

HPV-Associated Cancers in Texas, 2013-2017

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The TCR also wants to thank all cancer reporters for their hard work and collaboration. Cancer reporters help us meet national high quality and timeliness standards, and enable us to serve as the primary source of cancer data in Texas.

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Background

- Human papillomaviruses (HPV) are associated with increased risk of at least seven different types of cancer: carcinomas of the cervix and squamous cell carcinomas of the vagina, vulva, penis, anus, rectum, and oropharynx.
- This statistical report describes the burden of HPV-associated cancers in Texas and compares cancer rates and trends to national data.
- Because cancer registries do not collect data on the presence or absence of HPV in cancer tissue at the time of diagnosis, this report uses data from all tumors diagnosed at the seven cancer sites associated with HPV, rather than cases diagnosed in persons confirmed to have HPV.

Implications for Public Health Practice

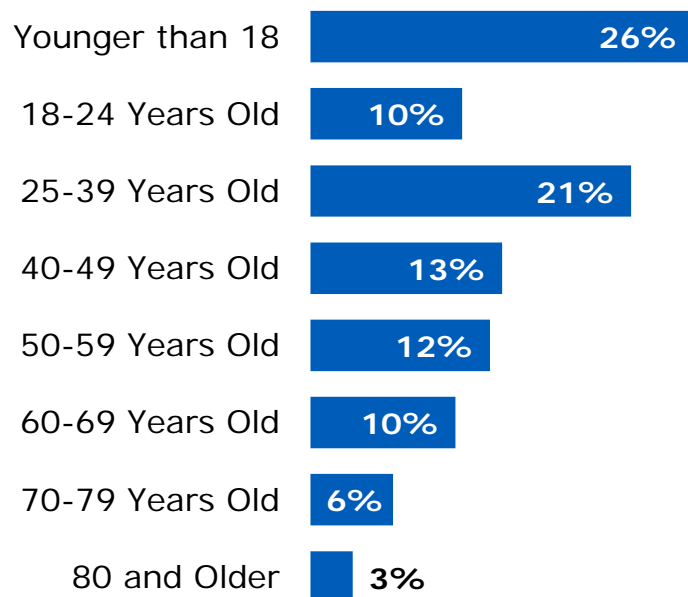
- Comprehensive cancer control strategies, including use of evidence-based interventions to prevent HPV infection, could help decrease the incidence of these cancers in Texas.
- Ongoing surveillance for HPV-associated cancers can inform state-level and national-level HPV vaccination and cervical cancer screening efforts and monitor their long-term impact.

Texas Overview

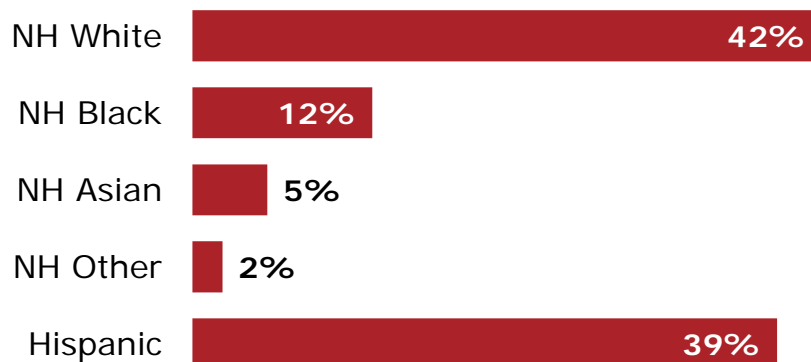
Texas Population Estimates

- The estimated population of Texas for 2019 was 28,995,881.¹
- The population of Texas is 1/12th of total U.S. population.

Population by Age Group, Texas, 2018²



Population by Race/Ethnicity, Texas, 2018²



¹ United States Census Bureau QuickFacts, [census.gov/quickfacts/fact/table/TX_US/PST045219](https://www.census.gov/quickfacts/fact/table/TX_US/PST045219)

² Texas Demographic Center, demographics.texas.gov/Data/TPEPP/Estimates/

NH = Non-Hispanic

Key Population Demographics for Texas

- Six Texas counties have a population over 1,000,000 people — Harris, Dallas, Tarrant, Bexar, Travis and Collin. About 47% of Texans live in one of these counties.¹
- 33 counties have a population between 100,000–1,000,000 people.¹
- 181 counties each have a population less than the number of Texans expected to die from cancer in 2020, which is 45,858.¹

	Texas ²	United States ²
Population	29 Million	328.2 Million
Hispanic	39.6%	18.3%
Persons living in poverty	14.9%	11.8%
Persons without health insurance (ages 0-64)	20.0%	10.0%
Persons who speak a language other than English spoken at home (ages 5 years and older)	35.5%	21.5%
Adults ages 25 and older with a high school diploma	83.2%	87.7%

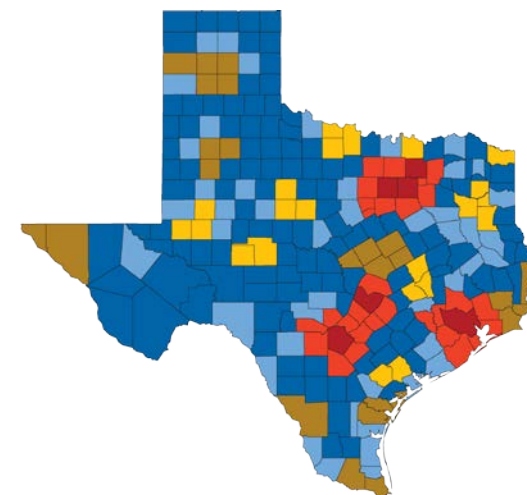
¹ Texas Demographic Center, demographics.texas.gov/Data/TPEPP/Estimates/

² United States Census Bureau QuickFacts, census.gov/quickfacts/fact/table/TX,US/PST045219

Texas Urban-Rural Classification

In this report, Texas counties are classified using the 2013 Urban-Rural Classification Scheme for Counties.¹

Metropolitan	
Large central metro	Counties in metropolitan statistical areas of 1,000,000 or more population that: contain the entire population of the largest principal city of the MSA, or have their entire population contained in the largest principal city, or contain at least 250,000 inhabitants of any principal city
Large fringe metro	Counties in MSAs of 1,000,000 or more population that do not qualify as large central metro counties
Medium metro	Counties in MSAs with populations of 250,000–999,999
Small metro	Counties in MSAs with populations less than 250,000
Nonmetropolitan	
Micropolitan	Counties with an urban cluster population of 10,000–49,999
Noncore	Nonmetro counties that do not qualify as micropolitan



- Large central metro
- Large fringe metro
- Medium metro
- Small metro
- Micropolitan
- Noncore

¹ 2013 Urban-Rural Classification Scheme for Counties, National Center for Health Statistics, Centers for Disease Control and Prevention (CDC). [cdc.gov/nchs/data_access/urban_rural.htm](https://www.cdc.gov/nchs/data_access/urban_rural.htm)

Texas Border Region

- In this report, “border counties” are defined as the 32 counties designated by the La Paz Agreement.
- Some of the key differences in demographics between the border and non-border counties are presented in the table below.



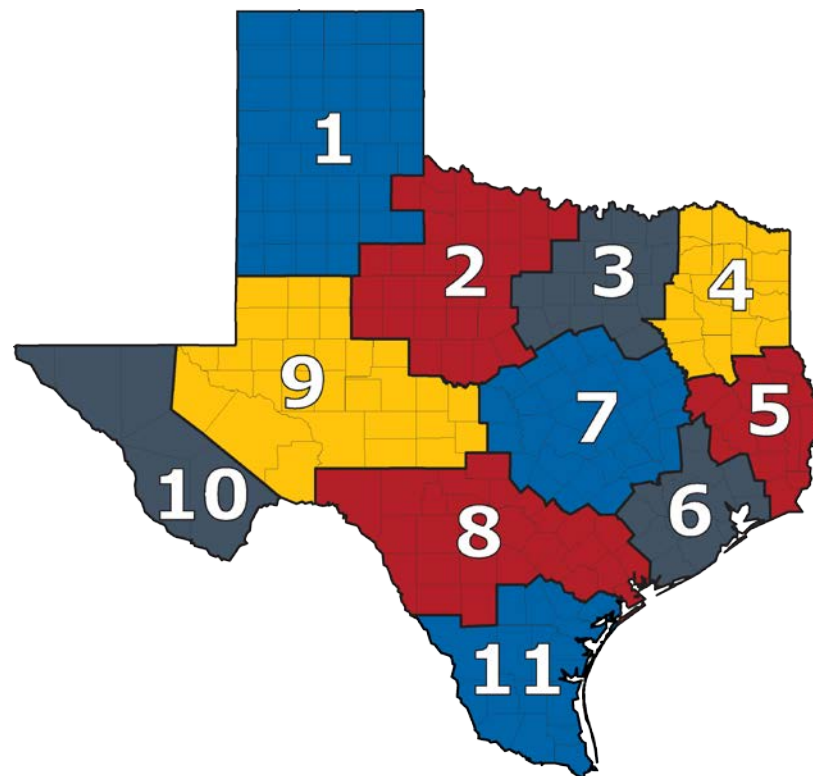
	Border Counties ¹	Non-Border Counties ¹
Population	3.0 Million	25.7 Million
Hispanic	88.4%	35.5%
Below poverty level	29.3%	15.9%
Adults ages 18–64 without health insurance	46.1%	28.3%
Do not speak English very well	31.7%	12.2%
Adults ages 25 and older without a high school diploma	32.8%	16.5%

¹ Office of Border Public Health, Texas Department of State Health Services, dshs.texas.gov/borderhealth/. Based on 2015 Census projections from DSHS Center for Health Statistics.

Texas Public Health Regions

- The Texas Department of State Health Service divides the state into 11 administrative Public Health Regions (also sometimes called health service regions).
- This report presents some information by public health region to show the variation of cancer statistics across the state.
- TCR's Web Query Tool can display cancer incidence and mortality rates by health service region, as well as county, at cancer-rates.info/tx/.

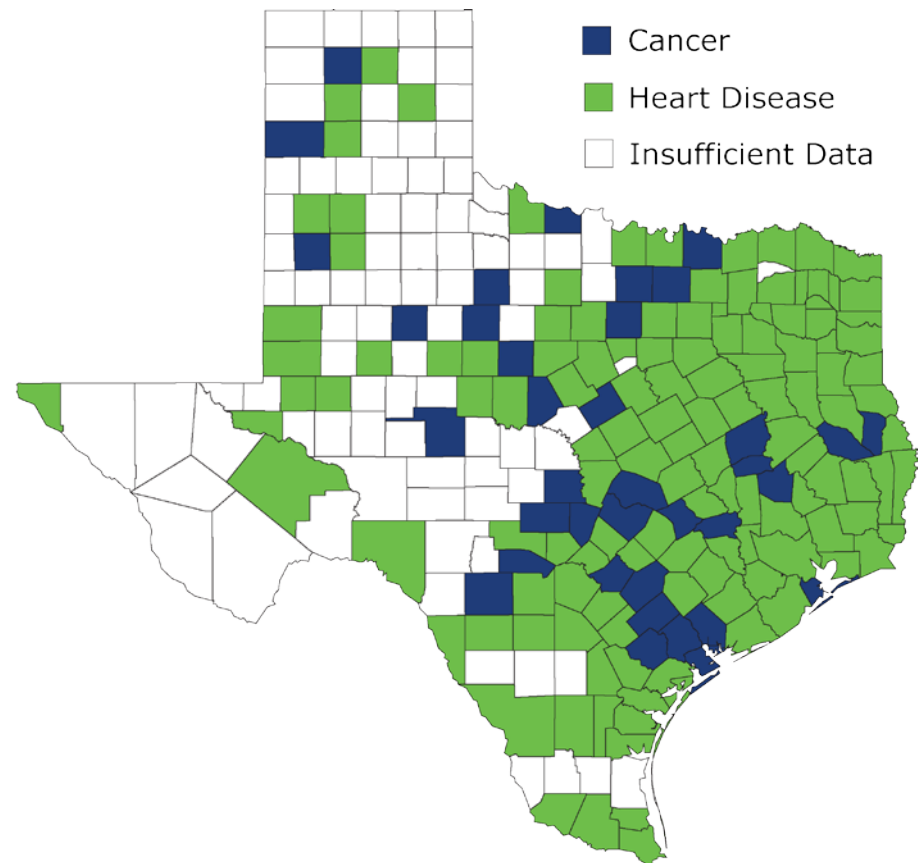
Map of Public Health Regions



Burden of Cancer in Texas

- In 2020, an estimated 127,131 new Texas cancer cases will be diagnosed.
- An estimated 45,858 Texans will die from cancer in 2020.
- As of January 1, 2017, 824,631 Texans who were diagnosed with cancer in the last 22 years were alive.
- Overall, cancer is the 2nd leading cause of death in Texas, but the 1st in some areas of the state.¹
- Cost of cancer in Texas for 2018 is estimated to be over \$40.3 billion.²

Leading Cause of Death by Texas County, 2016



¹ Texas Department of State Health Services, Center for Health Statistics, Vital Statistics Annual Reports, Leading Causes of Death for Selected Years Texas Residents.

² An Economic Assessment of the Cost of Cancer in Texas and the Benefits of the Cancer Prevention and Research Institute of Texas and its Programs: 2018 Update

Human Papillomavirus and Cancer

What is Human Papillomavirus?

