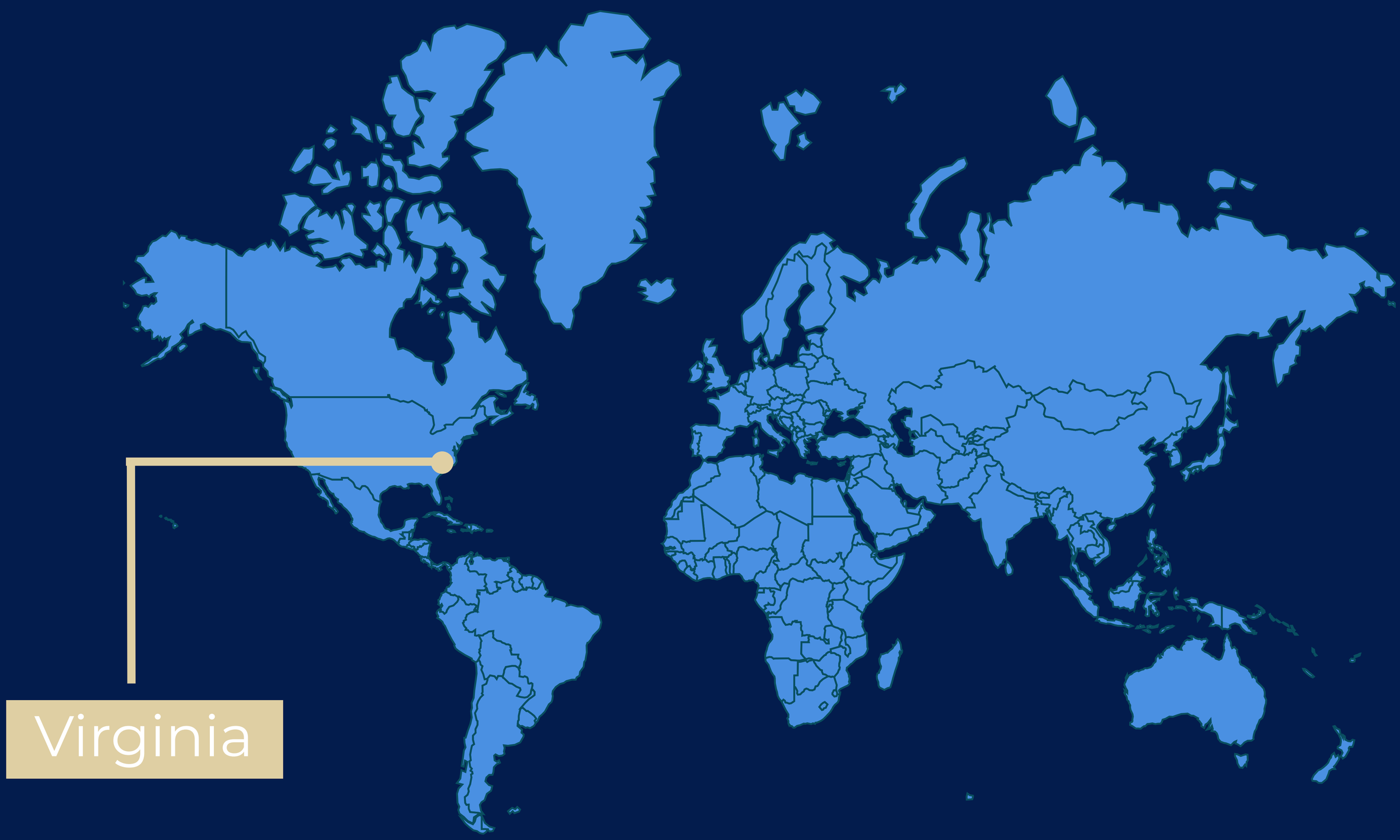
2019 Virginia

Tuberculosis

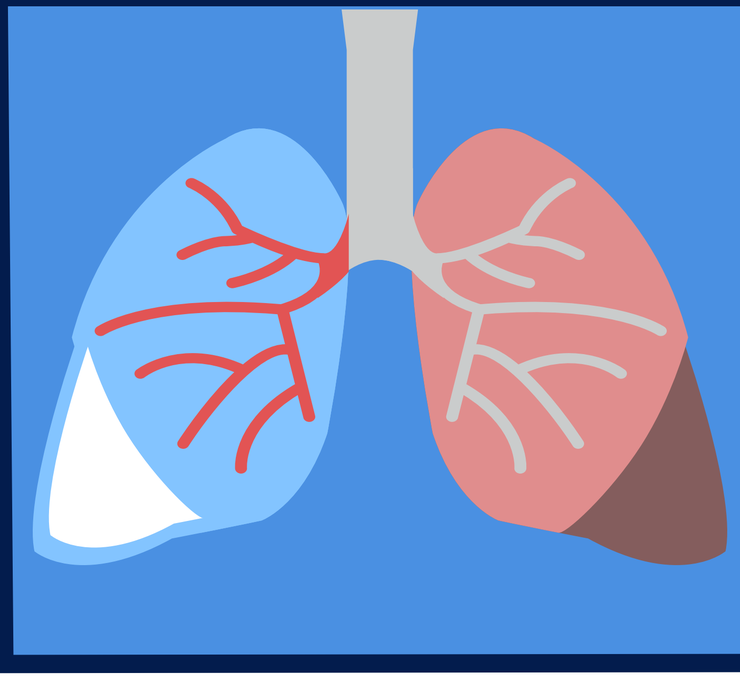
Surveillance Report



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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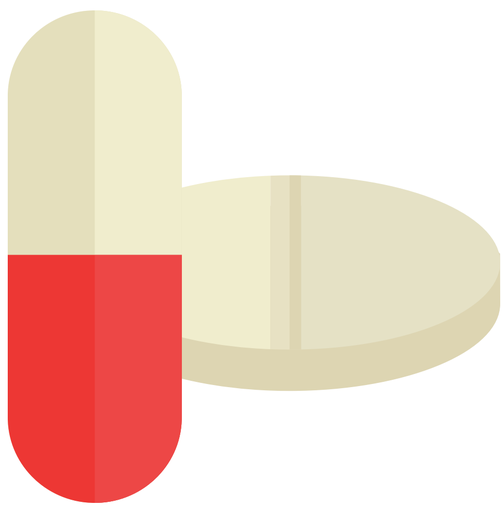

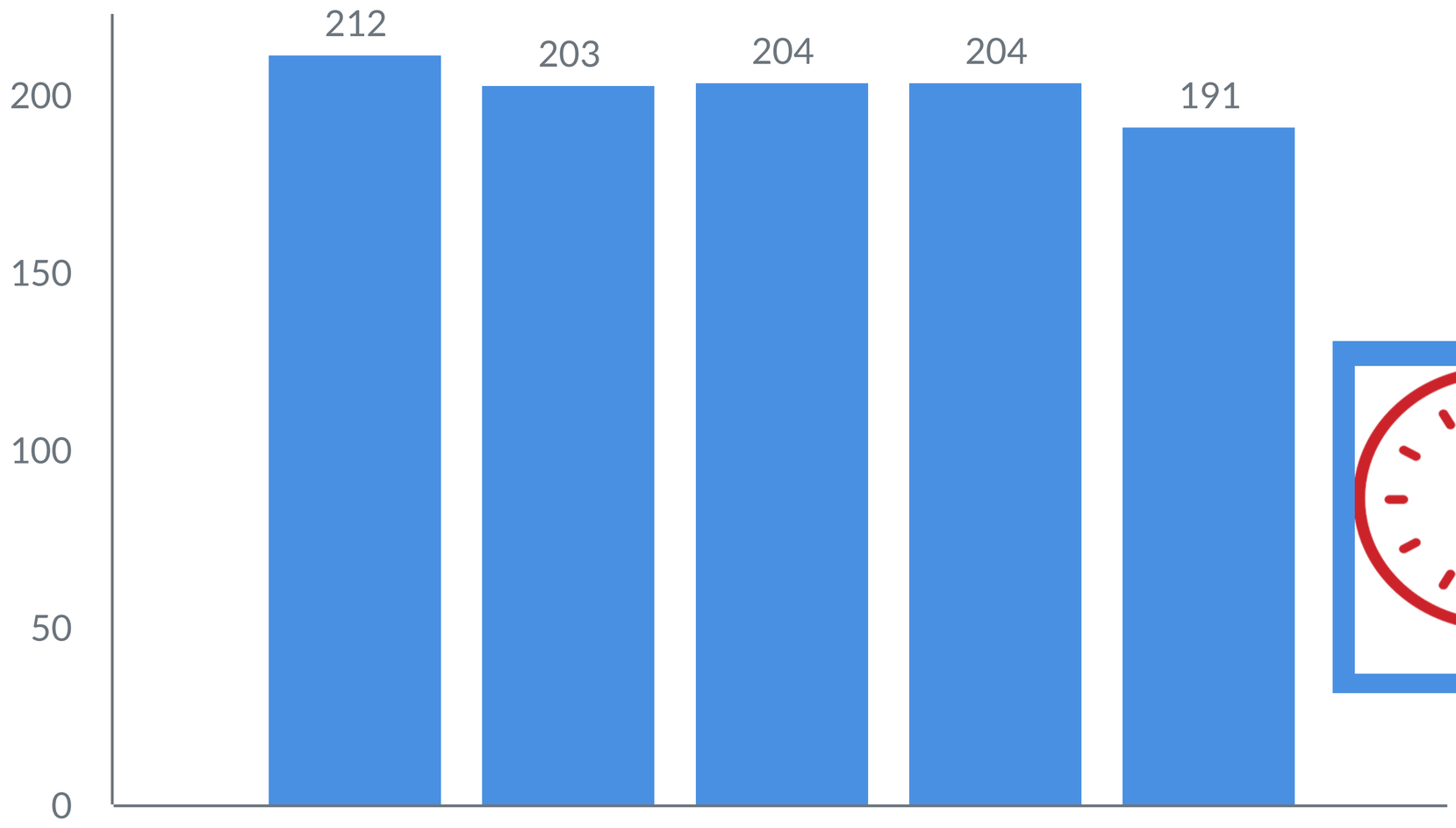

TB Cases in Virginia, 2015-2019

For more information contact:

VDH VIRGINIA DEPARTMENT OF HEALTH

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

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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, Virginia could not move toward the goal of TB elimination.

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Tuberculosis (TB) Reporting Requirements

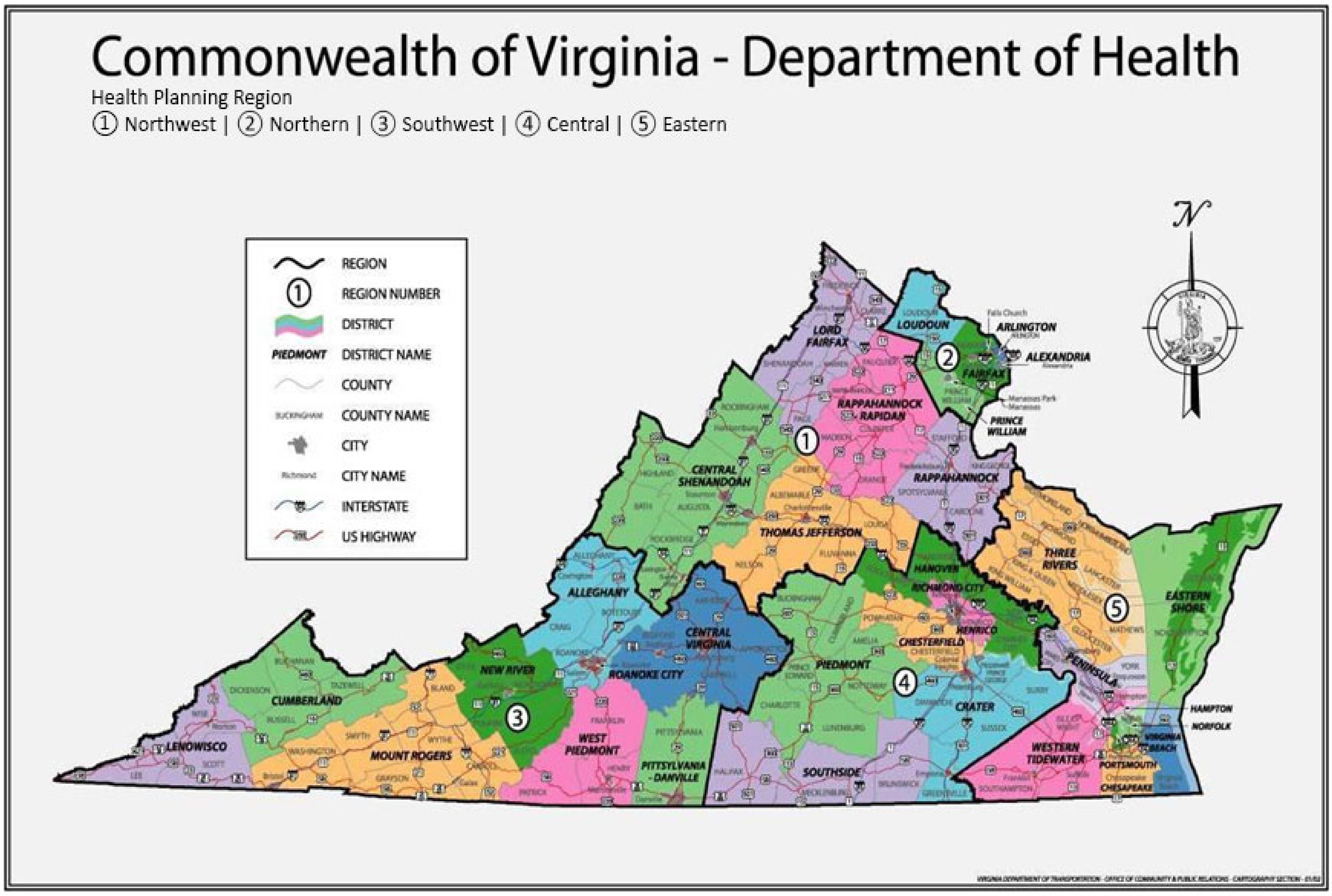
Healthcare providers and laboratories are required to report to the Virginia Department of Health:

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 presumed, reporting should never be delayed pending identification of *Mycobacterium tuberculosis* with a nucleic acid amplification (NAA) test or positive culture.



