confirmed

Comments

A case should not be counted twice within any consecutive 12-month period. However, a case occurring in a patient who had previously had verified TB disease should be reported and counted again if more than 12 months have elapsed since the patient completed therapy. A case should also be reported and counted again if the patient was lost to supervision for greater than 12 months and TB disease can be verified again.

Mycobacterial diseases other than those caused by *M. tuberculosis* complex should not be counted in tuberculosis morbidity statistics unless there is concurrent tuberculosis.

*Use of rapid identification techniques for *M. tuberculosis* (e.g., DNA probes and mycolic acid high-pressure liquid chromatography performed on a culture from a clinical specimen) are acceptable under this criterion.

** Nucleic acid amplification (NAA) tests must be accompanied by culture for mycobacteria species for clinical purposes. A culture isolate of *M. tuberculosis* complex is required for complete drug susceptibility testing and also genotyping. However, for surveillance purposes, CDC will accept results obtained from NAA tests approved by the Food and Drug Administration (FDA) and used according to the approved product labeling on the package insert, or a test produced and validated in accordance with applicable FDA and Clinical Laboratory Improvement Amendments (CLIA) regulations.

Appendix II - Latent TB Infection 2018 Case Definition

Background

TB is a disease caused by a bacterium called *Mycobacterium tuberculosis* (MTB). The active form of tuberculosis (TB Disease) was once the leading cause of death in the United States (US). TB Disease is spread through the air from one person to another when the disease is located in the lungs. People nearby may breathe in these bacteria and become infected.

Not everyone infected with *M. tuberculosis* becomes sick. People who are not sick have what is commonly called Latent TB Infection (TB Infection). People with TB Infection do not feel sick, do not have any symptoms, and cannot spread TB to others. Nevertheless, some people with TB Infection go on to develop TB Disease in the course of their lifetimes. Likelihood of developing TB Disease is variable depending on a number of risk factors.

Clinical Criteria

Clinical criteria alone are not sufficient to classify a case of TB Infection. Clinical criteria to confirm a presumptive case of TB Infection are as follows:

No clinical evidence compatible with TB Disease including:

No signs or symptoms consistent with TB Disease

AND

- 1) Chest imaging without abnormalities consistent with TB (chest radiograph or CT scan)

OR

- 2) Abnormal chest imaging that could be consistent with TB Disease with microbiologic testing that is negative for MTB complex **AND** where TB Disease has been clinically ruled out

Laboratory Criteria for Diagnosis

Laboratory/diagnostic criteria alone are not sufficient to confirm a case of TB Infection.

Laboratory criteria to identify presumptive cases of TB Infection are as follows:

A positive tuberculin skin test (TST) [As defined by the CDC (see reference)]

OR

A positive interferon gamma release assay (IGRA)

Appendix III – Additional Data Tables

Table 2: Count and Rate per 100,000 of Tuberculosis Cases, Virginia and the United States, 2007-2018

	Virginia		United States	
	No.	Rate	No.	Rate
2007	309	4	13,281	4.4
2008	292	3.7	12,890	4.2
2009	271	3.4	11,517	3.8
2010	268	3.3	11,157	3.6
2011	221	2.7	10,509	3.4
2012	235	2.9	9,940	3.2
2013	179	2.2	9,561	3
2014	198	2.4	9,398	3
2015	212	2.5	9,547	3
2016	203	2.4	9,253	2.9
2017	204	2.4	9,094	2.8
2018	205	2.4	9,029	2.8

Table 3: Count and Rate per 100,000 of Tuberculosis Cases by Health Region, Virginia, 2014-2018

	2014			2015			2016			2017			2018		
	No.	Rate	%	No.	Rate	%	No.	Rate	%	No.	Rate	%	No.	Rate	%
Central	17	1.2	8.6	16	1.1	7.5	23	1.6	11.3	20	1.4	9.8	24	1.7	11.7
Eastern	25	1.3	12.6	38	2.0	17.9	29	1.6	14.3	27	1.4	13.2	35	1.9	17.1
Northern	113	4.7	57.1	129	5.3	60.8	125	5.1	61.6	134	5.4	65.7	122	4.9	59.5
Northwest	23	1.8	11.6	20	1.5	9.4	13	1.0	6.4	18	1.4	8.8	17	1.3	8.3
Southwest	20	1.5	10.1	9	0.7	4.2	13	1.0	6.4	5	0.4	2.5	7	0.5	3.4

Table 4: Tuberculosis Cases by Race/Ethnicity and Place of Birth, Virginia, 2014-2018

	2014		2015		2016		2017		2018	
	U.S.-Born	Non-U.S.-Born	U.S.-Born	Non-U.S.-Born	U.S.-Born	Non-U.S.-Born	U.S.-Born	Non-U.S.-Born	U.S.-Born	Non-U.S.-Born
Asian, non-Hispanic	4	76	3	91	5	86	3	88	2	83
American Indian/Alaskan Native, non-Hispanic	0	0	0	0	0	0	0	0	0	0
Black, non-Hispanic	21	28	23	30	17	32	16	31	17	42
Hispanic	3	30	2	40	0	39	4	39	3	32
Multi-Race, non-Hispanic	0	0	0	0	0	2	1	0	0	0
Native Hawaiian/Pacific Islander	0	0	0	0	0	0	0	0	1	0
White, non-Hispanic	23	13	17	6	16	6	11	11	14	10

Appendix IV- Technical Notes

Rates for 2007-2010 were calculated using 2000 Census data released by the United States Bureau of the Census, Population Estimates Program: Annual Estimates of the Population for Counties of Virginia: April 1, 2000 to July 1, 2010. For 2011-2018, rates were calculated using estimates compiled by the Weldon Cooper Center for Public Service: https://demographics.coopercenter.org/virginia-population-estimates

If you have additional data requests for the Virginia Department of Health TB Program, please contact Laura Young at laura.r.young@vdh.virginia.gov.