- HPV is the most common sexually transmitted infection in the United States.
- More than 40 types of HPV can infect the genital areas and the lining of the mouth and throat.
- Most people who become infected with HPV do not experience any symptoms and the immune system usually gets rid of the HPV infection naturally within two years.
- However, when the body's immune system can't get rid of a high-risk HPV infection, it can linger over time and turn normal cells into abnormal cells and then cancer.

Low-Risk vs High-Risk HPVs

HPV types are often referred to as “low-risk” (wart-causing) or “high-risk” (cancer-causing) based on whether they put a person at higher risk for cancer.¹

Low-Risk HPVs

- Low-risk HPVs mostly cause no disease. However, a few low-risk HPVs can cause skin warts on or around the genitals, anus, mouth or throat.
- HPV 6 and HPV 11 cause 90% of all genital warts. They also cause recurrent respiratory papillomatosis, a less common disease in which benign tumors grow in the air passages leading from the nose and mouth into the lungs.²

High-Risk HPVs

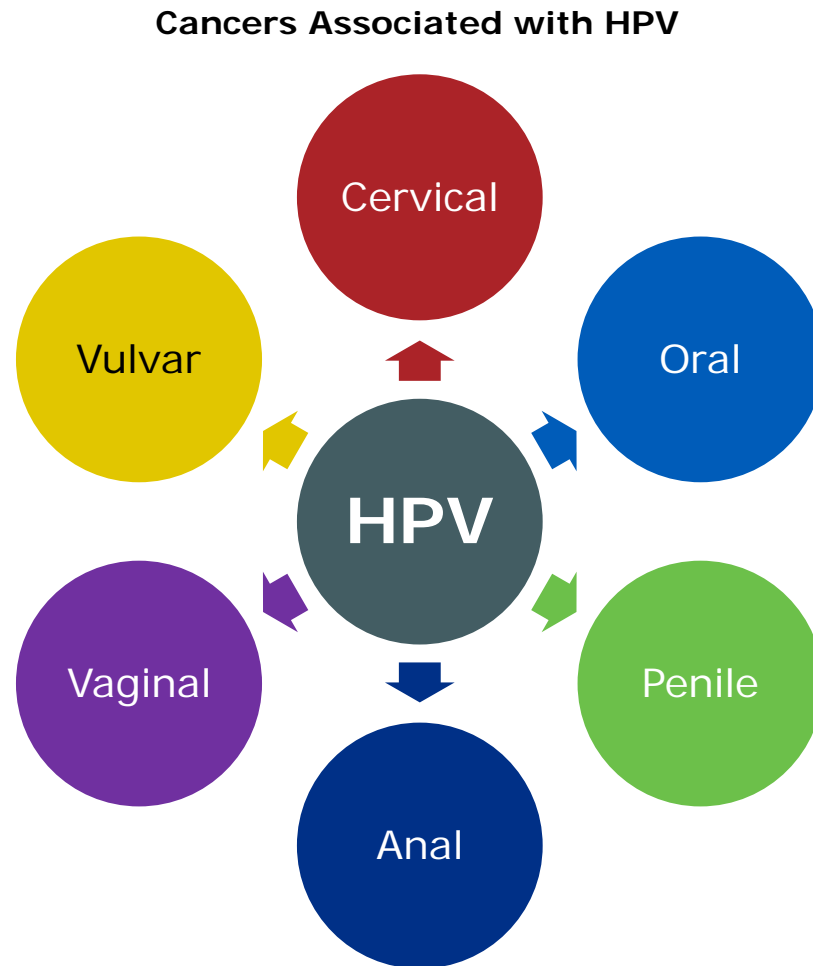
- High-risk HPVs can cause several types of cancer—there are about 14 high-risk HPV types.
- HPV 16 and HPV 18 are responsible for most HPV-associated cancers.²

¹ Basic Information about HPV and Cancer, Centers for Disease Control and Prevention (CDC). [cdc.gov/cancer/hpv/basic_info/](https://www.cdc.gov/cancer/hpv/basic_info/)

² HPV and Cancer, National Cancer Institute (NCI). [cancer.gov/about-cancer/causes-prevention/risk/infectious-agents/hpv-and-cancer](https://www.cancer.gov/about-cancer/causes-prevention/risk/infectious-agents/hpv-and-cancer)

Cancers Associated with HPV

- An HPV-associated cancer is a specific cellular type of cancer that is diagnosed in a part of the body where HPV is often found.
- Body parts include the cervix, vagina, vulva, penis, anus, and oropharynx (back of the throat, including the base of the tongue and tonsils).¹
- Cellular types include carcinomas of the cervix and squamous cell carcinomas of the vagina, vulva, penis, anus (including rectal squamous cell carcinoma), and oropharynx.¹



¹ How Many Cancers Are Linked with HPV Each Year?, Centers for Disease Control and Prevention (CDC). [cdc.gov/cancer/hpv/statistics/cases.htm](https://www.cdc.gov/cancer/hpv/statistics/cases.htm)

Cancers Attributable to HPV

- An HPV-attributable cancer is a cancer probably caused by HPV.¹
- The Centers for Disease Control and Prevention estimates that the following percentage of cancers are probably caused by HPV:²
 - More than 90% of cervical and anal cancers
 - About 70% of oropharyngeal, vaginal, and vulvar cancers
 - About 60% of penile cancers
- In the U.S., high-risk HPV types cause approximately 3% of all cancer cases in females and 2% of all cancer cases in men.³

¹ How Many Cancers Are Linked with HPV Each Year?, Centers for Disease Control and Prevention, [cdc.gov/cancer/hpv/statistics/cases.htm](https://www.cdc.gov/cancer/hpv/statistics/cases.htm)

² Cancers Associated with Human Papillomavirus (HPV), Centers for Disease Control and Prevention, [cdc.gov/cancer/hpv/basic_info/cancers.htm](https://www.cdc.gov/cancer/hpv/basic_info/cancers.htm)

³ HPV and Cancer, National Cancer Institute, [cancer.gov/about-cancer/causes-prevention/risk/infectious-agents/hpv-and-canc](https://www.cancer.gov/about-cancer/causes-prevention/risk/infectious-agents/hpv-and-canc)

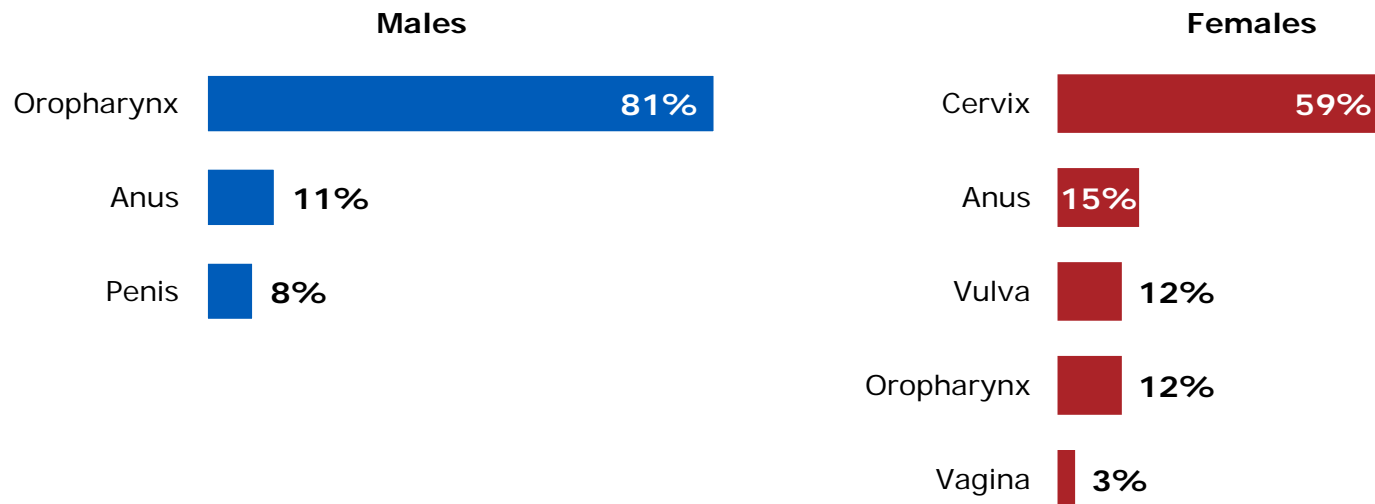
HPV-Associated Cancers

Overall Rates and Trends

HPV-Associated Cancer Cases in Texas

- During 2013–2017, about 3,200 new cases of HPV-associated cancers occurred in Texas each year (about 1,900 in females and 1,300 in males).
- In females, cervical cancer accounts for nearly 60% of cancers at HPV-associated cancer sites.
- In males, oropharyngeal cancers (cancers of the back of the throat, including the base of the tongue and tonsils) account for nearly 80% of cancers at HPV-associated cancer sites.

Proportion of New HPV-Associated Cancer Cases by Sex and Site, Texas, 2013-2017*



*Percentages may not add up to 100 due to rounding.

Average HPV-Associated Cancer Cases and Estimated HPV-Attributable Cancer Cases Per Year in Texas

- Not all cancer cases at HPV-associated cancer sites are attributed to, or caused by, HPV. The percent of HPV-attributable cases varies by cancer site and sex.¹
 - In females, an estimated 83% of cancer cases at HPV-associated sites are attributable to HPV. In males, the estimate is 74%.
 - Cervical and anal cancers have the highest percentage of cases attributed to HPV.
- The last column of this table shows the estimates of HPV-attributable cancer cases. This is calculated by multiplying the number of cases for each HPV-associated site by the percent attributable to HPV.

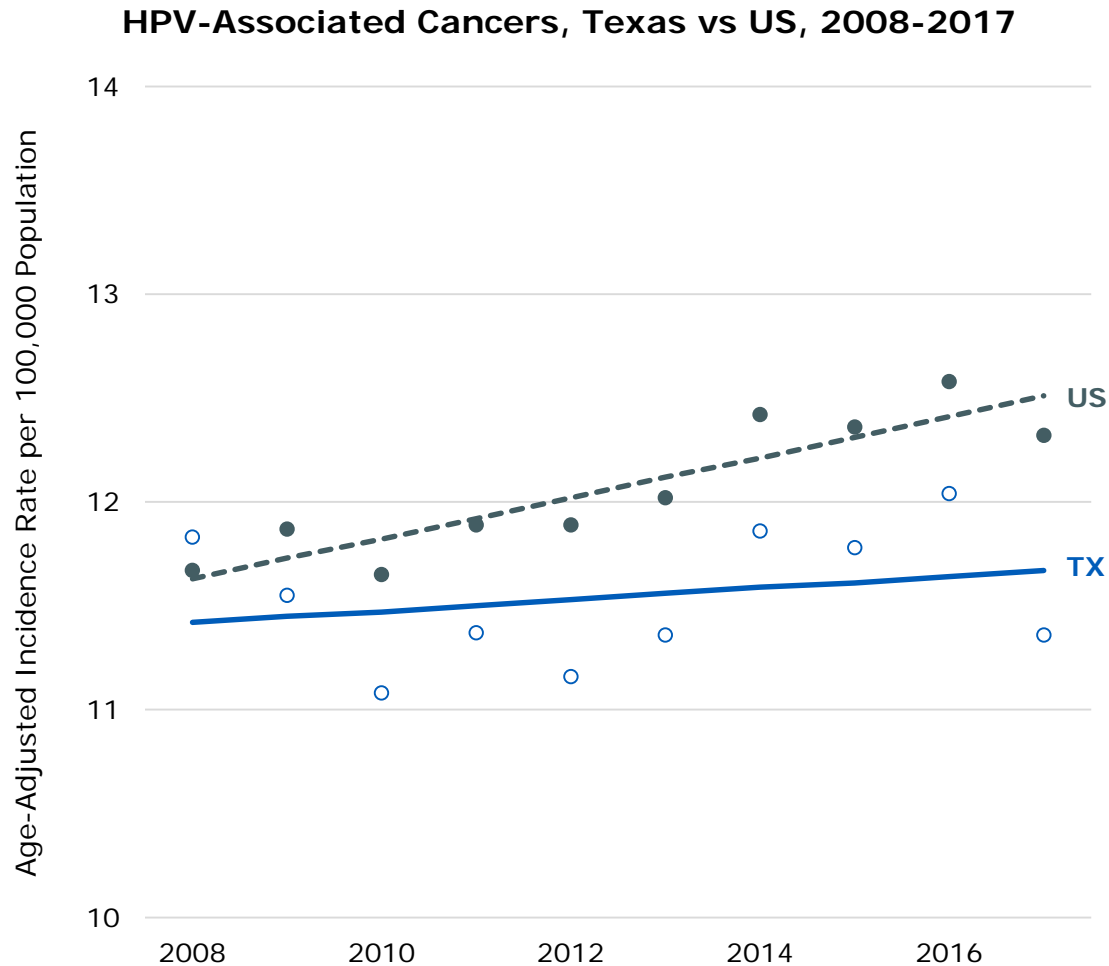
HPV-Associated Cancer Sites	Number of Cancer Cases per Year ²	Percent of Cases Attributed to HPV ¹	Estimated Number of Cases Attributed to HPV per Year
Cervix	1,123	91%	1,022
Vagina	60	75%	45
Vulva	218	69%	150
Penis	103	63%	65
Anus (All)	425	91%	387
Female	276	93%	256
Male	150	89%	133
Oropharynx (All)	1,303	70%	912
Female	218	63%	137
Male	1,085	72%	781

Average and estimated cases may not sum due to rounding.