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

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

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

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

Tuberculosis in Virginia, 2019

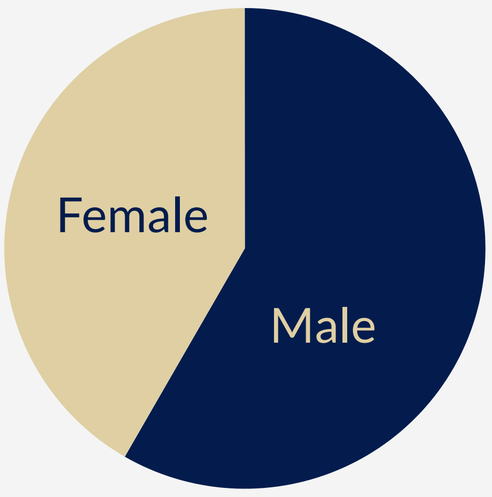
Overview

NUMBER OF VERIFIED CASES
191

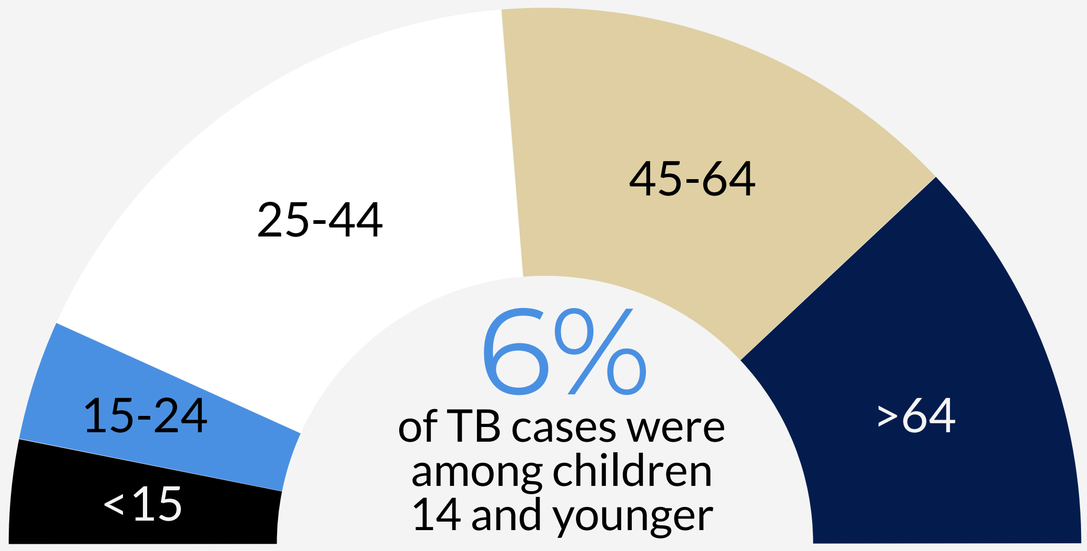
TB RATE PER 100,000 POPULATION
2.2

HEALTH DISTRICTS WITH TB CASES
26

Demographics



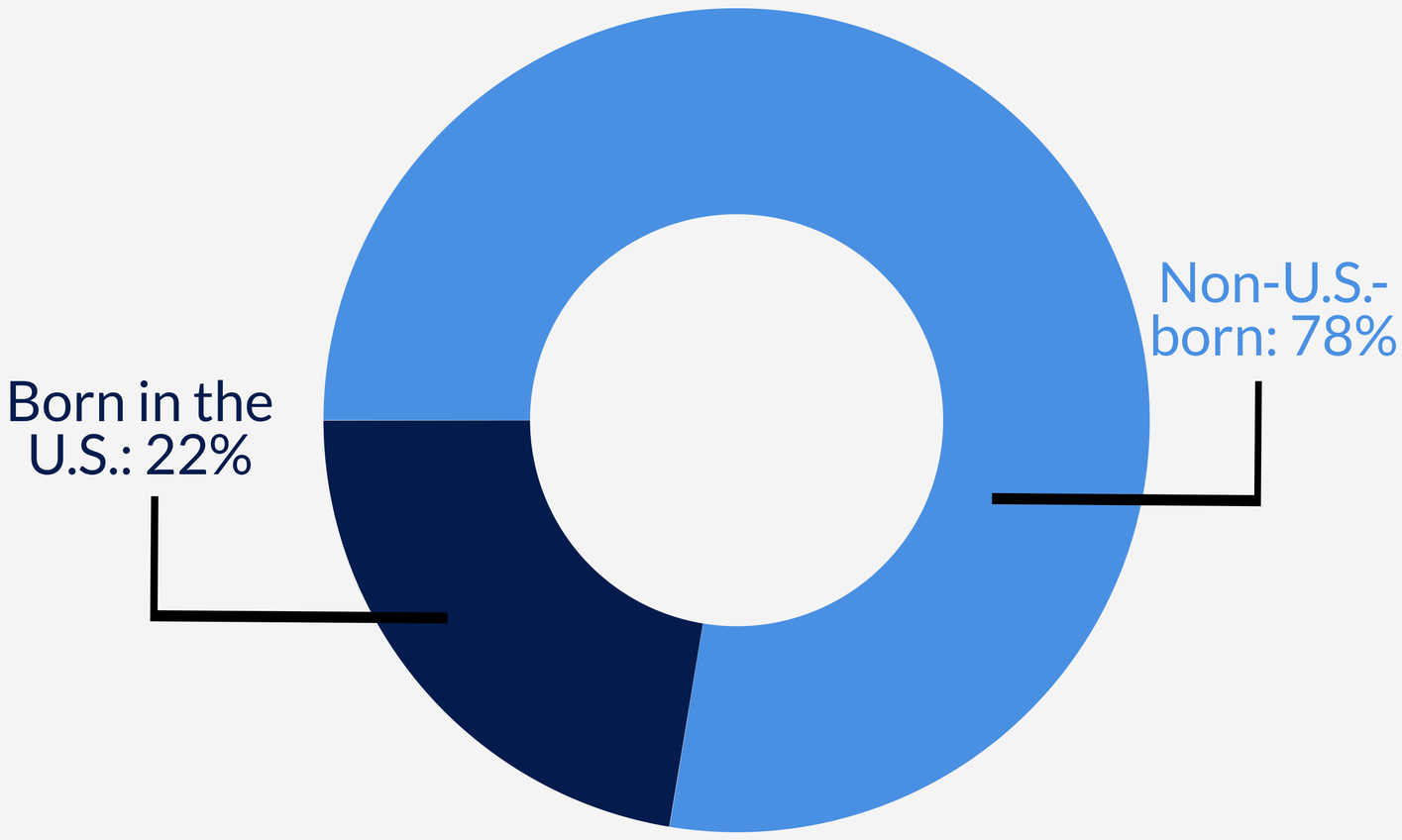
59%
of TB cases occurred among males

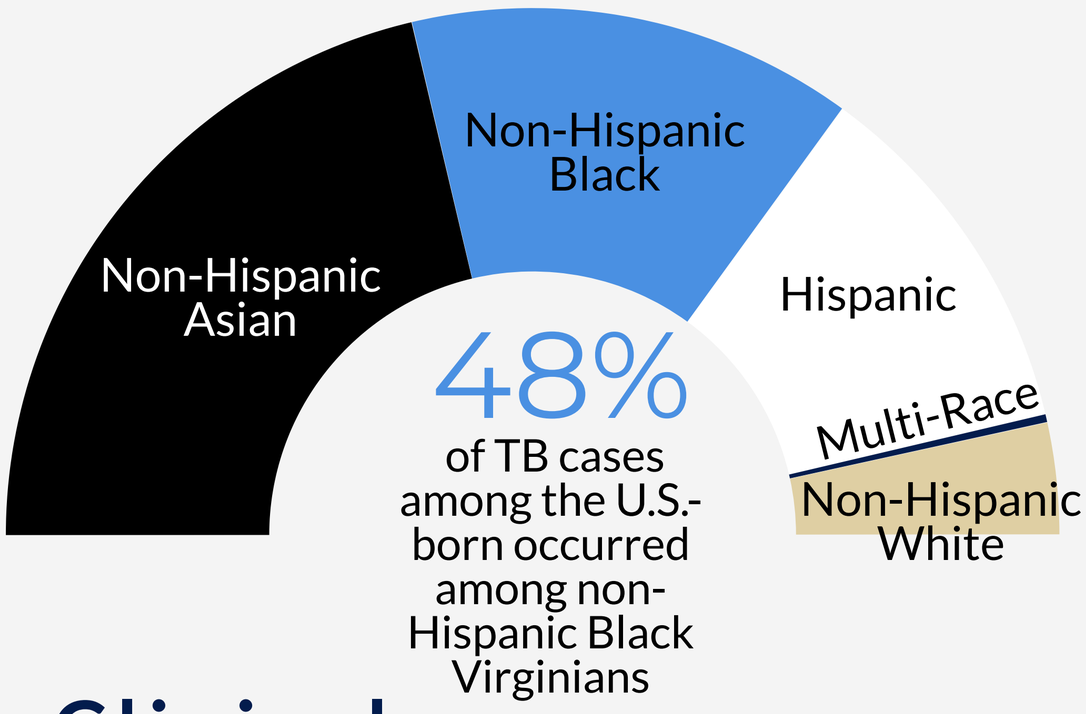


6%
of TB cases were among children 14 and younger

Country of Birth

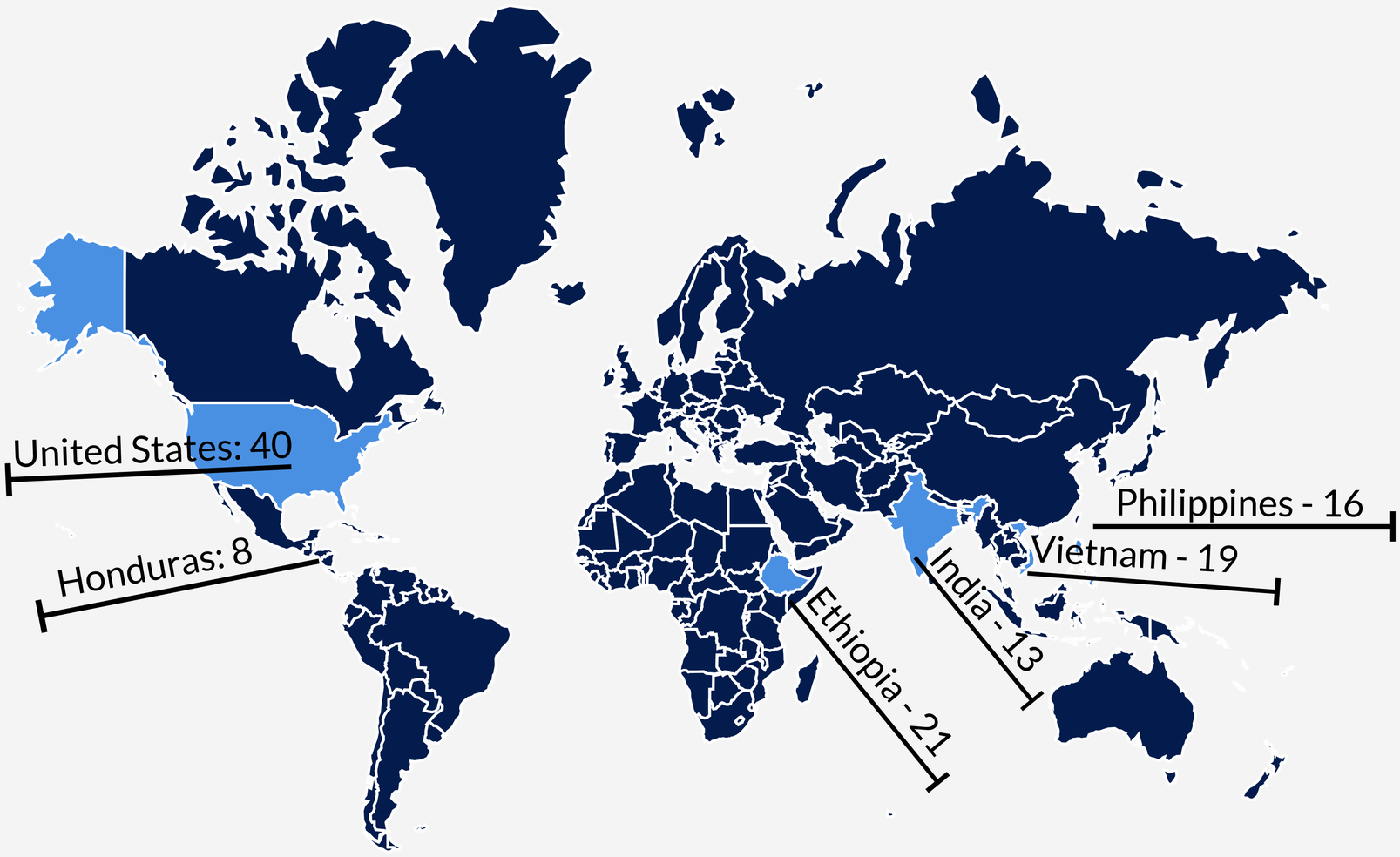
35 — Number of countries represented among TB cases





48%
of TB cases among the U.S.-born occurred among non-Hispanic Black Virginians

Most Common Countries of Birth Among Patients



Clinical Characteristics

2.6%	Proportion of TB cases with HIV co-infection
9.9%	Proportion of TB cases with resistance to any first line drug