¹ Centers for Disease Control and Prevention, [cdc.gov/cancer/hpv/statistics/cases.htm](https://www.cdc.gov/cancer/hpv/statistics/cases.htm)

² Average cases per year based on cases diagnosed in Texas from 2013-2017.

HPV Associated Cancer Incidence Rate Trends



- During 2008-2017, incidence rates of HPV-associated cancer did not significantly change in Texas.
- However, US incidence rates of HPV-associated cancer significantly increased at an average annual percent change of 0.8% per year.

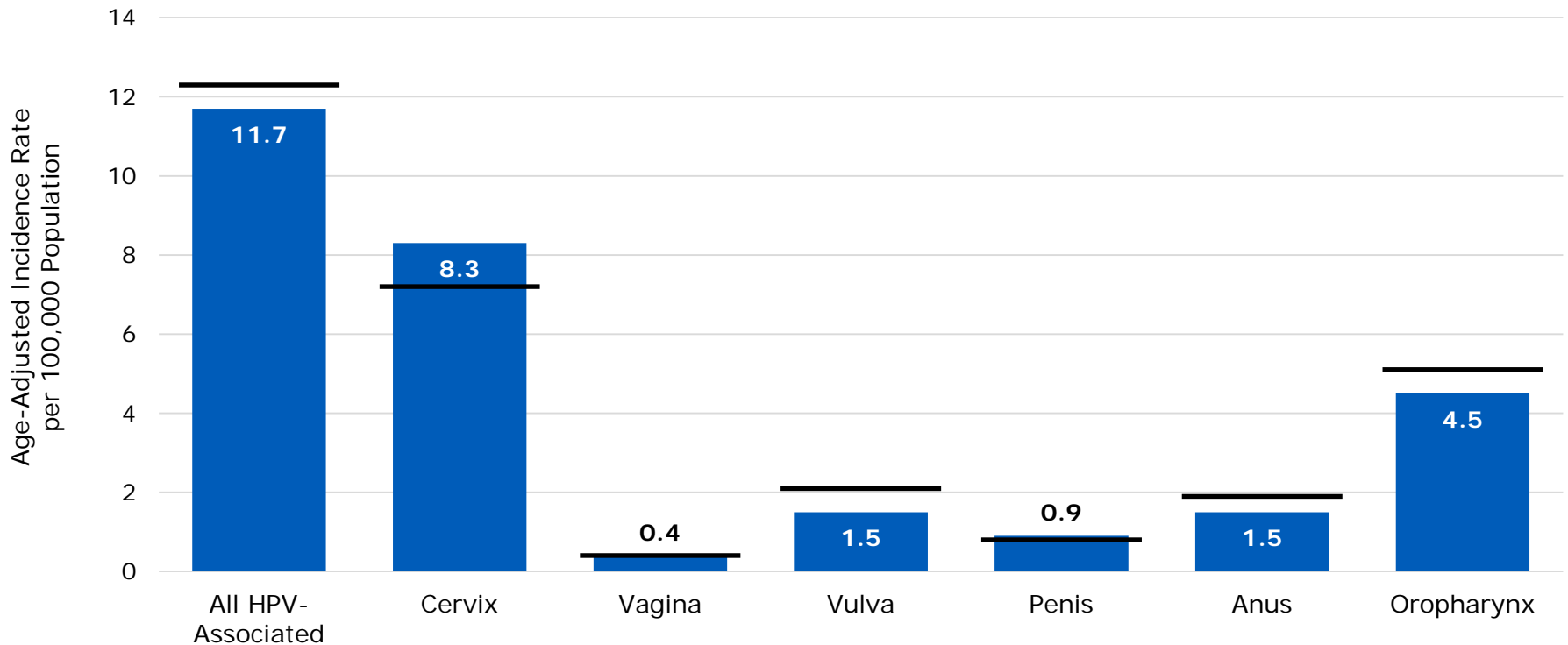
Lines represent the Joinpoint modeled trend, and points represent observed data.

HPV-Associated Cancer Incidence Rates by Site

- The incidence rate of all HPV-associated cancers combined was lower in Texas than the US.
- However, HPV-associated cervical cancer incidence rate was significantly higher in Texas than in the US.

HPV-Associated Cancers by Site, Texas, 2013–2017

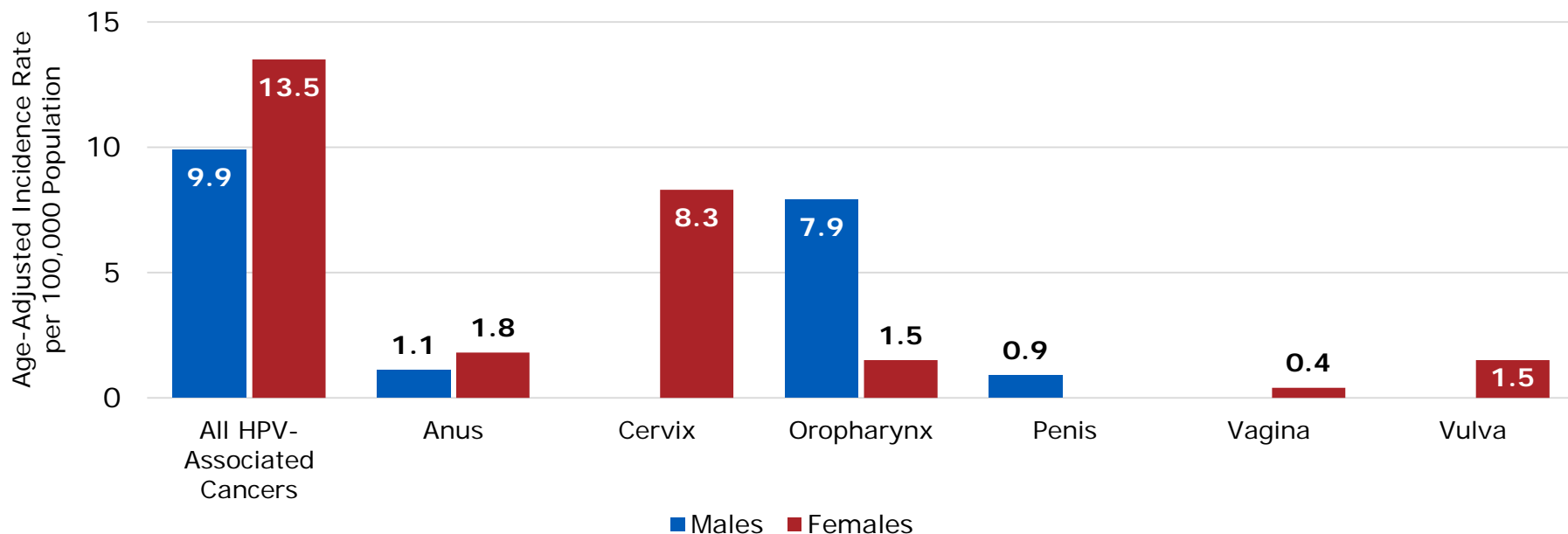
Black lines represent US incidence rates



HPV-Associated Cancer Incidence Rates by Site and Sex

- When all HPV-associated sites were combined, females had higher incidence rates versus males in Texas.
- The site with the highest incidence rate among females was cervical cancer. Oropharyngeal cancer was the highest among males.

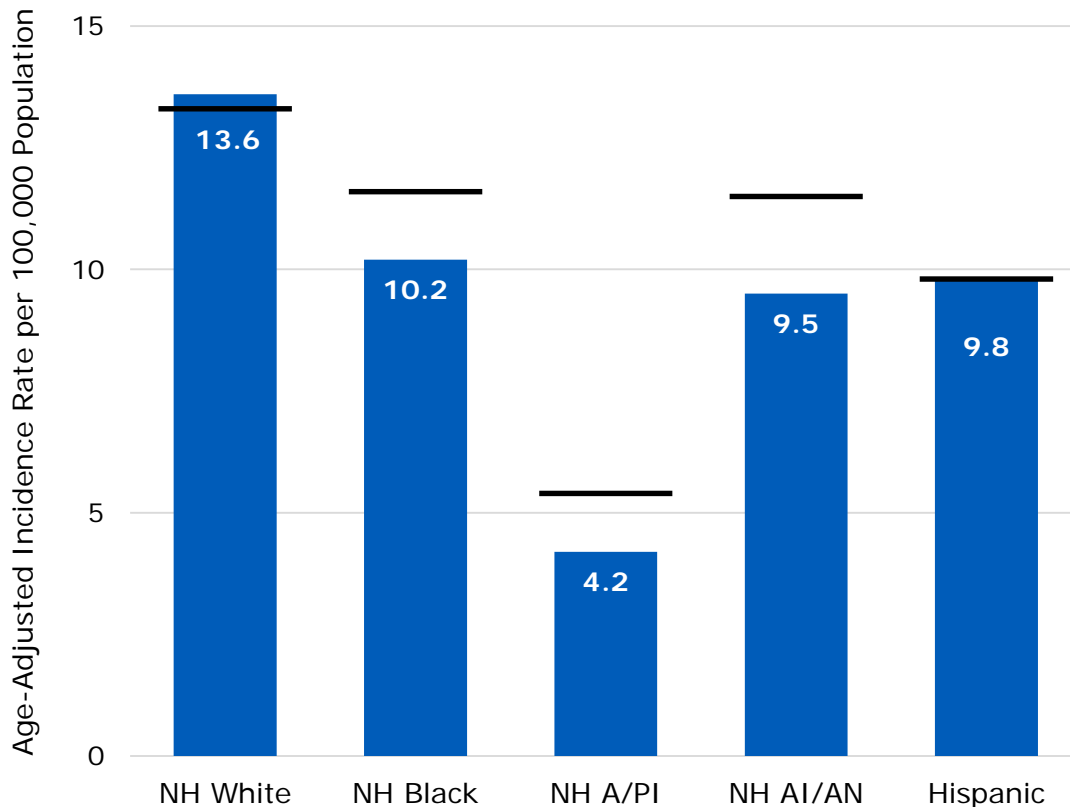
HPV-Associated Cancer by Sex and Site, Texas, 2013–2017



HPV-Associated Cancer Incidence Rates by Race/Ethnicity

HPV-Associated Cancers by Race/Ethnicity,
Texas, 2013-2017

Black lines represent US incidence rates



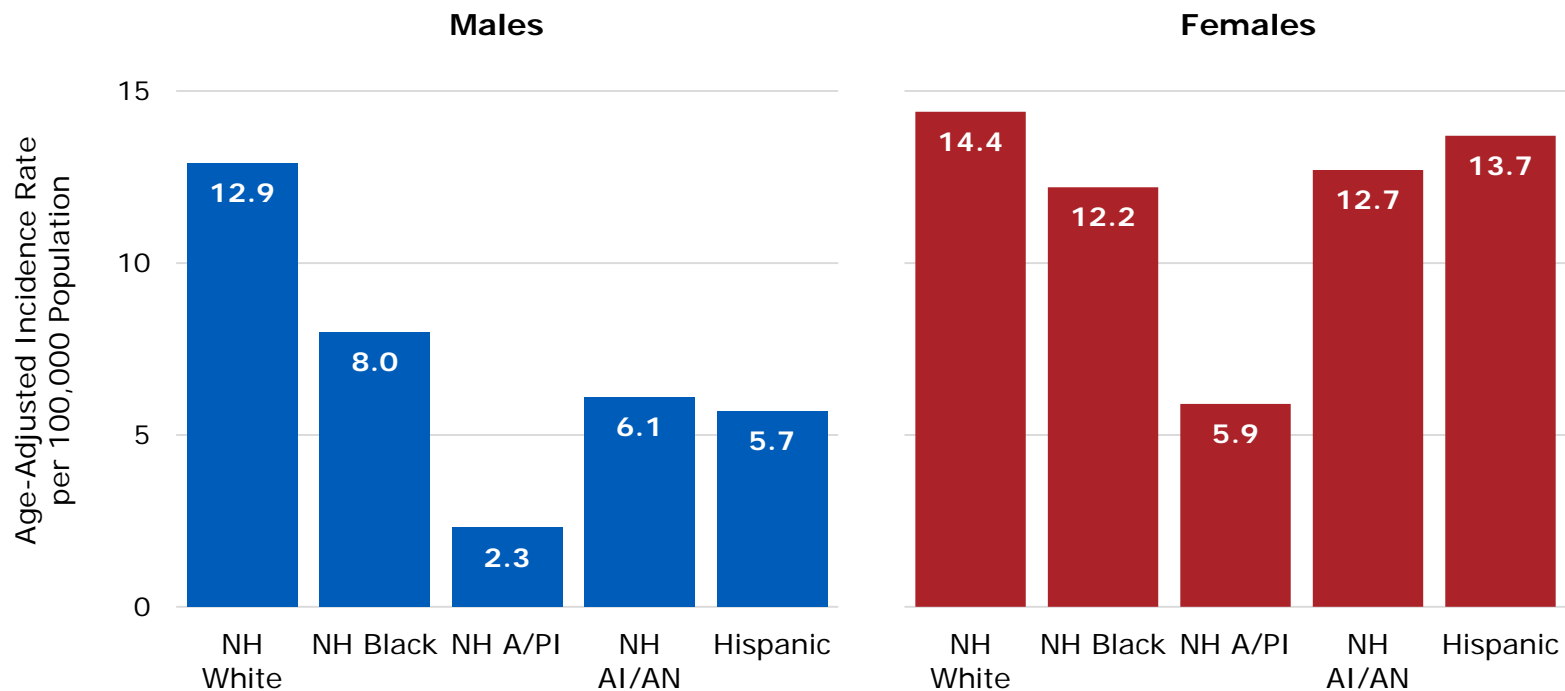
- The HPV-associated cancer incidence rate in Texas is 11.7 cases per 100,000. The US rate is 12.3.
- In Texas, incidence rates were highest among non-Hispanic whites and lowest among NH Asian/Pacific Islanders.
- For NH blacks and NH A/PI, HPV-associated cancer incidence rates were statistically significantly lower in Texas than the US.