18.3%	Proportion of TB cases with diabetes
75.4%	Proportion of TB cases with a pulmonary site of disease

Time in the U.S.

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

Profile of Tuberculosis Cases in Virginia

In 2019, Virginia reported 191 cases of tuberculosis (TB), a 6.4% decrease from the 204 cases reported in 2018. Nationally, the Centers for Disease Control and Prevention (CDC) reported 8,916 TB cases for 2019, a 1.2% decrease from 2018. Although TB incidence in the United States in 2019 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 2019, Virginia ranked 17th by number of cases and by rate, with a rate of 2.2 per 100,000 population. Virginia's TB case rate has consistently stayed below the national rate, and in 2019 dropped to equal the state's previously lowest rate of 2.2 per 100,000 population, last recorded in 2013.

Figure 1: Tuberculosis Rates, Virginia and the United States, 1989-2019

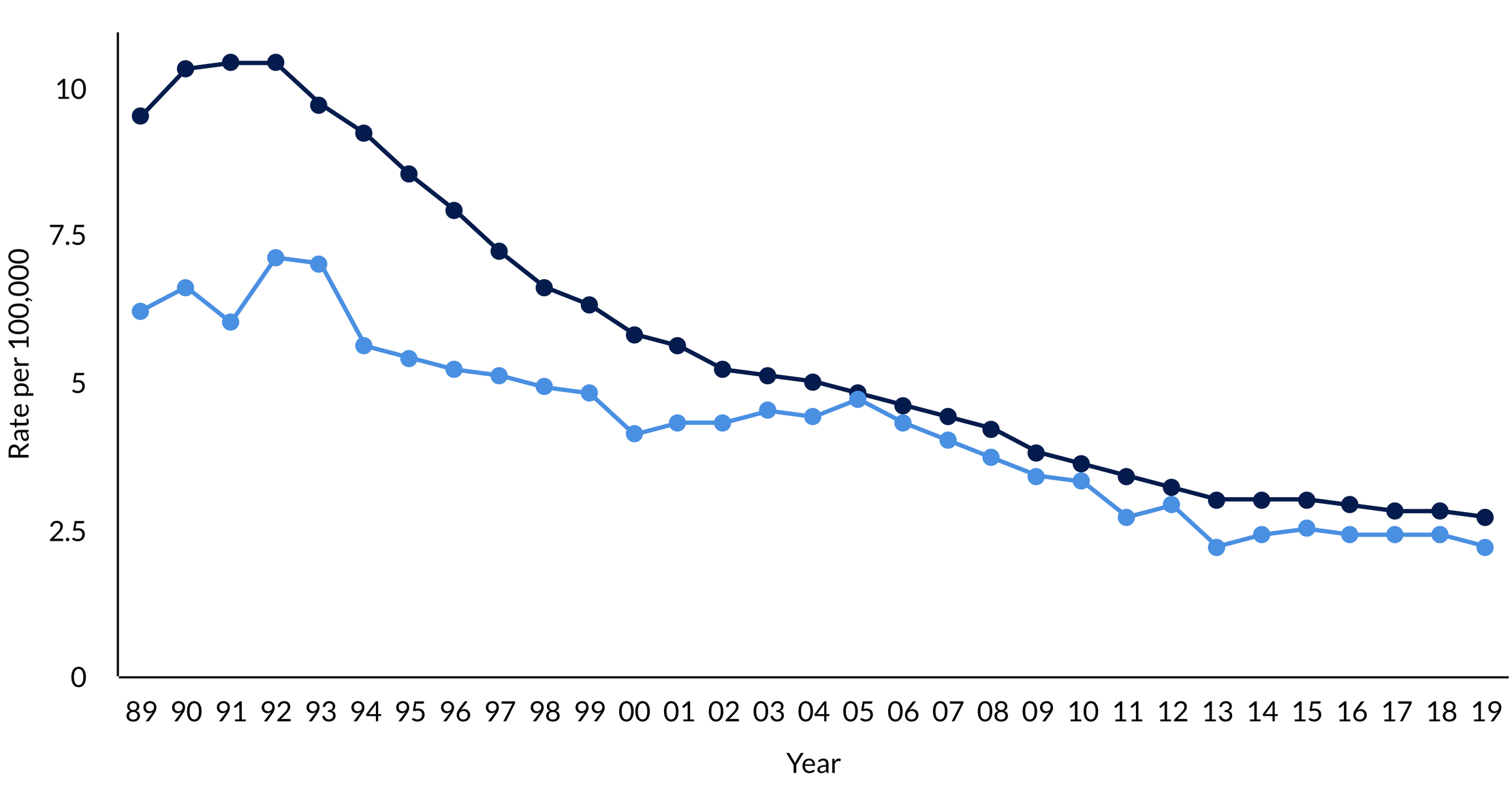
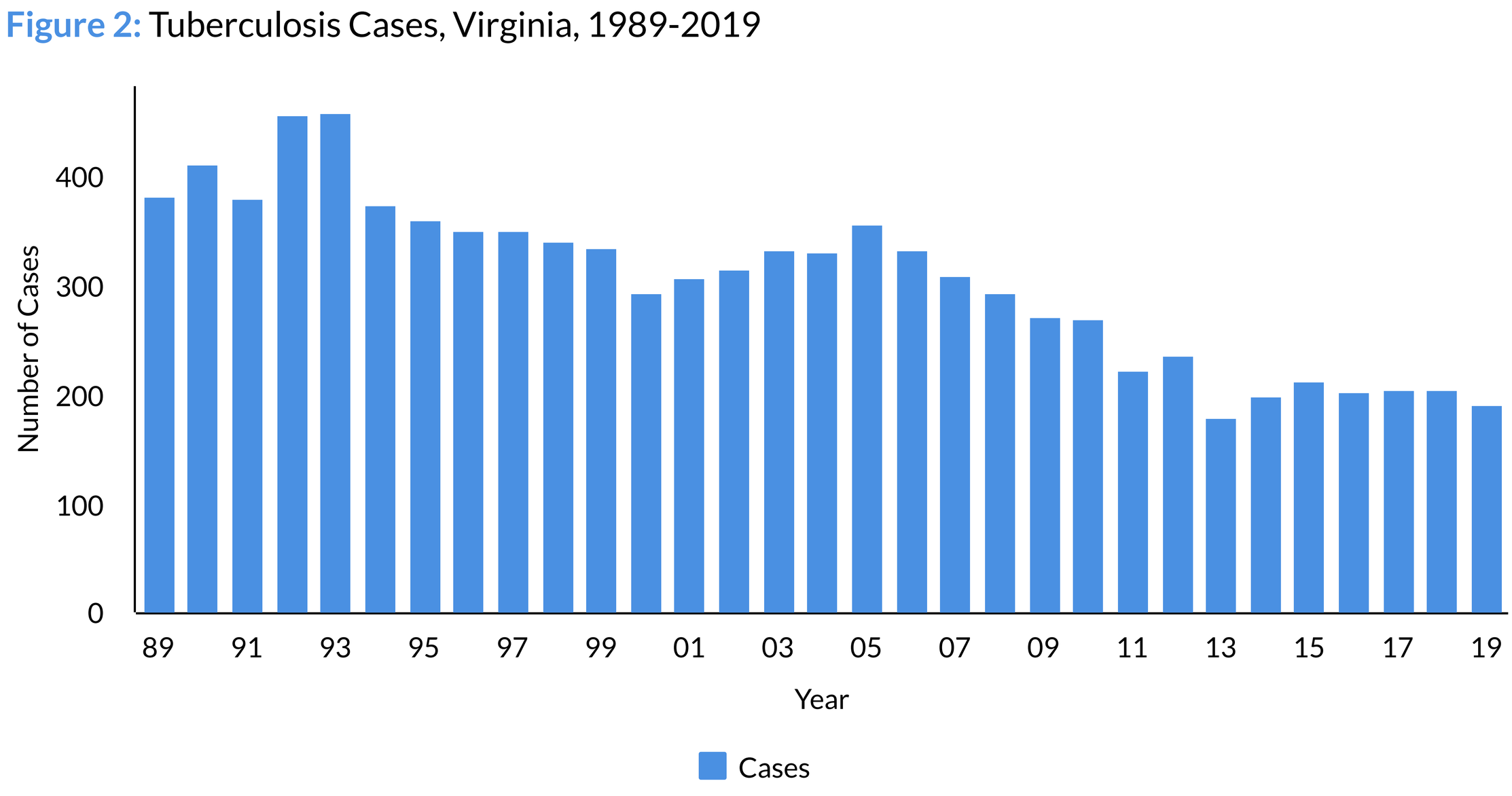
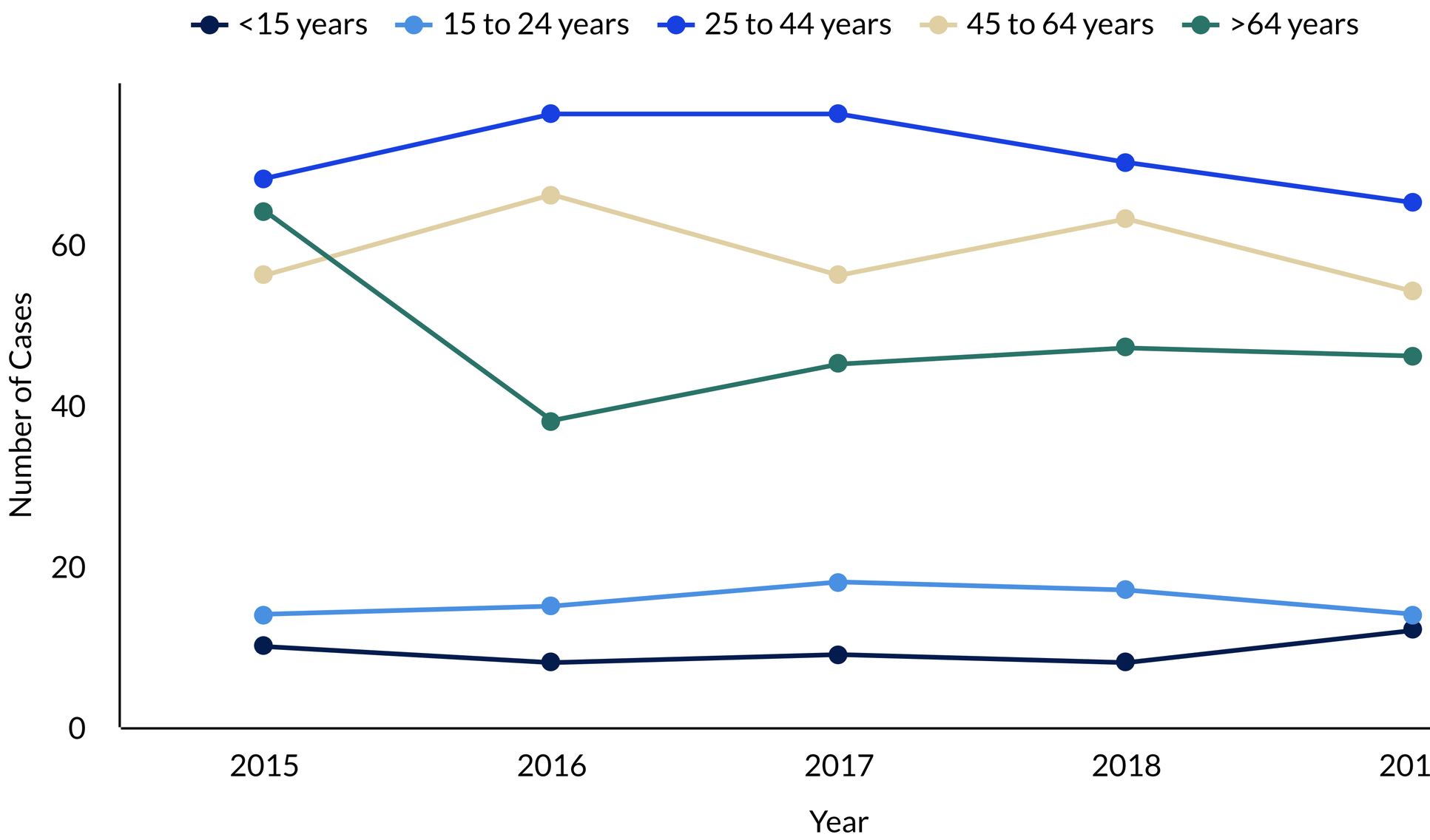


Figure 2: Tuberculosis Cases, Virginia, 1989-2019



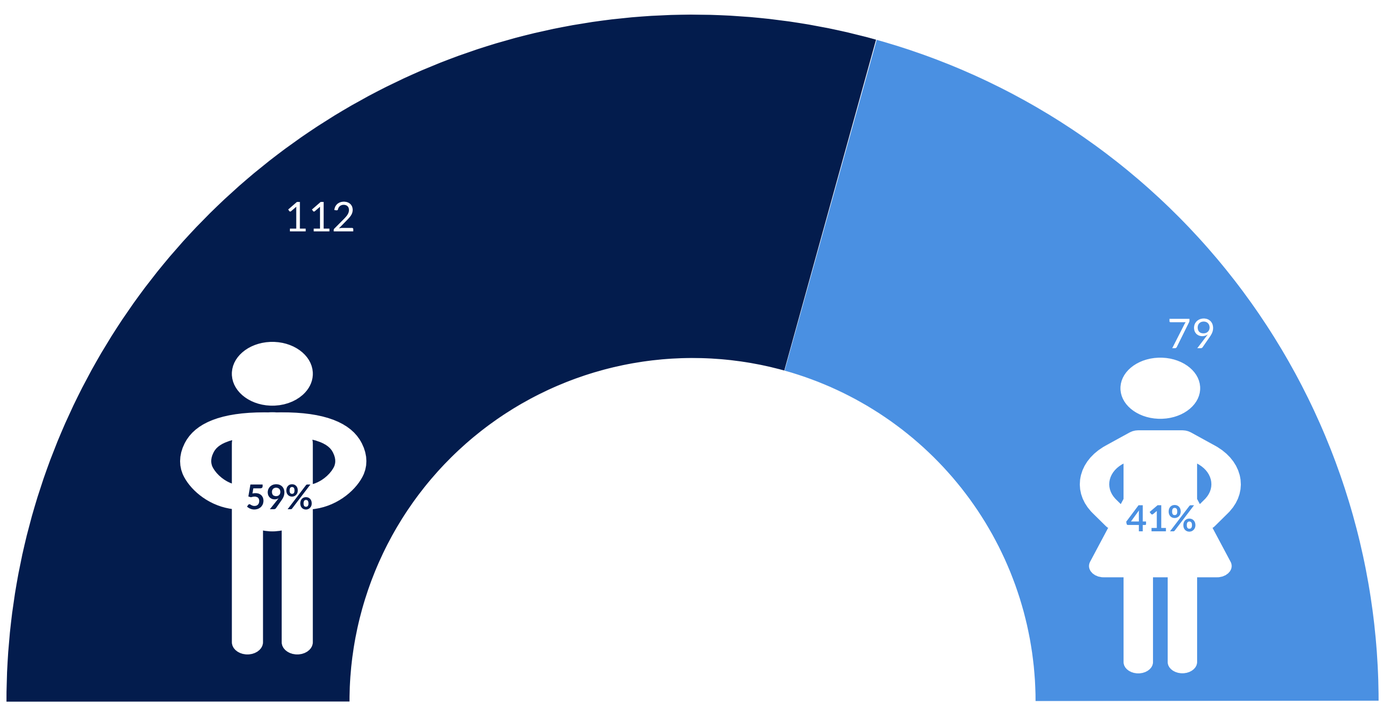
Age and Sex

Figure 3: Tuberculosis Cases by Age Group in Years, Virginia, 2015-2019



In 2019, Virginia's TB cases ranged in age from less than one to 90 years old. Consistent with previous years, the highest percentage of cases was identified in the 25-44 year age group representing 34% of 2019 cases. Sixty-five cases were identified in this age group, a 7.1% decrease from 2018. The highest rate of TB was identified in the 65 year and older group with a rate of 3.4 cases per 100,000 population. Although Virginia reported fewer cases overall in 2019, this age group saw a decrease of just 2.1% which represented one case. Fifteen children under the age of 18 were diagnosed with TB in Virginia in 2019. Eight of those children were younger than 15 and four were below the age of two. In children aged 0-15, there was a 50% increase in cases from 8 in 2018 to 12 in 2019. Young children have the potential for significant negative outcomes from TB. Virginia works with a pediatric TB consultant when young children are identified with active TB or as contacts to active cases. Young adults age 15-24 saw a 17.6% decrease in cases, although this represented a difference of only three cases. There was a 17.3% decrease in cases aged 45-64 from 63 cases in 2018 to 54 cases in 2019 and a 7.1% decrease in cases aged 25-44. Fifty-nine percent of Virginia's TB cases were male and 41% were female.

Figure 4: Tuberculosis Cases by Sex, Virginia, 2019



Birth in the United States

In 2019, 149 (78%) of Virginia's TB cases were reported among non-U.S.-born persons. This is higher than what was seen nationally for 2019 with 71% of U.S. TB cases reported among non-U.S.-born persons. In Virginia, TB rates among non-U.S.-born persons are significantly higher than among U.S.-born persons*. In 2019, the U.S.-born rate was 0.57 cases per 100,000 persons while the rate among non-U.S.-born persons was 14.2 cases per 100,000. The rate of TB among non-U.S.-born persons in Virginia is equal to the national rate for 2019 and greater than 20 times that of U.S.-born persons in Virginia for 2019.

In 2019, TB cases identified in Virginia represented people born in 34 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, the Philippines, and India represented countries of origin with the most cases in 2019. One or more cases over the past five years has represented 72 countries of origin including the United States.

Figure 5: Non-U.S.-born and U.S.-born* Tuberculosis Cases, Virginia, 2015-2019

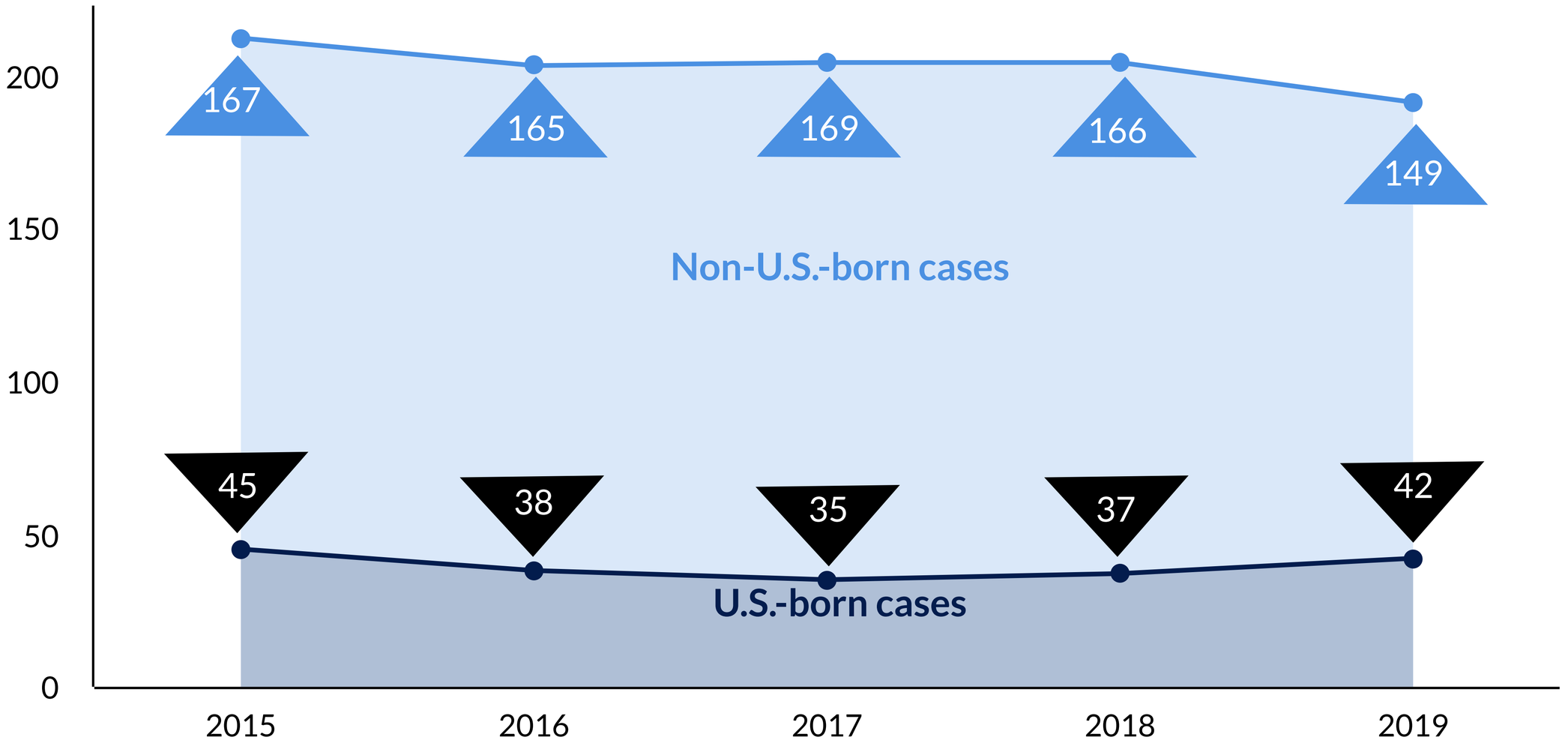
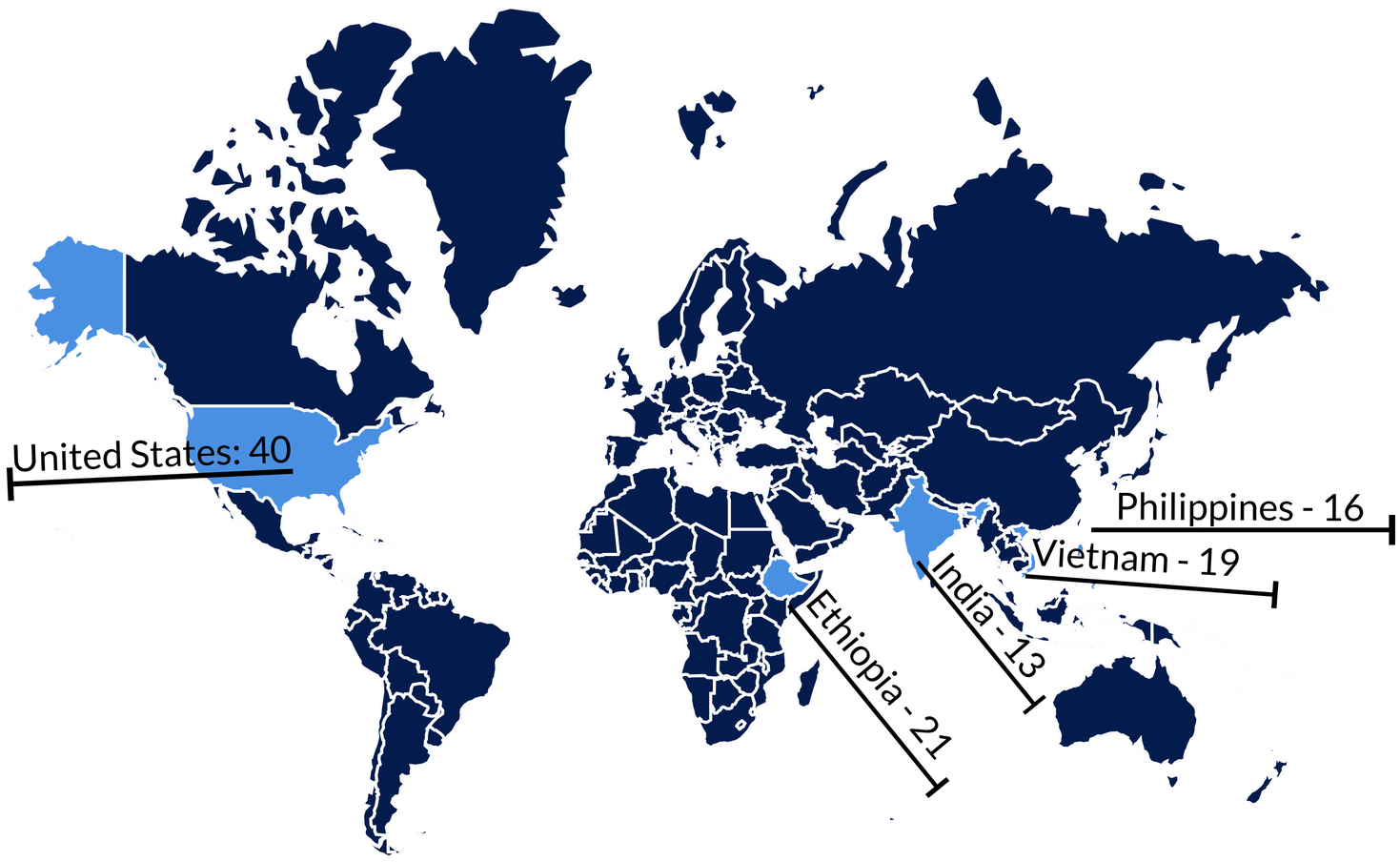