NH = Non-Hispanic; A/PI = Asian/Pacific Islander; AI/AN = American Indian/Alaska Native.

HPV-Associated Cancer Incidence Rates by Sex and Race/Ethnicity

- Incidence rates of HPV-associated cancers were higher in females than males across all race/ethnicity groups.
- The disparity between sexes was greatest among Hispanic Texans. Incidence rate of HPV-associated cancer was 2.4 times higher in Hispanic females than Hispanic males.

HPV-Associated Cancers by Race/Ethnicity and Sex, Texas, 2013–2017

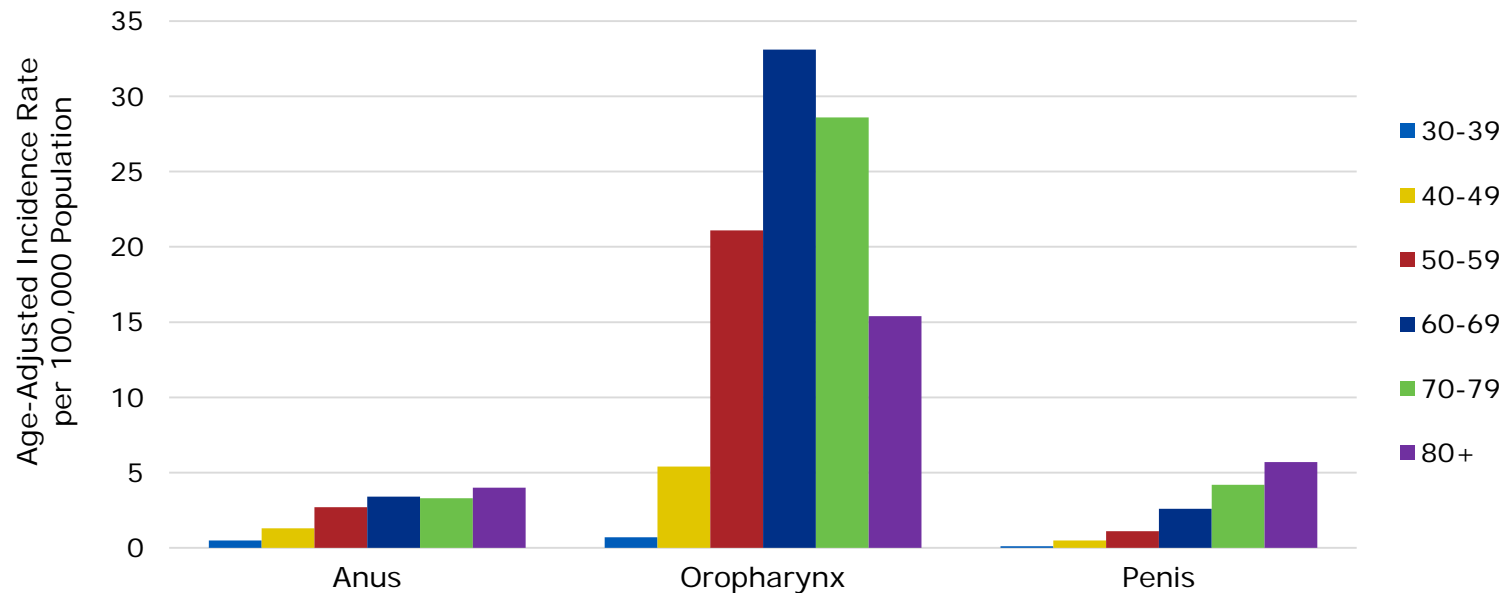


NH = Non-Hispanic; A/PI = Asian/Pacific Islander; AI/AN = American Indian/Alaska Native.

HPV-Associated Cancer Incidence Rates in Males by Site and Age at Diagnosis

- In males, HPV-associated oropharyngeal cancer incidence rates were highest for ages 60-69 years (33.1 cases per 100,000 population).
- Incidence rates of HPV-associated penile and anal cancer increase with each age group.

HPV-Associated Cancers by Site and Age at Diagnosis, Males, Texas, 2013-2017

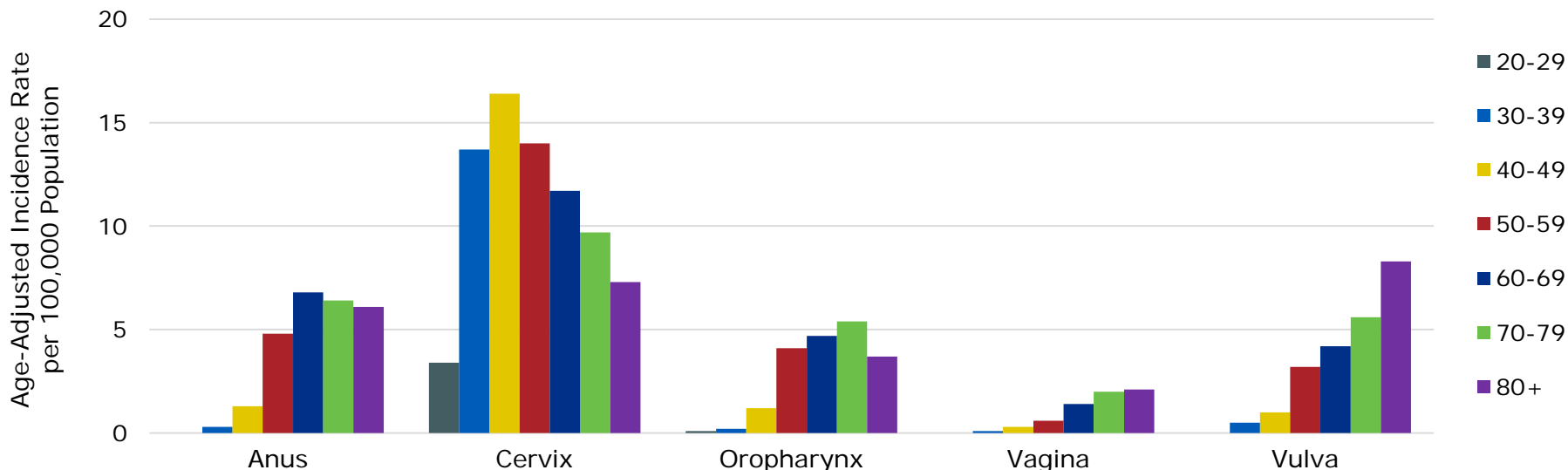


Rates are suppressed if fewer than 16 cases were reported in a specific category, such as cancer site and age group.

HPV-Associated Cancer Incidence Rates in Females by Site and Age at Diagnosis

- HPV-associated cervical cancer incidence rates were highest for ages 40-49 years (16.4 cases per 100,000 population). It was highest among all HPV-associated females for all age groups except ages 80 and older.
- HPV-associated anal cancer rates were highest among females ages 60-69 years (6.8).
- Incidence rates of HPV-associated oropharyngeal cancer were highest among females ages 70-79 years (5.4).
- Incidence rates of HPV-associated vulvar and vaginal cancer continued to increase with each age group.

HPV-Associated Cancers by Site and Age at Diagnosis, Females, Texas, 2013-2017

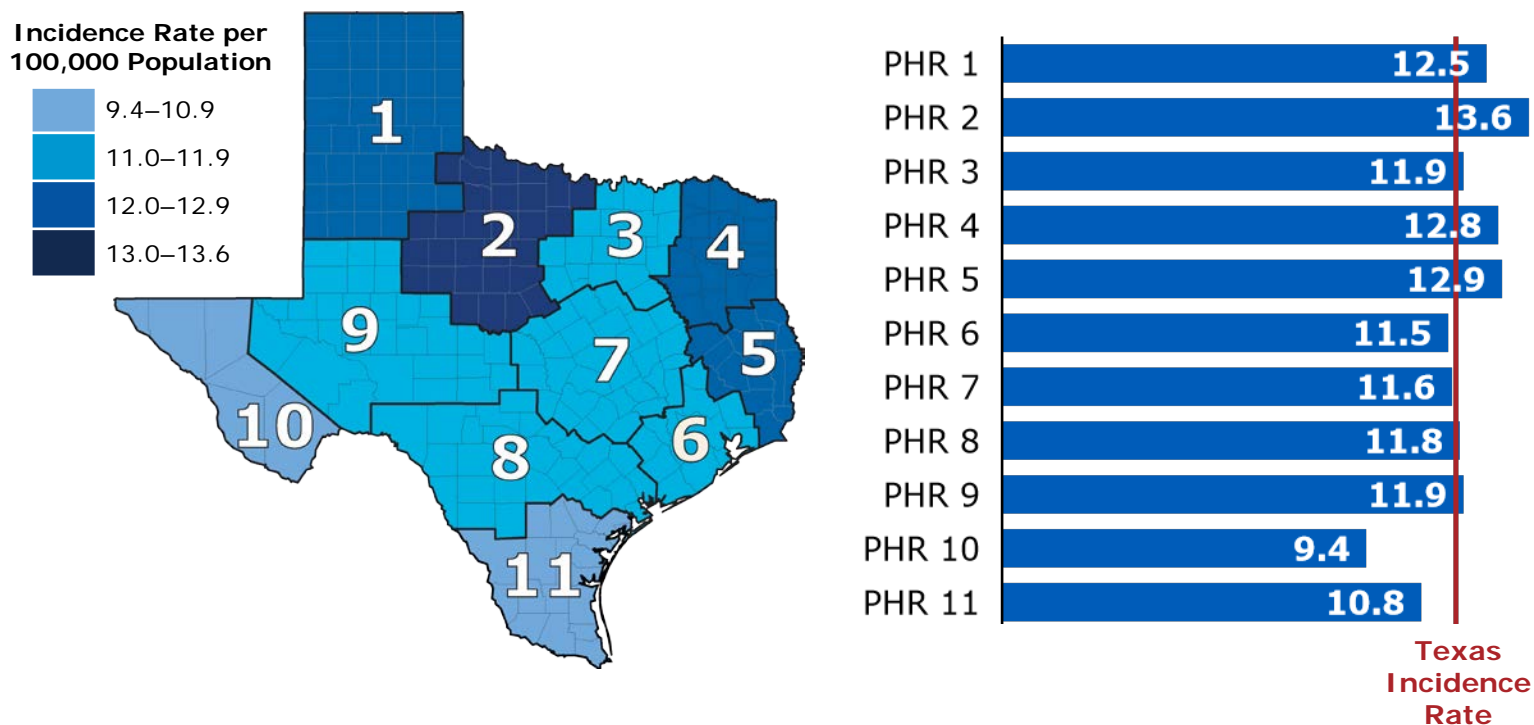


Rates are suppressed if fewer than 16 cases were reported in a specific category, such as cancer site and age group.

HPV-Associated Cancer Incidence Rates by Texas Public Health Region

Incidence rates of HPV-associated cancers are highest in PHR 2.

Incidence Rates of All HPV-Associated Cancers by PHR, 2013–2017

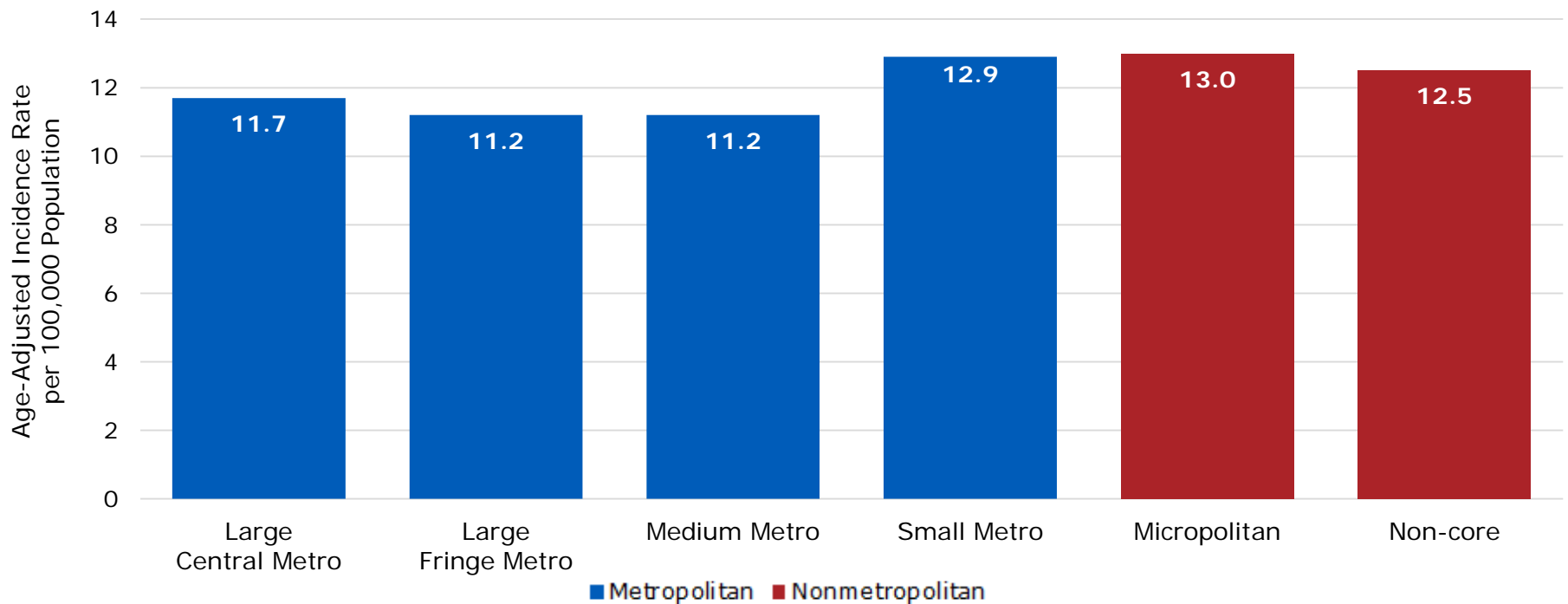


For more information on PHRs, see slide [Texas Public Health Regions](#).

HPV-Associated Cancer Incidence Rates by Rural-Urban Classification

- In Texas, incidence rates of HPV-associated cancers were higher in more rural areas.
- Micropolitan counties have the highest incidence rates.

HPV-Associated by Urban-Rural Classification, Texas, 2013-2017

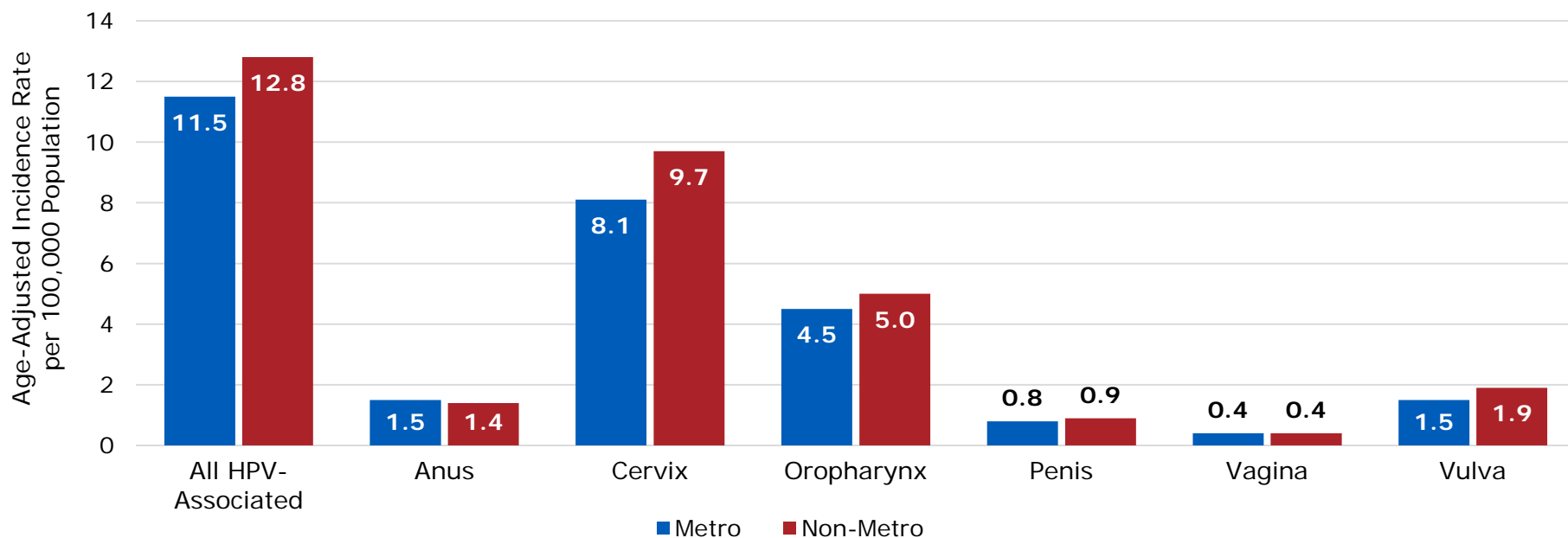


For more information on county classification, see slide [Texas Urban-Rural Classification](#).

HPV-Associated Cancer Incidence Rates by Site and Metro Status, Texas, 2013-2017

- The incidence rate of all HPV-associated cancers combined was statistically higher in non-metro counties than in metro counties.
- For cervical cancer, the incidence rate was statistically higher in non-metro counties. For all other sites, incidence rates were statistically similar between metro and non-metro counties.

HPV-Associated Cancers by Site and Urban-Rural Classification, Texas, 2013-2017

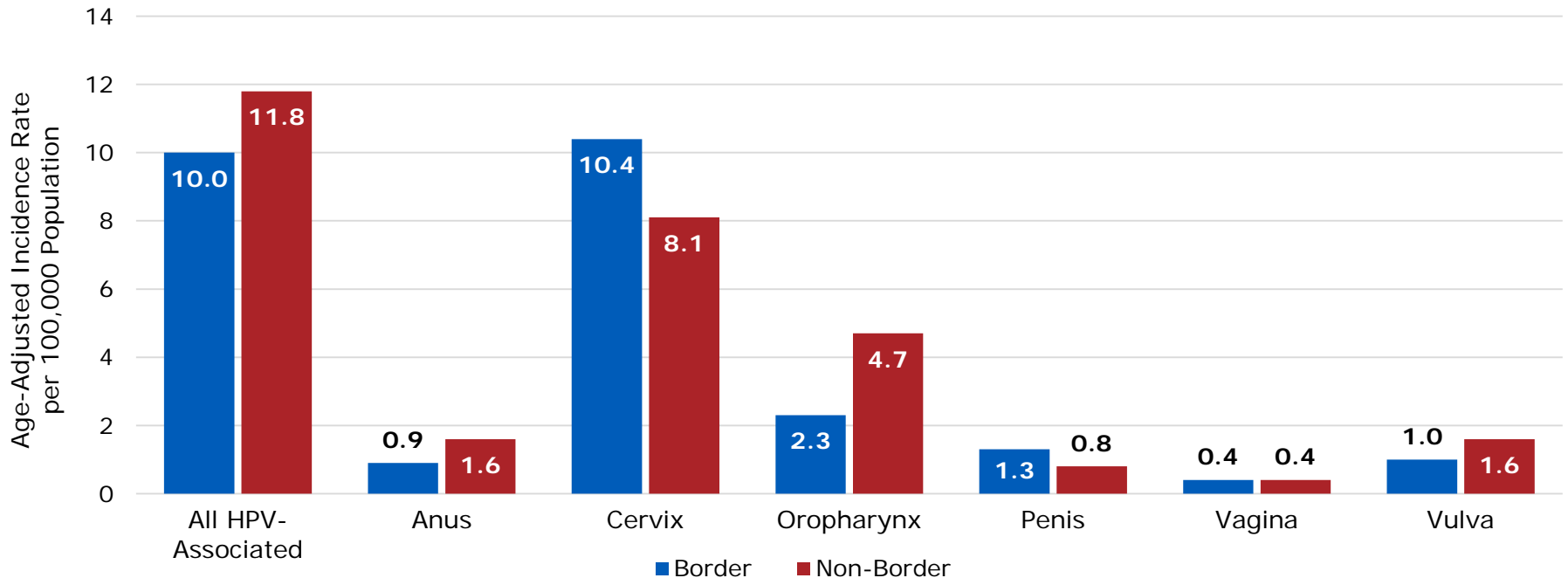


For more information on county classification, see slide [Texas Urban-Rural Classification](#).

HPV-Associated Cancer Incidence Rates by Site and Border/Non-Border Status

HPV-associated cancer incidence rates were higher in non-border counties than border counties except for cervical and penile cancers, which had statistically higher incidence rates in border counties.

HPV-Associated Cancers by Site and Border/Non-Border Status, Texas, 2013-2017



Border counties as defined by the La Paz agreement (see slide [Texas Border Region](#)).

HPV-Associated Cancers

Rates & Trends for Specific Cancer Sites in Texas

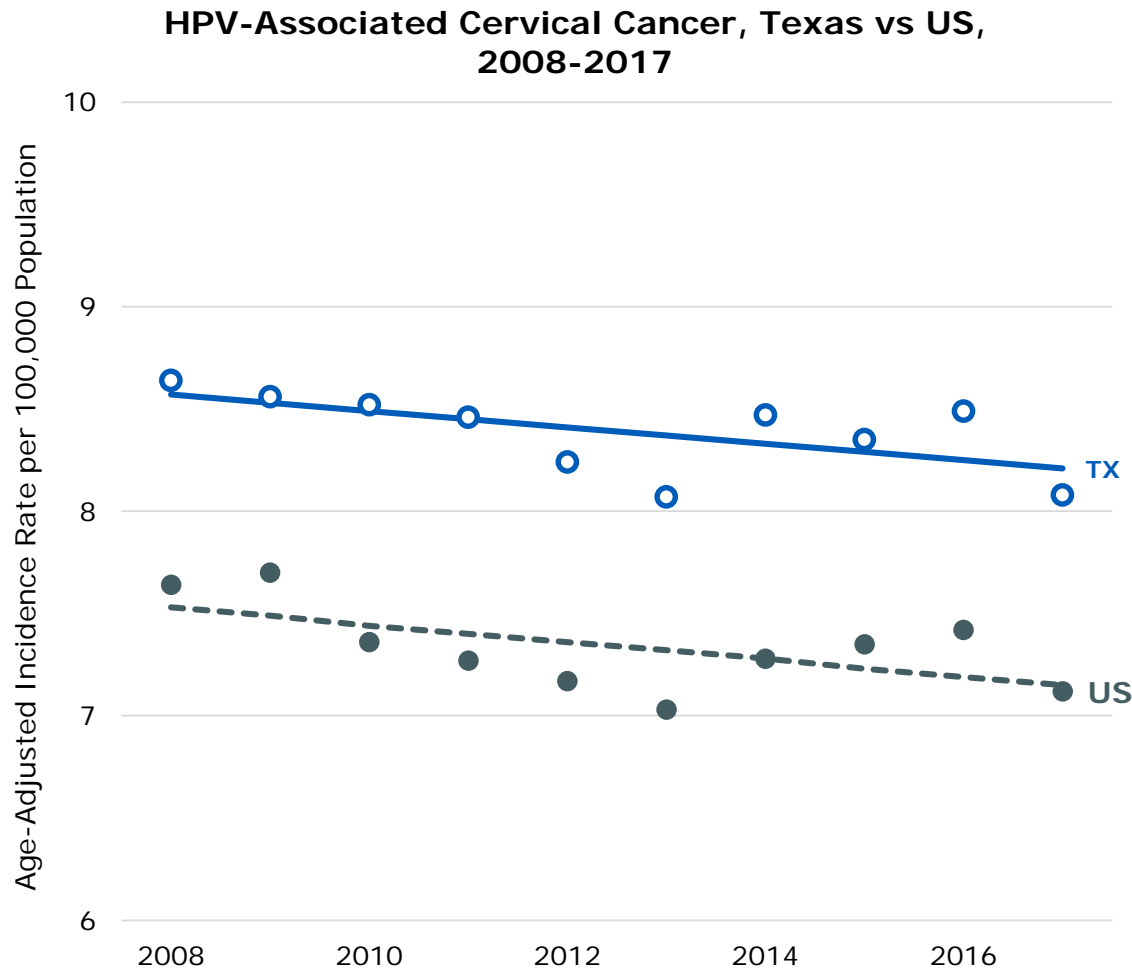
Cervical Cancer

- HPV is associated with cervical carcinomas, the most common type of cervical cancer.¹
- An estimated 91% of cervical carcinoma cases are attributed to HPV.²
- Overall, the HPV-associated cervical cancer incidence rate in Texas was 8.3 cases per 100,000 population from 2013-2017. The rate was higher in Texas than the US (7.2).