Figure 6: Top Five Countries of Birth of Tuberculosis Cases, Virginia, 2019



Time in the U.S.

10

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

Origin

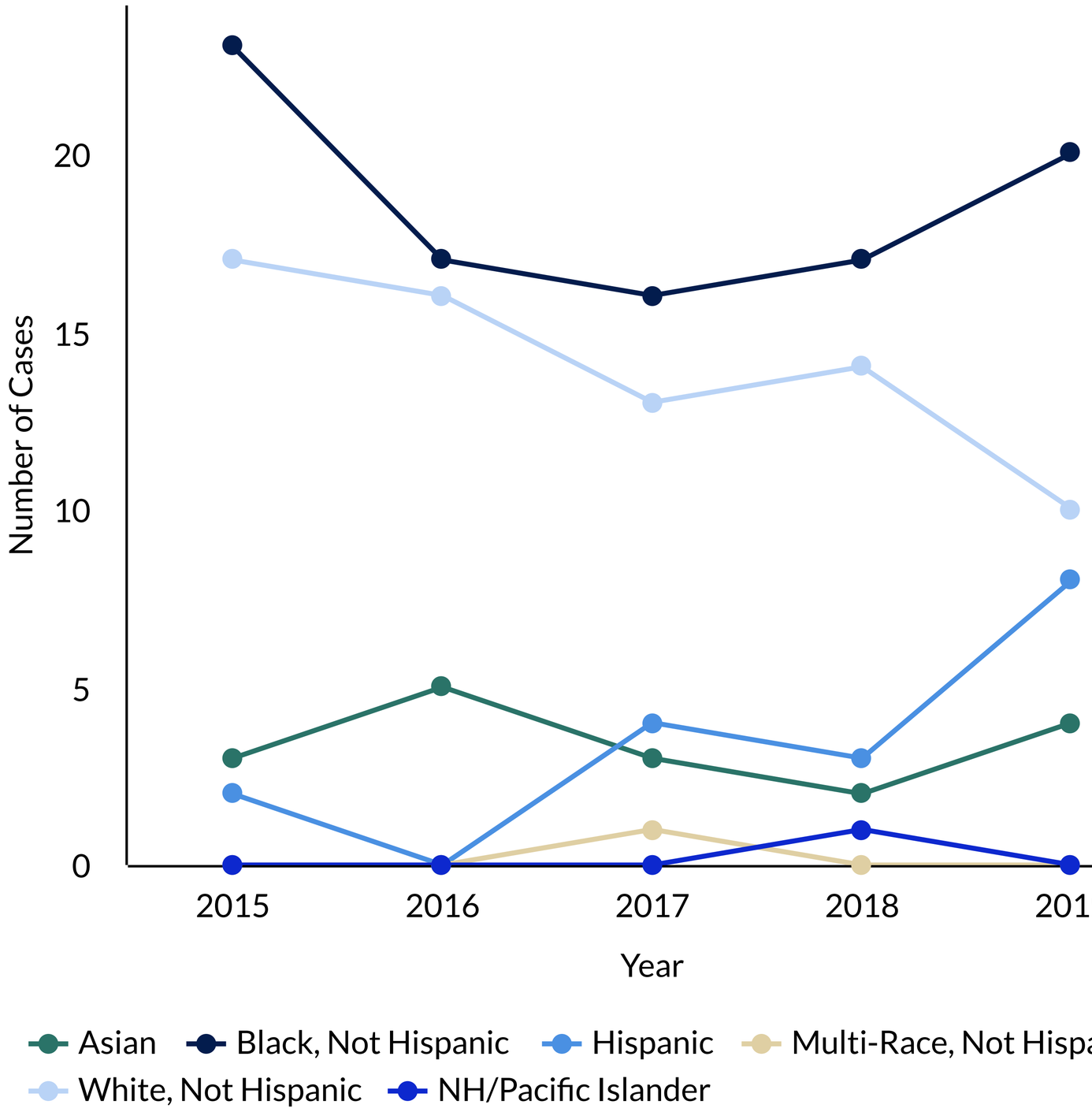
78%

Proportion of non-U.S.-born TB cases in 2019

*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, 2019 American Community Survey 5-Year Estimates

Race and Ethnicity

Figure 7: Race and Ethnicity of U.S.-born TB cases, Virginia, 2015-2019



2019

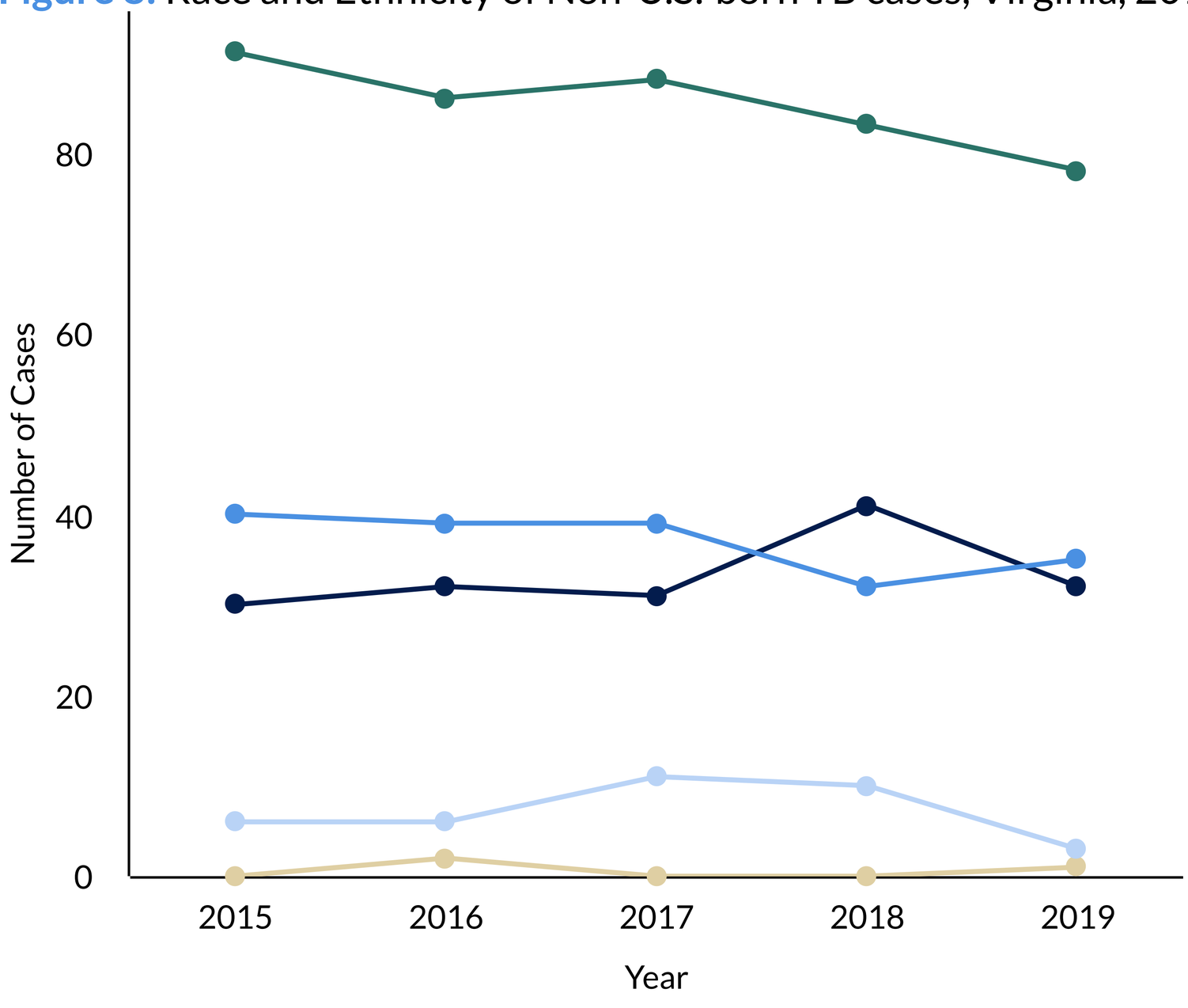
48% Proportion of U.S.-born TB cases in Virginia among non-Hispanic Blacks

24% Proportion of U.S.-born TB cases in Virginia among non-Hispanic Whites

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

9.5% Proportion of U.S.-born TB cases in Virginia among Asians

Figure 8: Race and Ethnicity of Non-U.S.-born TB cases, Virginia, 2015-2019



2019

52% Proportion of non-U.S.-born TB cases in Virginia among Asians

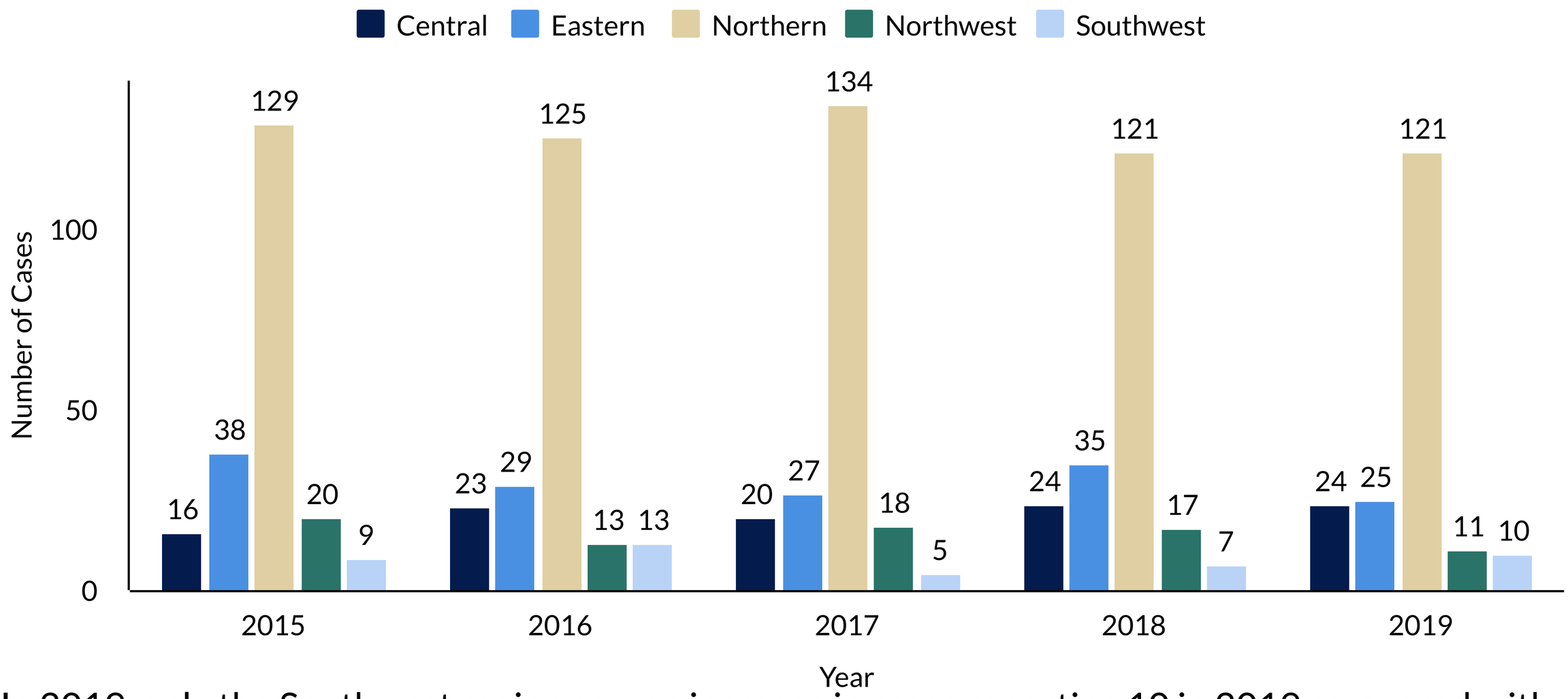
23% Proportion of non-U.S.-born TB cases in Virginia among Hispanics