¹ American Cancer Society, [cancer.org/cancer/cervical-cancer/about/what-is-cervical-cancer.html](https://www.cancer.org/cancer/cervical-cancer/about/what-is-cervical-cancer.html)

² Centers for Disease Control and Prevention, [cdc.gov/cancer/hpv/statistics/cases.htm](https://www.cdc.gov/cancer/hpv/statistics/cases.htm)

Cervical Cancer Incidence Rate Trends



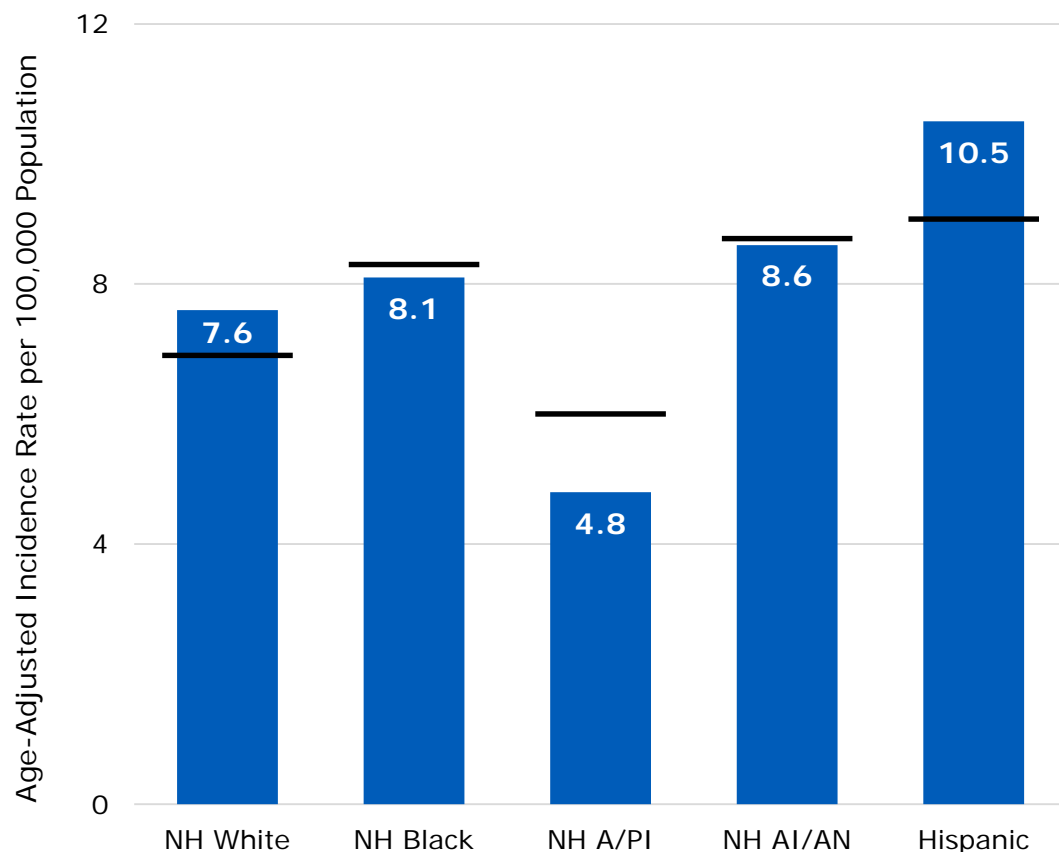
- During 2008-2017, Texas and the US experienced small decreases in the incidence rates of HPV-associated cervical cancer.
- However, the decreases in incidence rates of HPV-associated cervical cancer were not statistically significant for Texas or the US.

Lines represent the Joinpoint modeled trend, and points represent observed data.

Cervical Cancer Incidence Rates by Race/Ethnicity

HPV-Associated Cervical Cancer by Race/Ethnicity, Texas, 2013-2017

Black lines represent US incidence rates



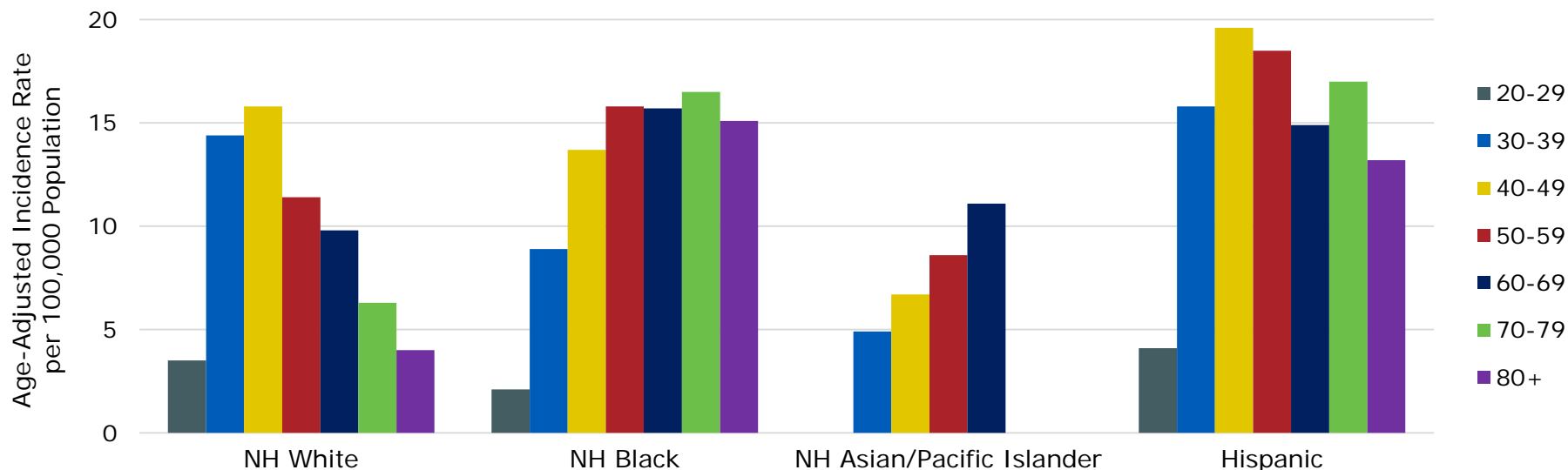
- In Texas, the incidence rate of HPV-associated cervical cancer was highest among Hispanic females. It was lowest among non-Hispanic Asian/Pacific Islander females.
- Rates were statistically higher among Hispanic and NH White females in Texas than the US.
- Rates for NH A/PI females were statistically lower in Texas than the US.

NH = Non-Hispanic; A/PI = Asian/Pacific Islander; AI/AN = American Indian/Alaska Native.

Cervical Cancer Incidence Rates by Race/Ethnicity and Age at Diagnosis

- HPV-associated cervical cancer incidence rates were highest among Hispanic females age 40-49 years (9.6 cases per 100,000 population).
- Rates peaked among non-Hispanic white and Hispanic females at ages 40-49 years, while rates continued to increase with age among NH Black and NH Asian/Pacific Islander females.

HPV-Associated Cervical Cancers by Race/Ethnicity and Age at Diagnosis, Texas, 2013-2017

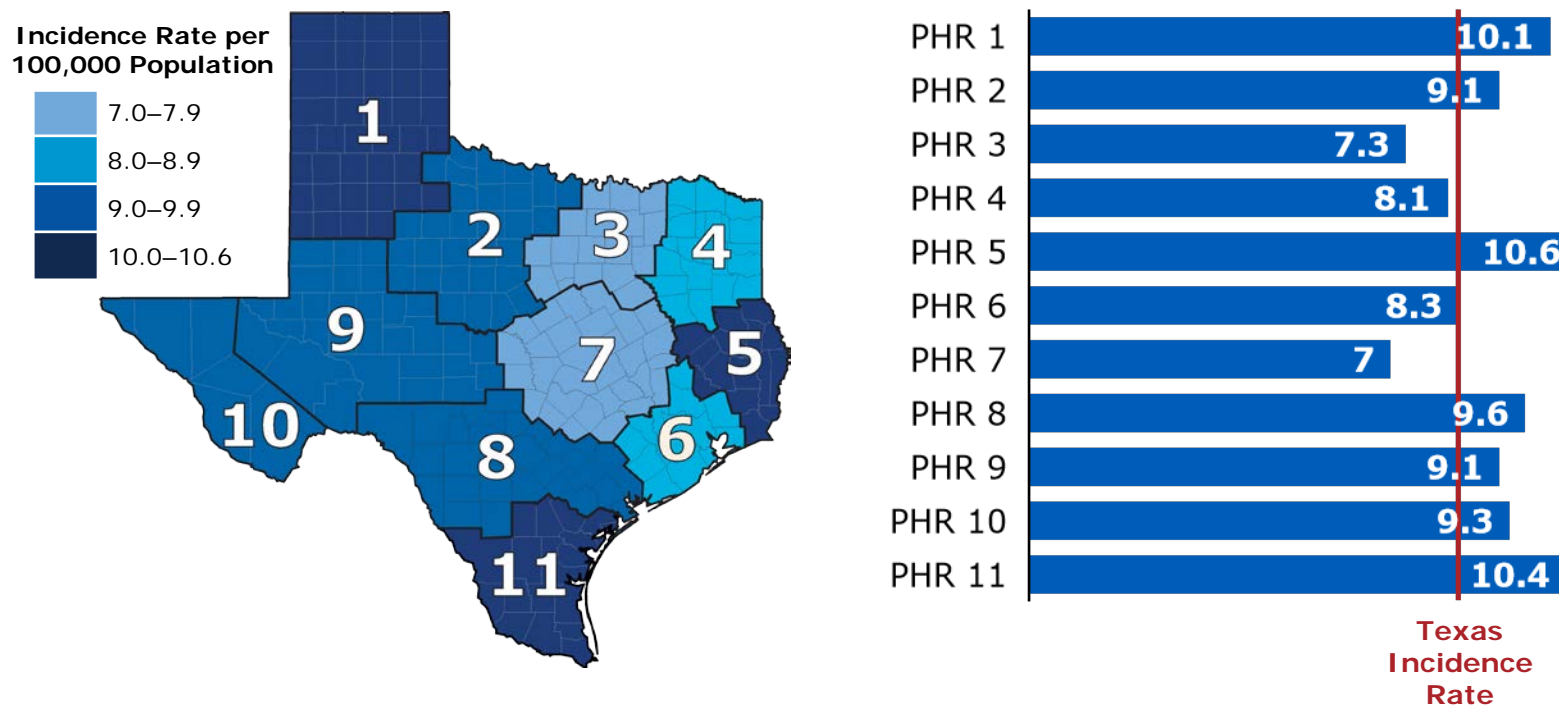


Rates are suppressed if fewer than 16 cases were reported in a specific category, such as race/ethnicity and age group.
NH = Non-Hispanic.

Cervical Cancer Incidence Rates by Texas Public Health Region

Cervical cancer incidence rates are highest in PHRs 5, 11, and 1.

HPV-Associated Cervical Cancer Incidence by PHR, 2013–2017

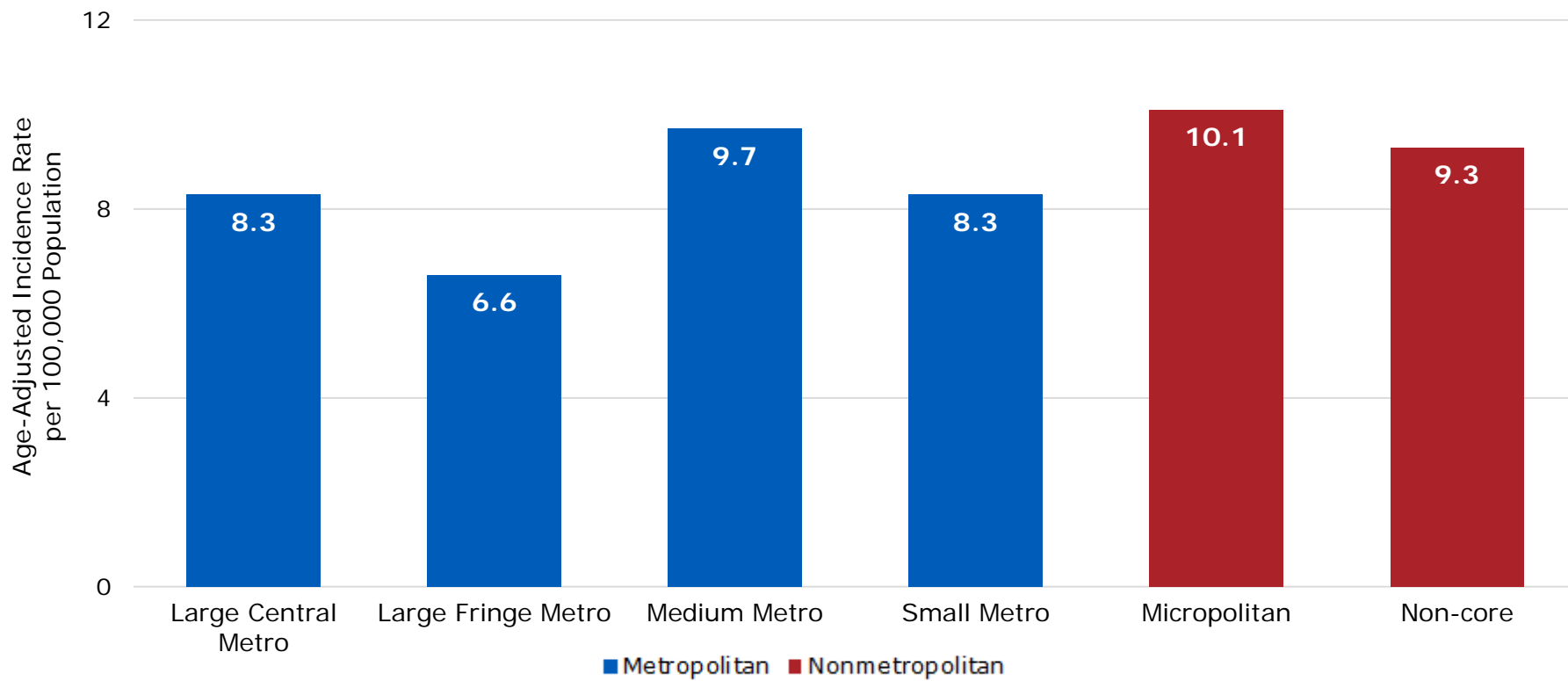


For more information on PHRs, see slide [Texas Public Health Regions](#).

Cervical Cancer Incidence Rates by Urban-Rural Classification

Incidence rates of HPV-associated cervical cancer were highest in micropolitan counties and lowest in large fringe metro counties.

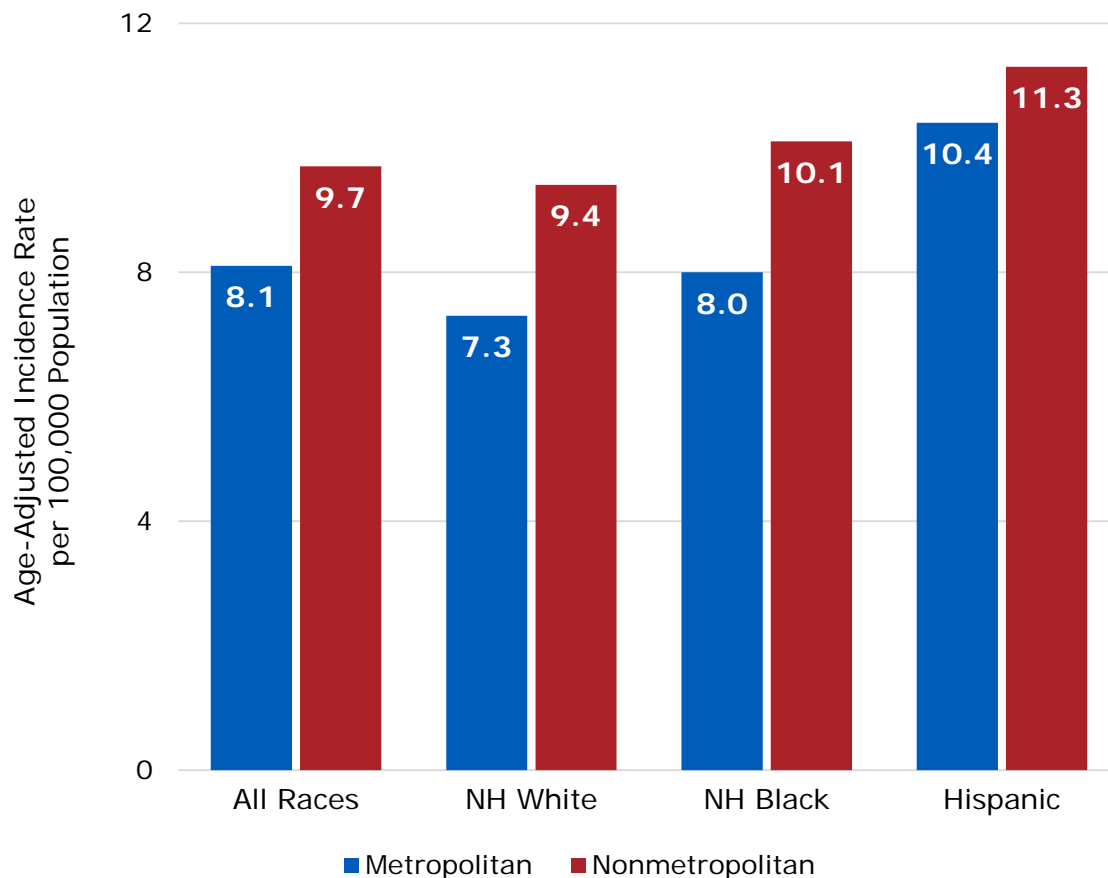
HPV-Associated Cervical Cancer by Urban-Rural Classification, Texas, 2013-2017



For more information on county classification, see slide [Texas Urban-Rural Classification](#).

Cervical Cancer Incidence Rates by Race/Ethnicity and Urban-Rural Status

HPV-Associated Cervical Cancer by Race/Ethnicity and Urban-Rural Status, Texas, 2013-2017



- The HPV-associated cervical cancer incidence rate for all races in Texas was statistically higher in non-metropolitan counties than in metropolitan counties.
- Incidence rates of HPV-associated cervical cancer were higher in non-metro counties across race/ethnicity groups. However, the difference was statistically significant only in non-Hispanic white females.

Rates for NH Asian/Pacific Islander and NH American Indian/Alaska Native are suppressed because fewer than 16 cases were reported in a specific category. NH = non-Hispanic. For more information on county classification, see slide [Texas Urban-Rural Classification](#).

Oropharyngeal Cancer

- HPV is associated with oropharyngeal squamous cell carcinomas, the most common type of oropharyngeal cancer.¹
- An estimated 70% of oropharyngeal squamous cell carcinoma cases are attributed to HPV.²
- In Texas, the incidence rate of HPV-associated oropharyngeal cancer was 4.5 cases per 100,000 population from 2013-2017.

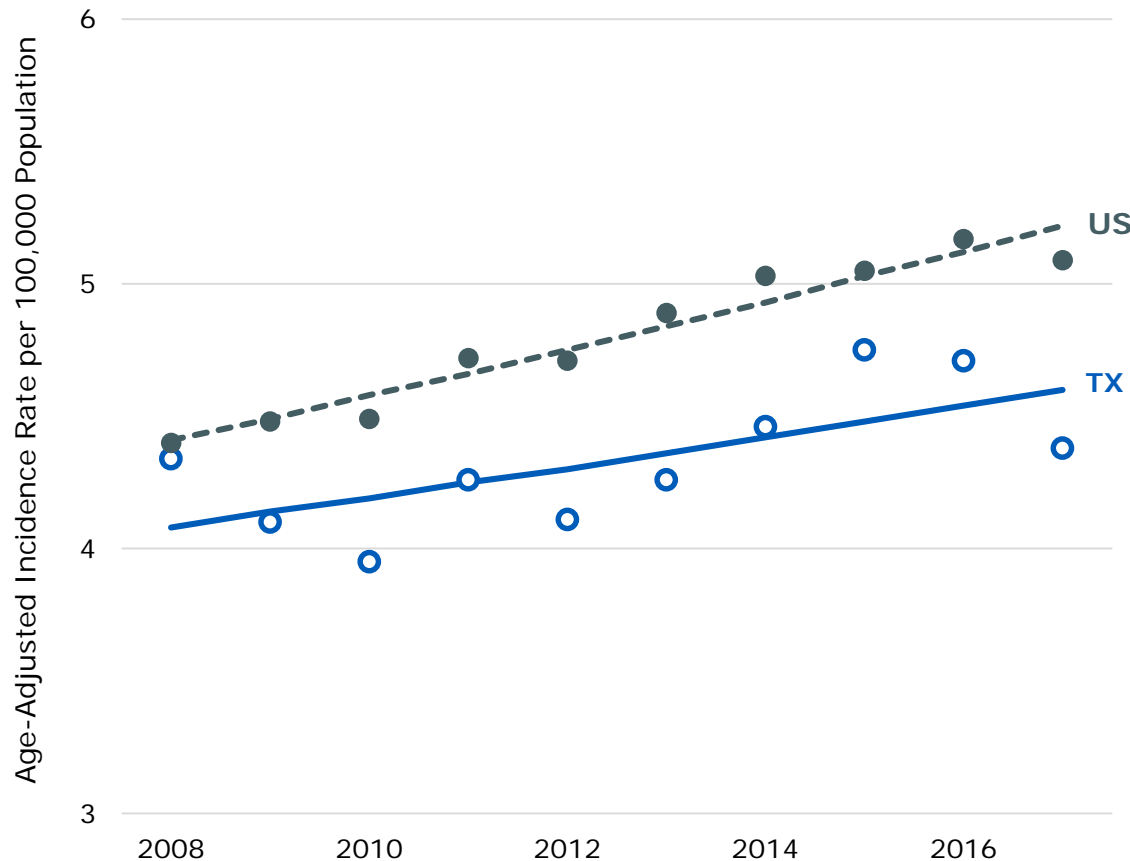
¹ American Cancer Society, [cancer.org/cancer/oral-cavity-and-oropharyngeal-cancer/about/what-is-oral-cavity-cancer.html](https://www.cancer.org/cancer/oral-cavity-and-oropharyngeal-cancer/about/what-is-oral-cavity-cancer.html)

² Centers for Disease Control and Prevention, [cdc.gov/cancer/hpv/statistics/cases.htm](https://www.cdc.gov/cancer/hpv/statistics/cases.htm)

* The most recent date for which prevalence data are available, includes all cases diagnosed since 1995.

Oropharyngeal Cancer Incidence Rate Trends

HPV-Associated Oropharyngeal Cancer,
Texas vs US, 2008-2017

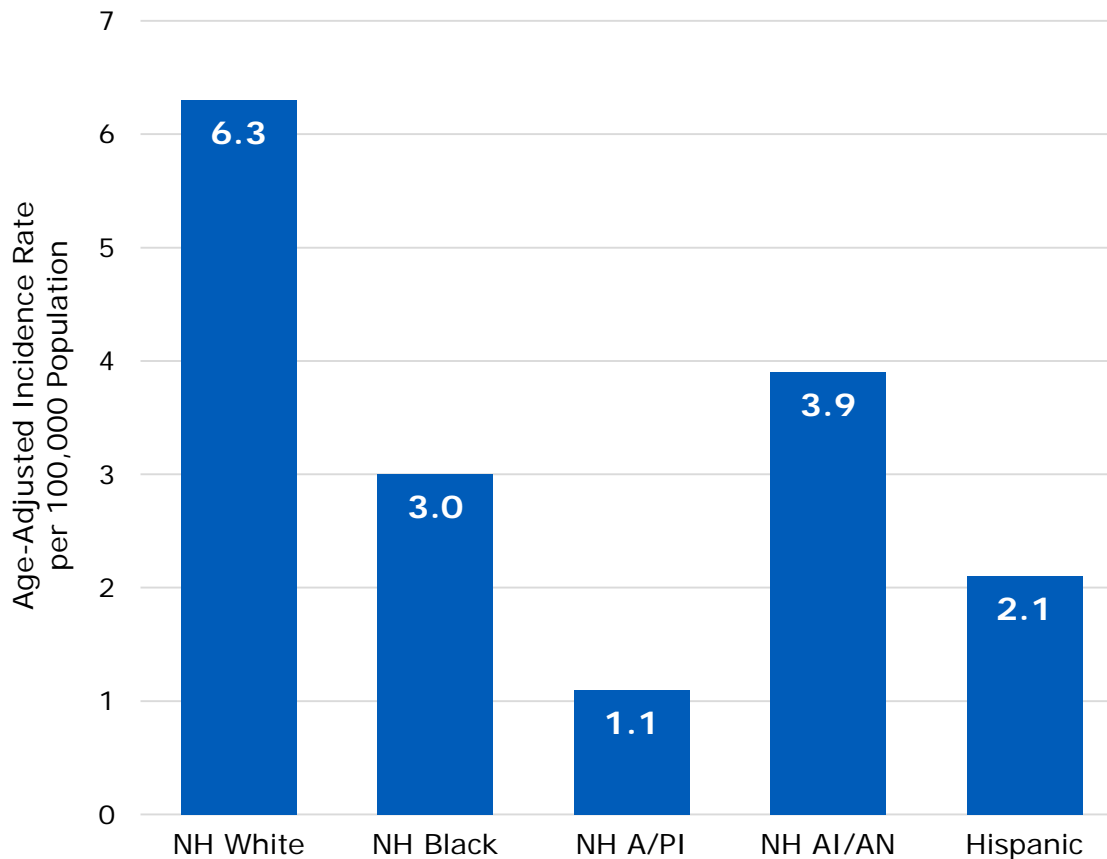


- HPV-associated oropharyngeal cancer incidence rates increased in both Texas and the US from 2008-2017.
- In Texas, the incidence rate increased significantly by an average of 1.3% per year.
- In the US, the incidence rate increased significantly by an average of 1.9% per year.

Lines represent the Joinpoint modeled trend, and points represent observed data.

Oropharyngeal Cancer Incidence Rates by Race/Ethnicity

HPV-Associated Oropharyngeal Cancer Incidence Rates by Race/Ethnicity, Texas, 2013-2017



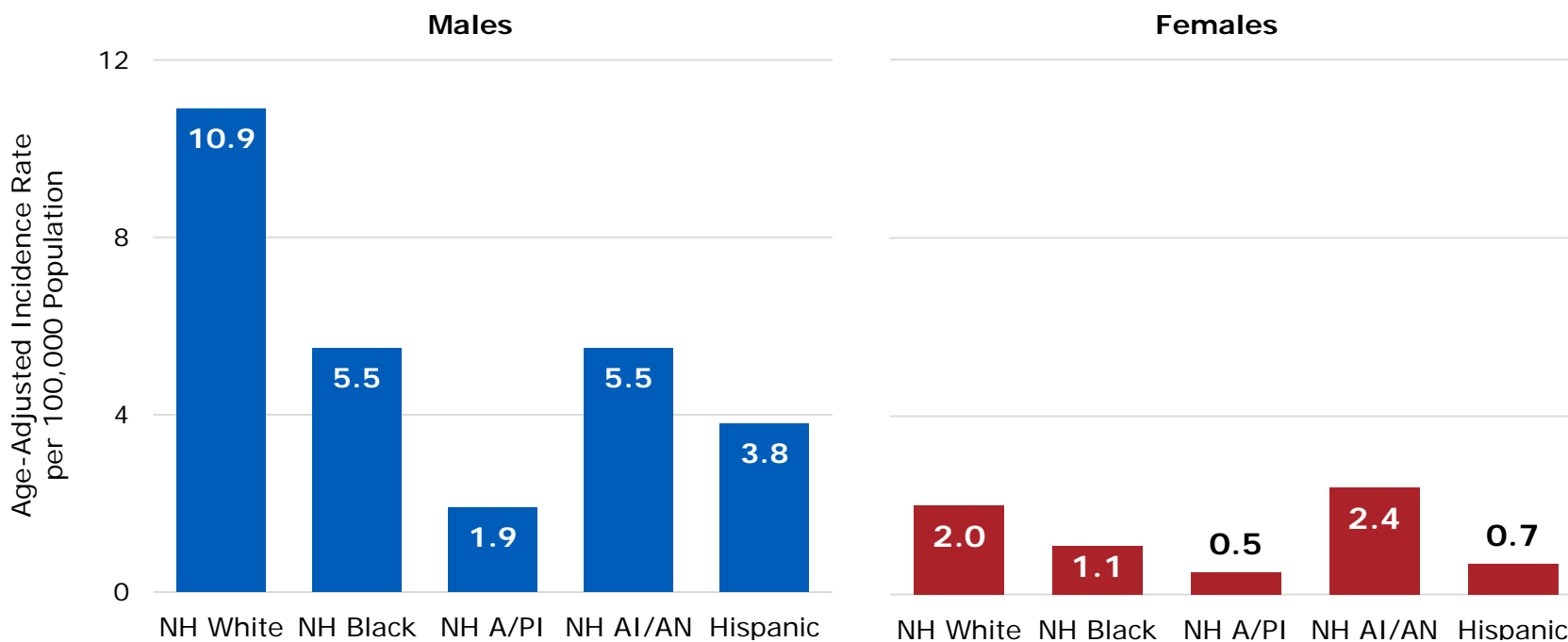
- In Texas, the incidence rate of HPV-associated oropharyngeal cancer was highest among non-Hispanic whites.
- Incidence rates in NH whites were two times higher than the rate among NH blacks and three times higher than the rate among Hispanics.
- The incidence rate was lowest among NH Asian/Pacific Islanders.