21% Proportion of non-U.S.-born TB cases in Virginia among non-Hispanic Blacks

2% Proportion of non-U.S.-born TB cases in Virginia among non-Hispanic Whites

TB in Virginia Regions

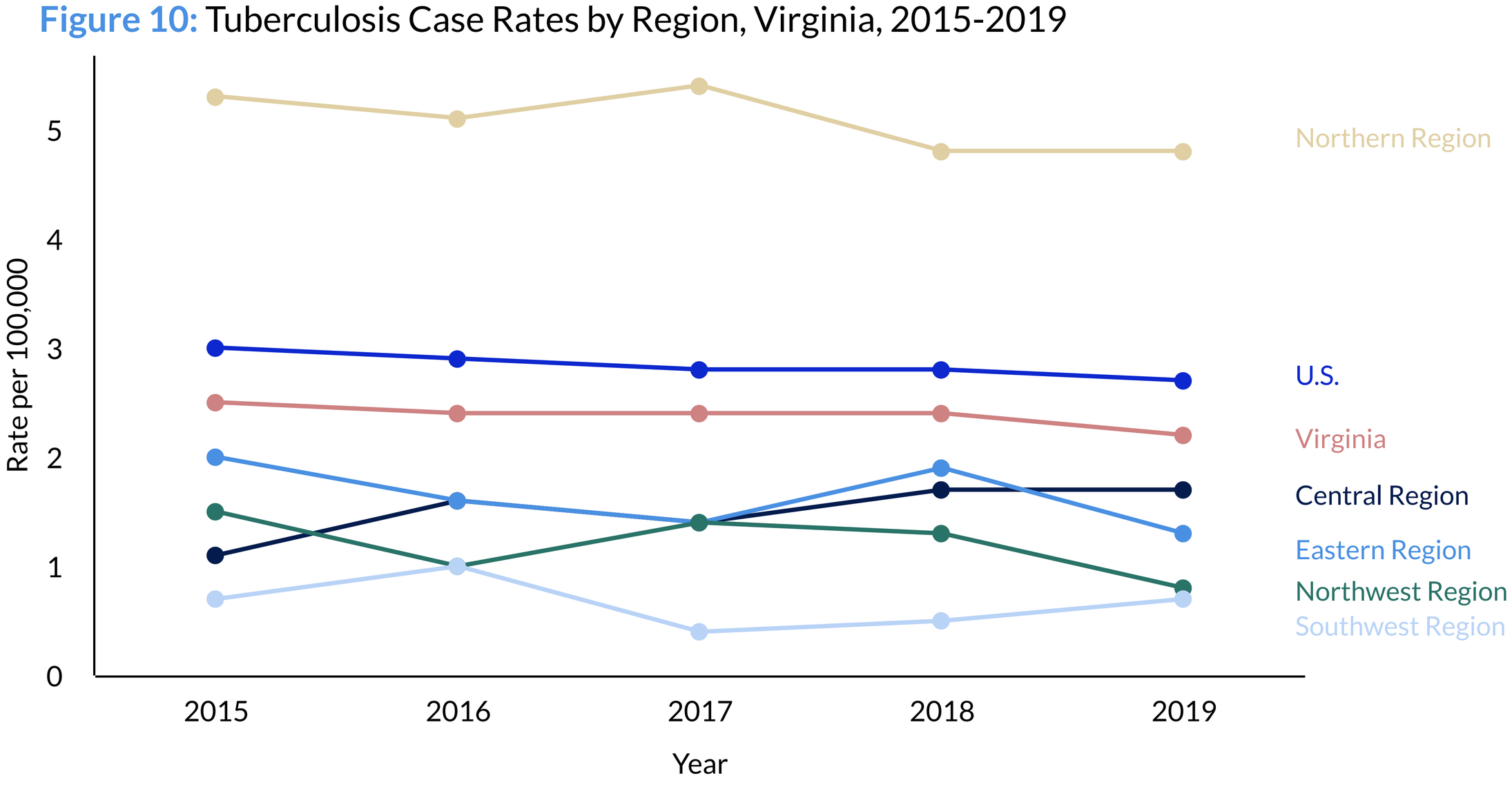
Figure 9: Tuberculosis Cases by Region, Virginia, 2015-2019



In 2019, only the Southwest region saw an increase in cases reporting 10 in 2019 compared with seven in 2018. All other regions stayed the same or saw a slight decrease from 2018. The Northern region reported 63.4% (121) of Virginia's TB cases in 2019. 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 2019. The Eastern region reported 25 cases in 2019, 13% of the state's cases. This was a 28% decrease from the Eastern region's 35 cases reported in 2018. The Central region reported the same number of cases, 24, as were reported in 2018. These 24 cases represent 12.5% of the state's total 2019 cases. The Northwest region saw a decrease from 17 cases in 2018 to 11 cases in 2019. This region accounted for 5.8% percent of Virginia's 2019 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, 2015-2019



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, experiencing homelessness, substance use and diabetes. Diabetes is consistently the most frequently observed risk factor among TB cases in Virginia. In 2019, 35 cases (18%) with diabetes were reported. Virginia tests TB cases for diabetes as a standard of care and performs serum drug level monitoring to ensure absorption of TB drugs in this population. In 2019, 10 healthcare workers were reported with TB, one long-term care resident, and four people who at diagnosis or in the past year experienced homelessness. Excessive consumption of alcohol was reported among nine cases, with three cases reporting the use of injection drugs (IDU) and six cases reporting the use of non-injection drugs.

Figure 11: Selected Risk Factors of Tuberculosis Cases, Virginia, 2015-2019

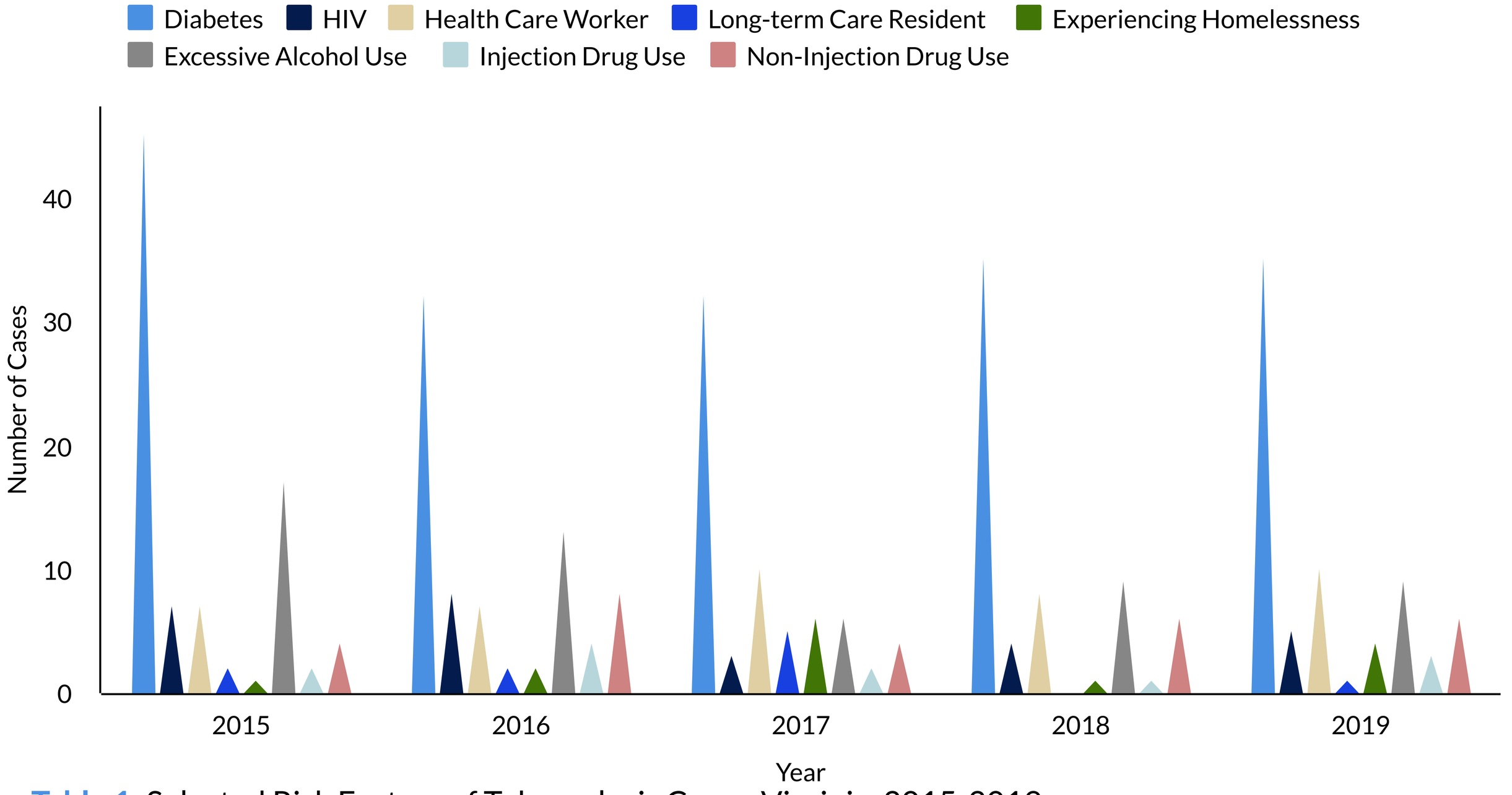


Table 1: Selected Risk Factors of Tuberculosis Cases, Virginia, 2015-2019

	2015		2016		2017		2018		2019	
Total Cases	**212**		**203**		**204**		**204**		**191**	
	No.	%	No.	%	No.	%	No.	%	No.	%
Occupation										
Health Care	7	3.3	7	3.4	10	4.9	8	3.9	10	5.2
Migrant	0	0.0	0	0.0	0	0.0	1	0.5	1	0.5
Corrections	0	0.0	0	0.0	0	0.0	0	0.0	0	0
Type of Residence										
Long Term Care	2	0.9	2	1.0	5	2.5	0	0.0	1	0.5
Prison/Jail	1	0.5	2	1.0	2	1.0	1	0.5	0	0
Homeless	1	0.5	2	1.0	6	2.9	1	0.5	4	2.1
Co-Morbidity										
Diabetes	45	21.2	32	15.8	33	16.2	35	17.2	35	18.3
HIV	7	3.3	8	3.9	4	2.0	3	1.5	5	2.6
Substance Use										
Alcohol	17	8.0	13	6.4	9	4.4	6	2.9	9	4.7
IDU	2	0.9	4	2.0	1	0.5	2	1.0	3	1.6
Non-IDU	4	1.9	8	3.9	6	2.9	4	2.0	6	3.1

2.6%

Proportion of 2019 TB cases with HIV co-infection

18%

Proportion of 2019 TB cases with diabetes

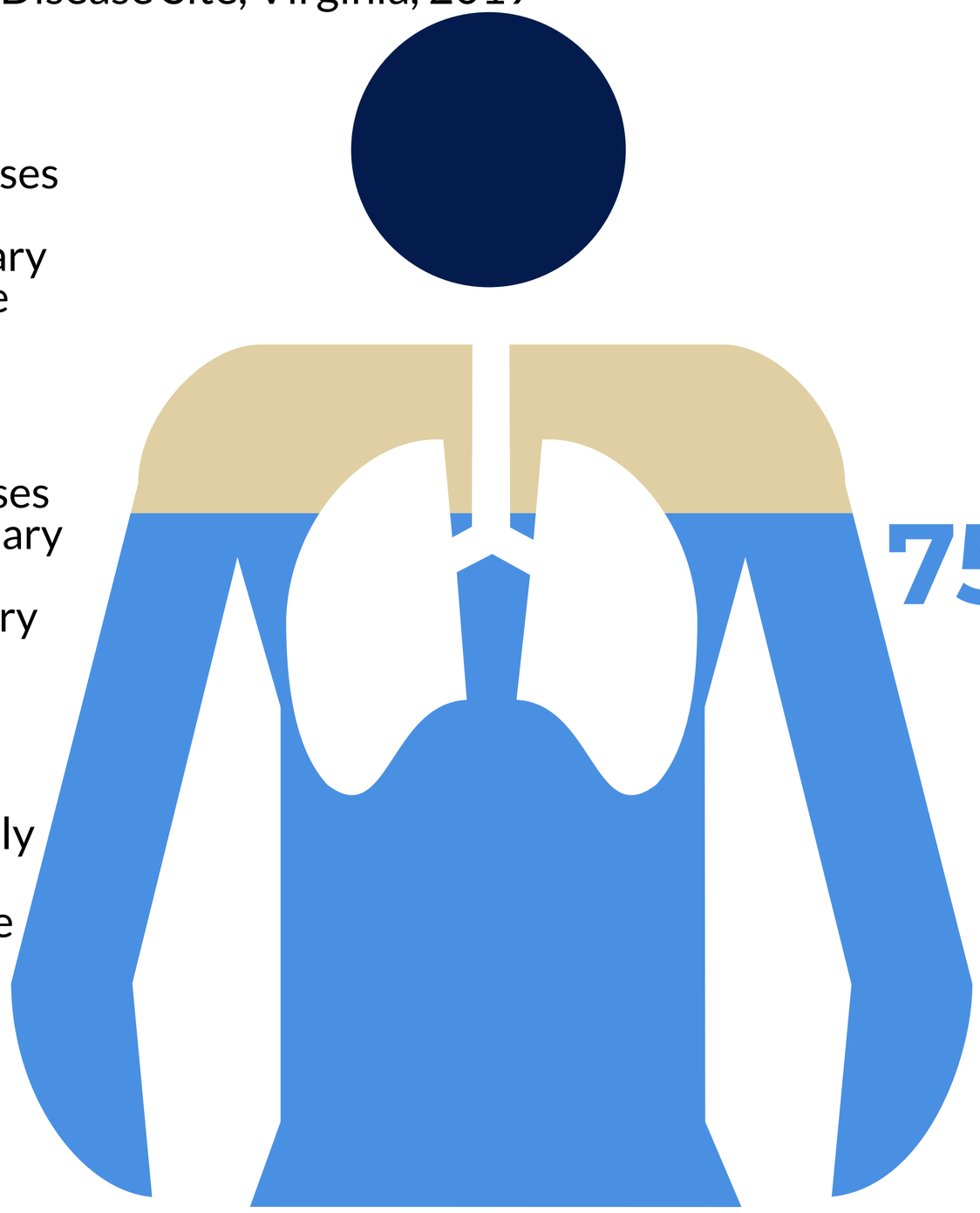
Clinical Characteristics

Figure 12: Tuberculosis by Disease Site, Virginia, 2019

47 Number of cases with an extrapulmonary site of disease

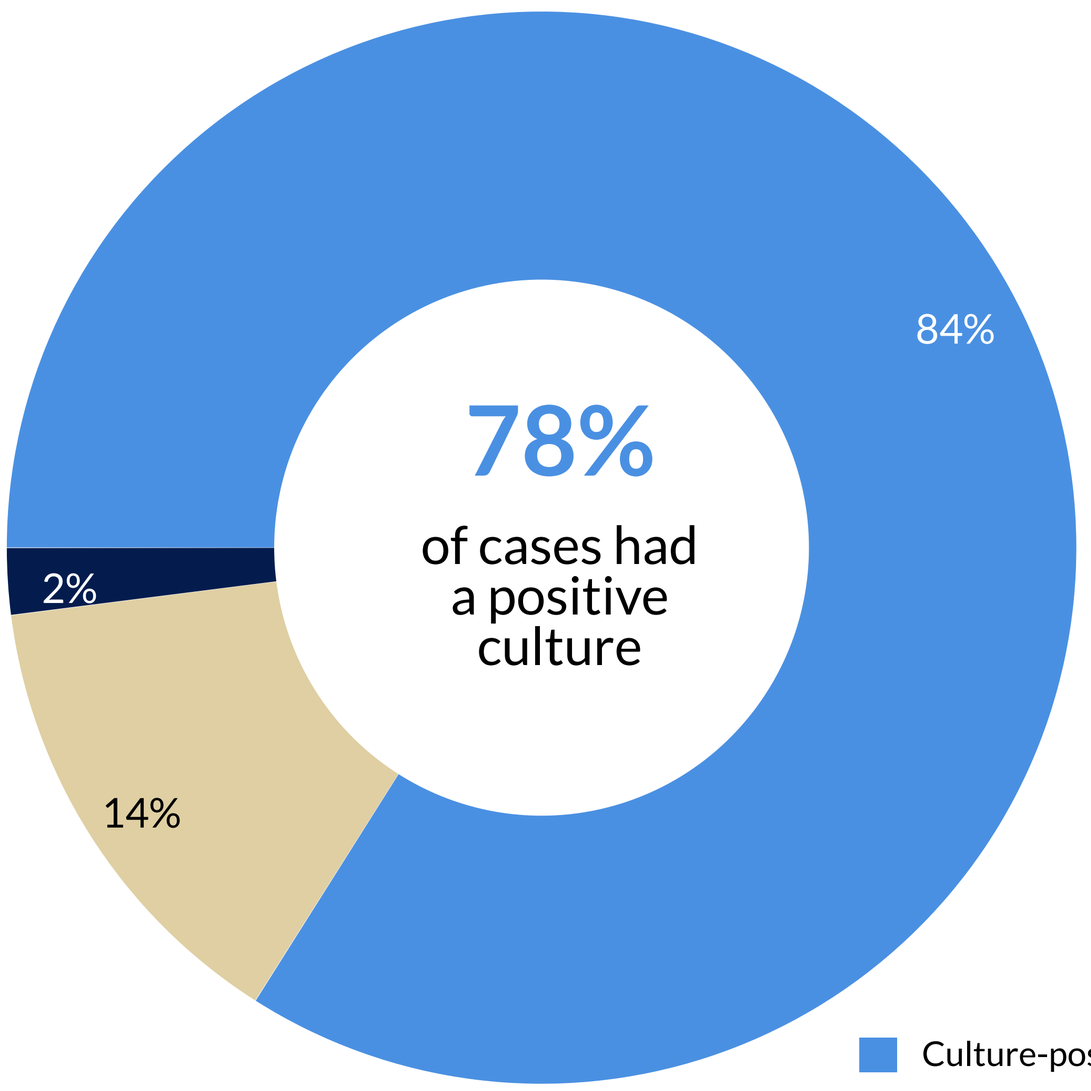
16 Number of cases with a pulmonary and an extrapulmonary site of disease

128 Number of cases with only a pulmonary site of disease



75% Proportion of TB cases with a pulmonary site of disease

Figure 13: Tuberculosis Cases by Confirmation Method, Virginia, 2019



78% Proportion of TB cases evaluated primarily for TB symptoms

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

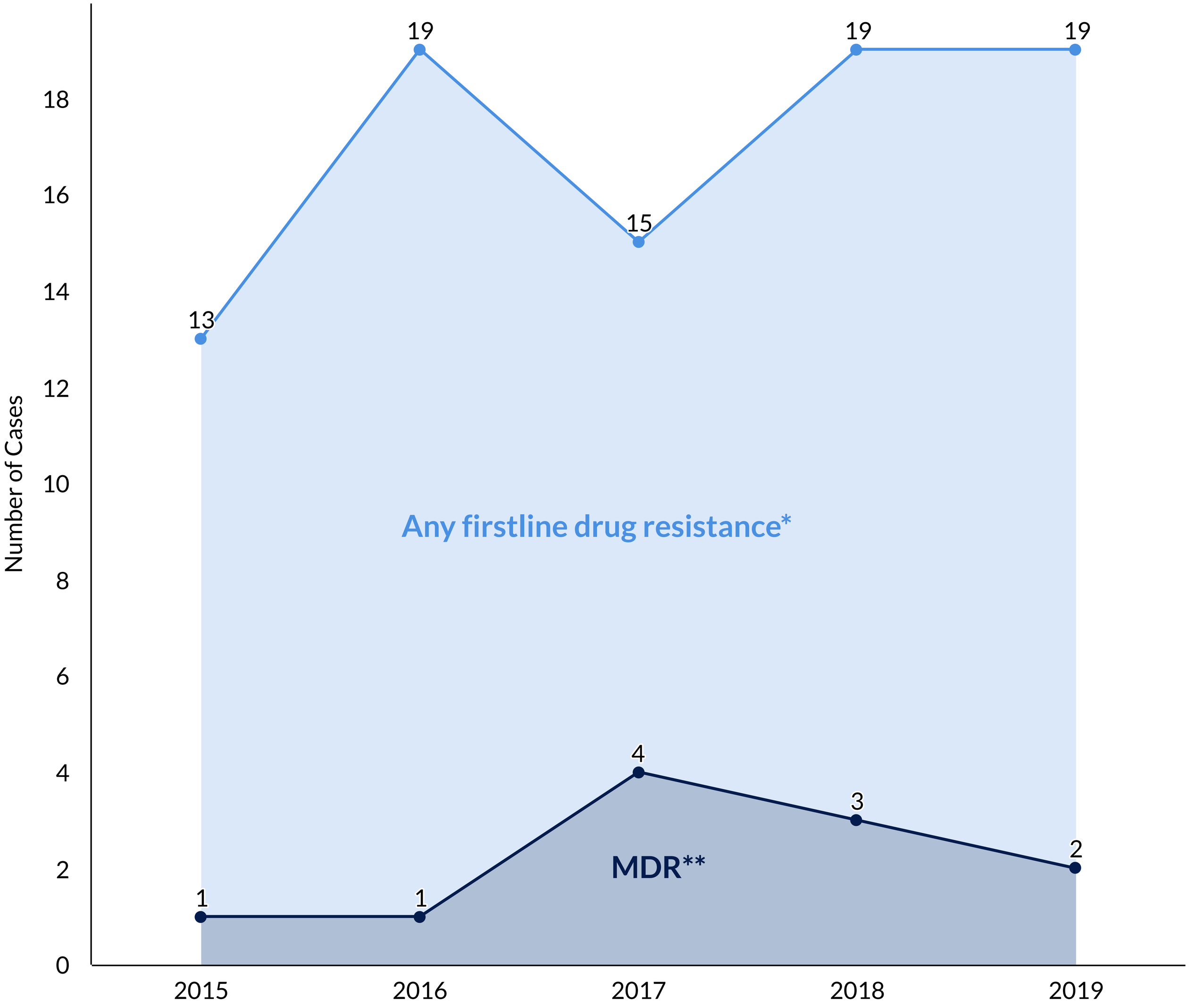
1.5% Proportion of TB cases evaluated primarily due to a TB contact investigation

*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 (3 in 2019).

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 2019, drug-susceptibility tests were performed on all culture positive specimens (158). Seventeen patients showed resistance to at least one of the four first-line TB drugs. Two additional patients diagnosed in Virginia in 2019 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 included in Virginia's TB case count had extensively drug-resistant (XDR) TB, although Virginia did provide care for a pre-XDR client in 2019. 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.

Figure 14: Drug Resistance of Tuberculosis Cases, Virginia, 2015-2019

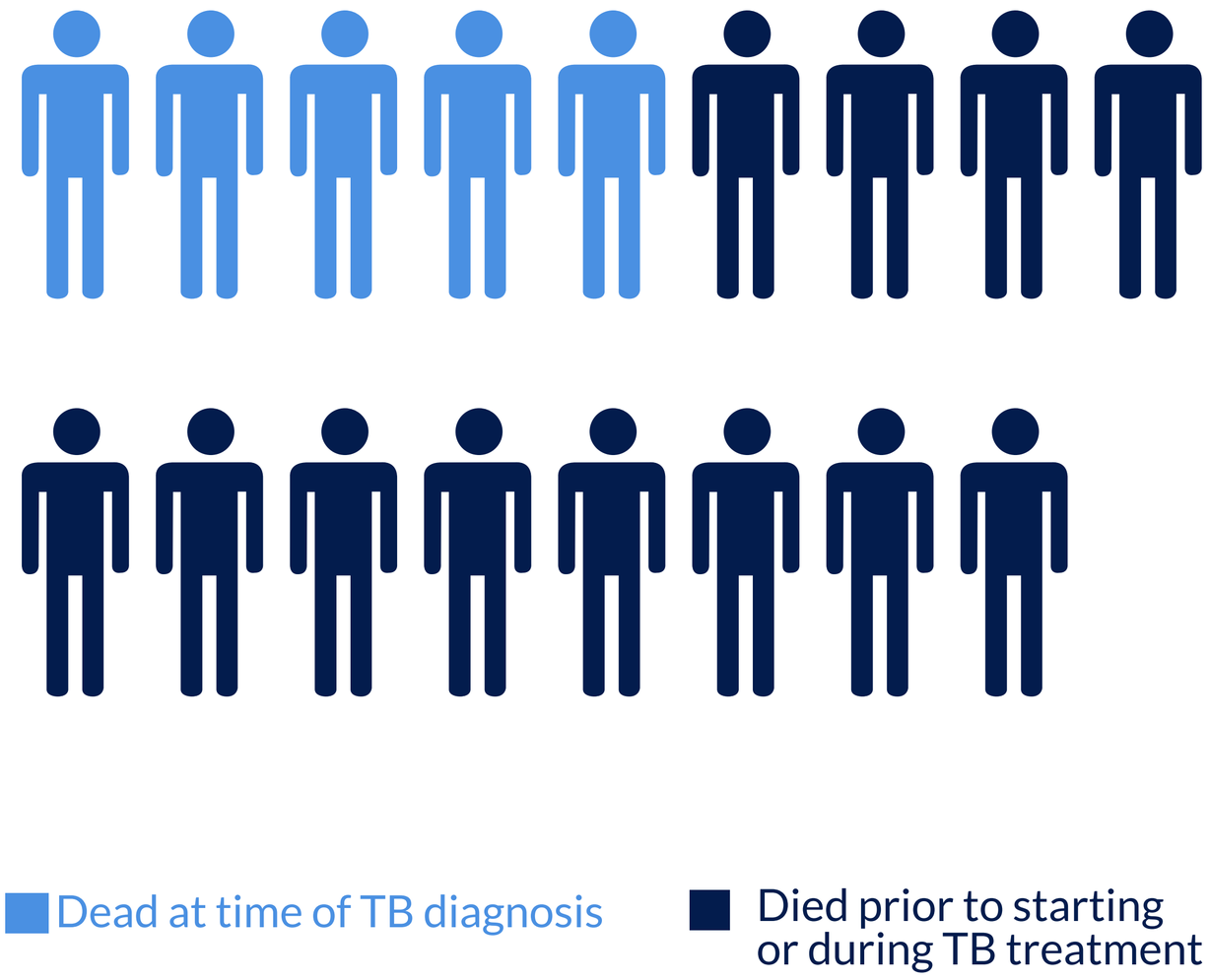


*Firstline drug resistance is defined as resistance to any of the primary TB drugs: rifampin, isoniazid, pyrazidamine and ethambutol

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

Mortality and Treatment Completion

Figure 15: Mortality Among Tuberculosis Cases, Virginia, 2018*



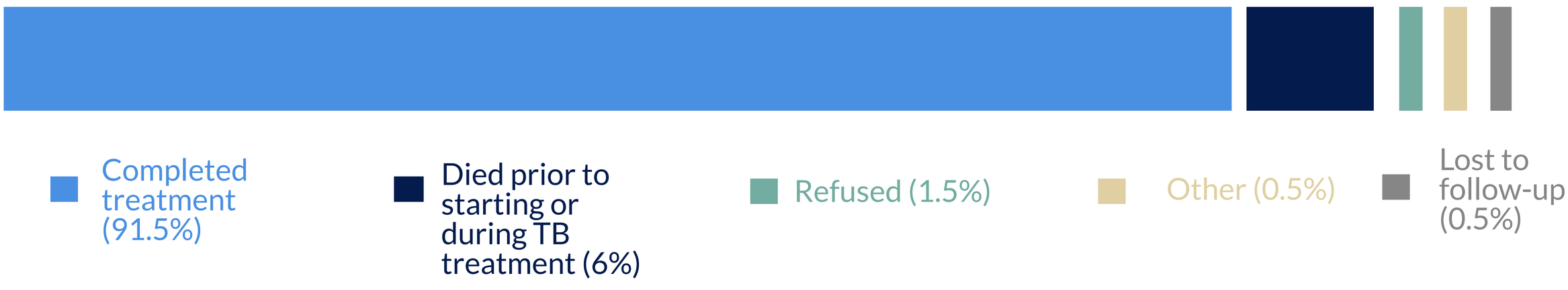
8%

Proportion of all 2018 Virginia TB cases who died

In 2018, 17 Virginia TB cases passed away. Five cases were deceased at the time of diagnosis and 12 cases died during TB treatment or prior to beginning TB treatment. Many of these deaths were attributed to underlying conditions unrelated to TB disease.

Of those individuals with TB disease who were eligible to complete treatment within one year, 94% were able to do so among 2018 cases in Virginia. Treatment completion requires diligence and collaboration between the patient, the local health department staff and the patient's provider.

Figure 16: Treatment outcomes for TB cases who were alive at diagnosis (n=199), Virginia, 2018*

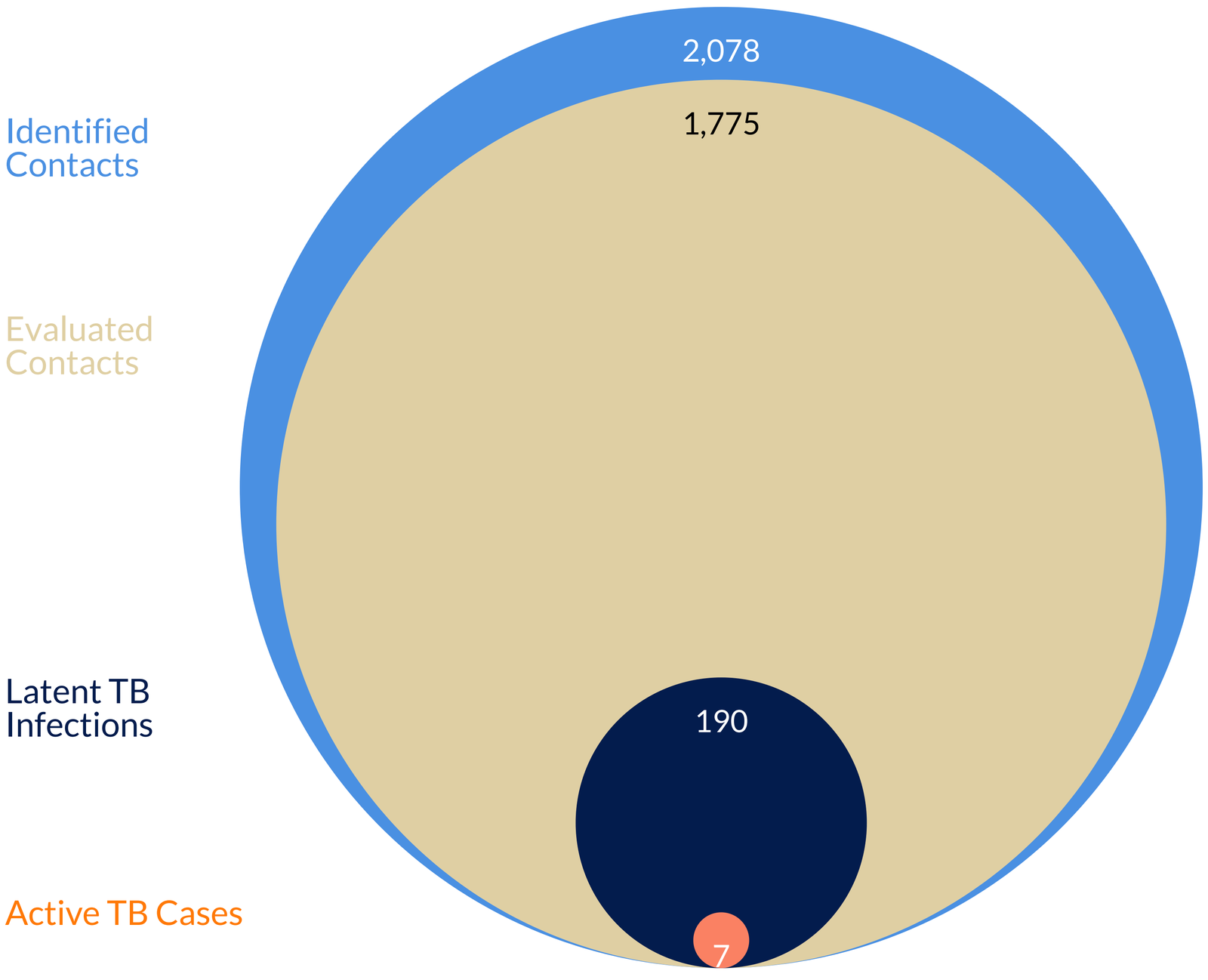


*2018 is the most recent year with complete data available for treatment completion and mortality

Contact Investigations

In 2018, the most recent year for which complete contact investigation data is available, 2,078 contacts to TB cases were identified. Of these contacts, 1,775 were completely evaluated. These evaluations uncovered six cases of TB disease and 190 infections with latent tuberculosis (LTBI). Of the 190 persons diagnosed with LTBI, 148 people began treatment and 125 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, 2018



10.7% Proportion of evaluated contacts for 2018 TB cases with LTBI

0.39% Proportion of evaluated contacts for 2018 TB cases with TB disease

Genotyping can assist with contact investigations, providing supporting evidence for hypothesized links 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 2019, 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 2019 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 with previously 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 (U.S.). 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. The 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, 2009-2019

	Virginia		United States	
	No.	Rate	No.	Rate
2009	271	3.4	11,503	3.8
2010	268	3.3	11,077	3.6
2011	221	2.7	10,483	3.4
2012	235	2.9	9,926	3.2
2013	179	2.2	9,551	3
2014	198	2.4	9,390	3
2015	212	2.5	9,537	3
2016	203	2.4	9,252	2.9
2017	204	2.4	9,082	2.8
2018	204	2.4	9,024	2.8
2019	191	2.2	8,916	2.7

Table 3 : Count and Rate per 100,000 of Tuberculosis Cases by Health Region, Virginia, 2015-2019

	2015			2016			2017			2018			2019		
	No.	Rate	%	No.	Rate	%	No.	Rate	%	No.	Rate	%	No.	Rate	%
Central	16	1.1	7.5	23	1.6	11.3	20	1.4	9.8	24	1.7	11.7	24	1.7	12.5
Eastern	38	2.0	17.9	29	1.6	14.3	27	1.4	13.2	35	1.9	17.1	25	1.3	13.1
Northern	129	5.3	60.8	125	5.1	61.6	134	5.4	65.7	122	4.9	59.5	121	4.8	63.4
Northwest	20	1.5	9.4	13	1.0	6.4	18	1.4	8.8	17	1.3	8.3	11	0.8	5.8
Southwest	9	0.7	4.2	13	1.0	6.4	5	0.4	2.5	7	0.5	3.4	10	0.7	5.2

Table 4: Tuberculosis Cases by Race/Ethnicity and Place of Birth, Virginia, 2015-2019

	2015		2016		2017		2018		2019	
	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	3	91	5	86	3	88	2	83	4	78
American Indian/Alaskan Native, non-Hispanic	0	0	0	0	0	0	0	0	0	0
Black, non-Hispanic	23	30	17	32	16	31	17	41	20	32
Hispanic	2	40	0	39	4	39	3	32	8	35
Multi-Race, non-Hispanic	0	0	0	2	1	0	0	0	0	1
Native Hawaiian/Pacific Islander	0	0	0	0	0	0	1	0	0	0
White, non-Hispanic	17	6	16	6	11	11	14	10	10	3

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 2011-2014, rates were calculated using estimates compiled by the Weldon Cooper Center for Public Service: https://demographics.coopercenter.org/virginia-population-estimates

For 2015-2019, rates were calculated using population estimates from NCHS Bridged Race Population via VDH Data Management. Prior year population is used for calculation.

Rates for areas with < 5 cases may be statistically unreliable

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.