NH = Non-Hispanic; A/PI = Asian/Pacific Islander; AI/AN = American Indian/Alaska Native.

Oropharyngeal Cancer Incidence Rates by Sex and Race/Ethnicity

- Across all race/ethnicity groups, incidence rates of HPV-associated oropharyngeal cancer were higher in males than females.
- The incidence rate was highest among non-Hispanic white males.

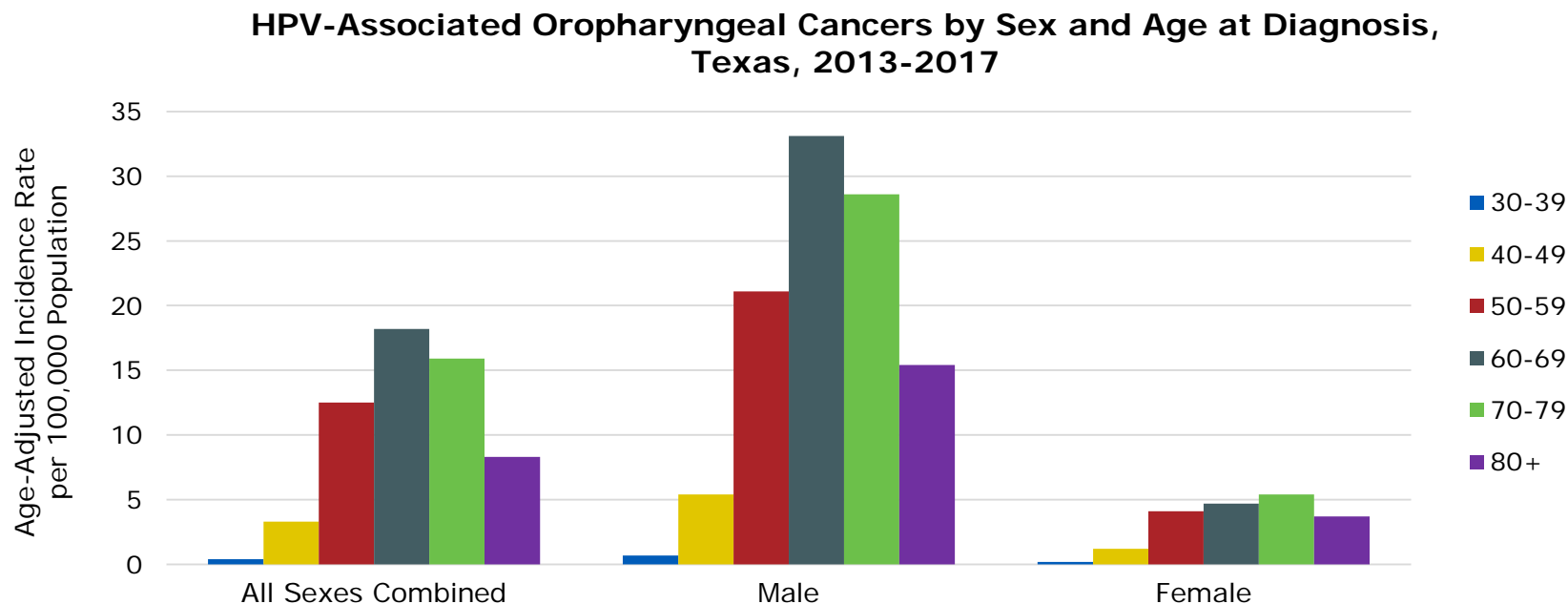
HPV-Associated Oropharyngeal Cancer by Race/Ethnicity and Sex, Texas, 2013-2017



NH = Non-Hispanic; A/PI = Asian/Pacific Islander; AI/AN = American Indian/Alaska Native.

Oropharyngeal Cancer Incidence Rates by Sex and Age at Diagnosis

- In males, incidence rates of HPV-associated oropharyngeal cancer peaked at ages 60-69 years (33.1 cases per 100,000 population).
- HPV-associated oropharyngeal cancer incidence rates were lower in females than males for all age groups. Rates in females peaked at ages 70-79 years (5.4).

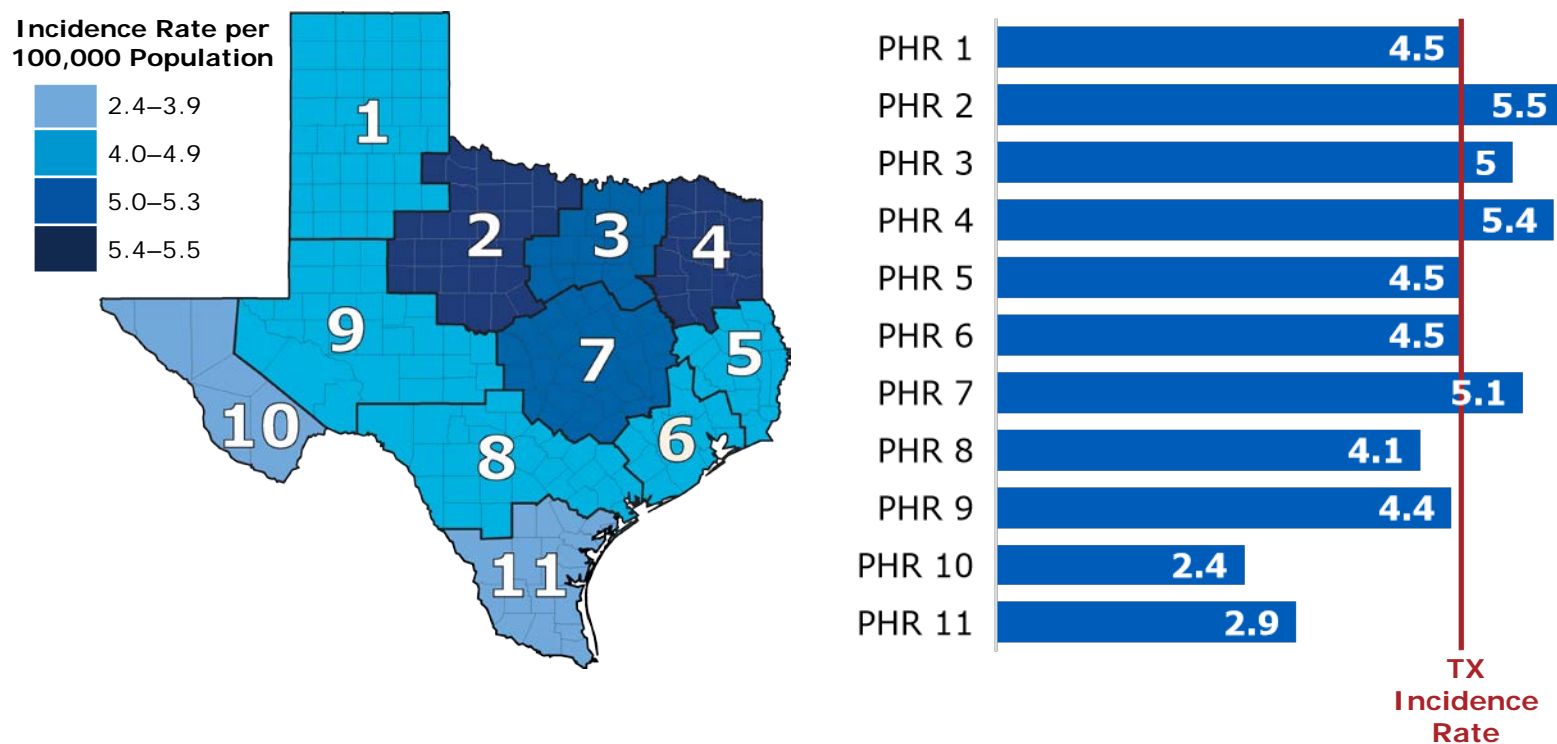


Rates are suppressed if fewer than 16 cases were reported in a specific category, such as sex and age group.

Oropharyngeal Cancer Incidence Rates by Texas Public Health Region

HPV-associated oropharyngeal cancer incidence rates are highest in PHRs 2 and 4.

HPV-Associated Oropharyngeal Cancer Incidence Rate by PHR, 2013–2017

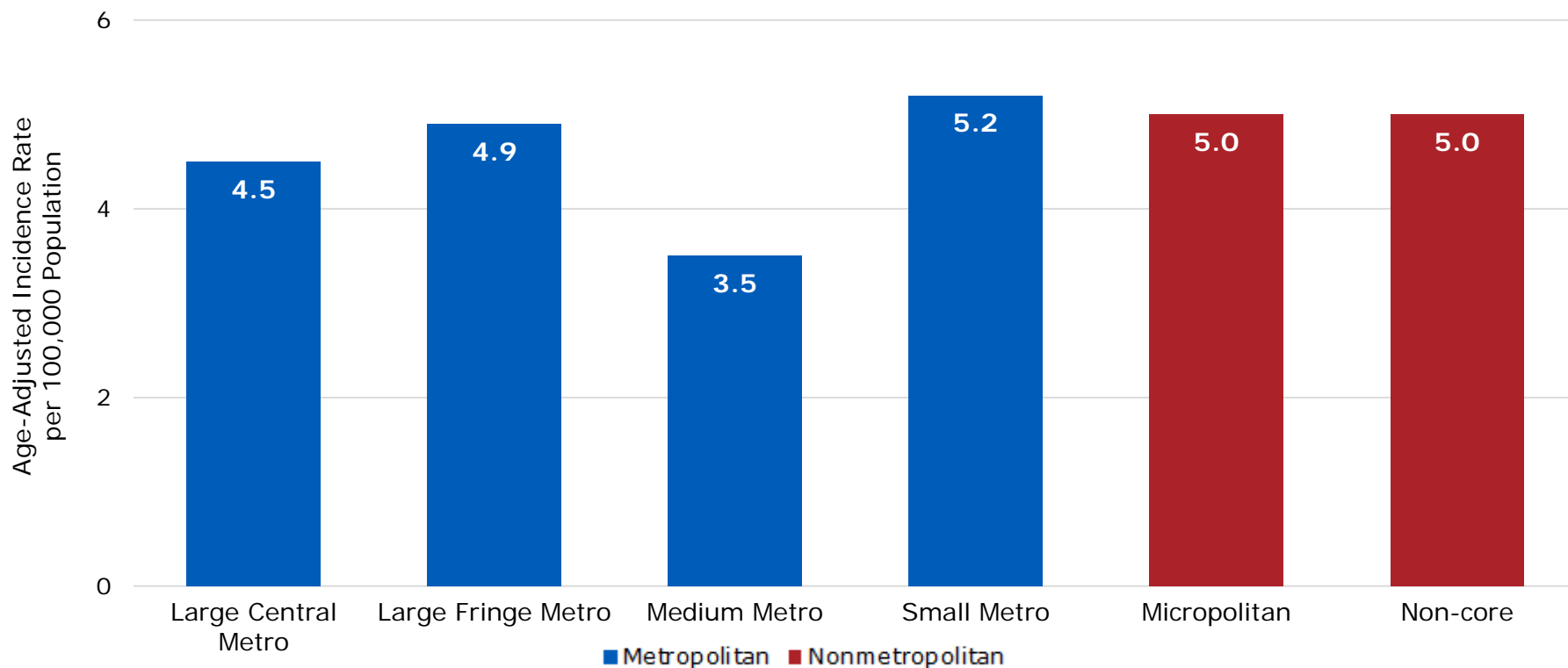


For more information on PHRs, see slide [Texas Public Health Regions](#).

Oropharyngeal Cancer Incidence Rates by Urban-Rural Classification

The incidence rate of HPV-associated oropharyngeal cancer was highest in small metro counties and lowest in medium metro counties.

HPV-Associated Oropharyngeal Cancer by Urban-Rural Classification, Texas, 2013-2017



For more information on county classification, see slide [Texas Urban-Rural Classification](#).

Anal Cancer

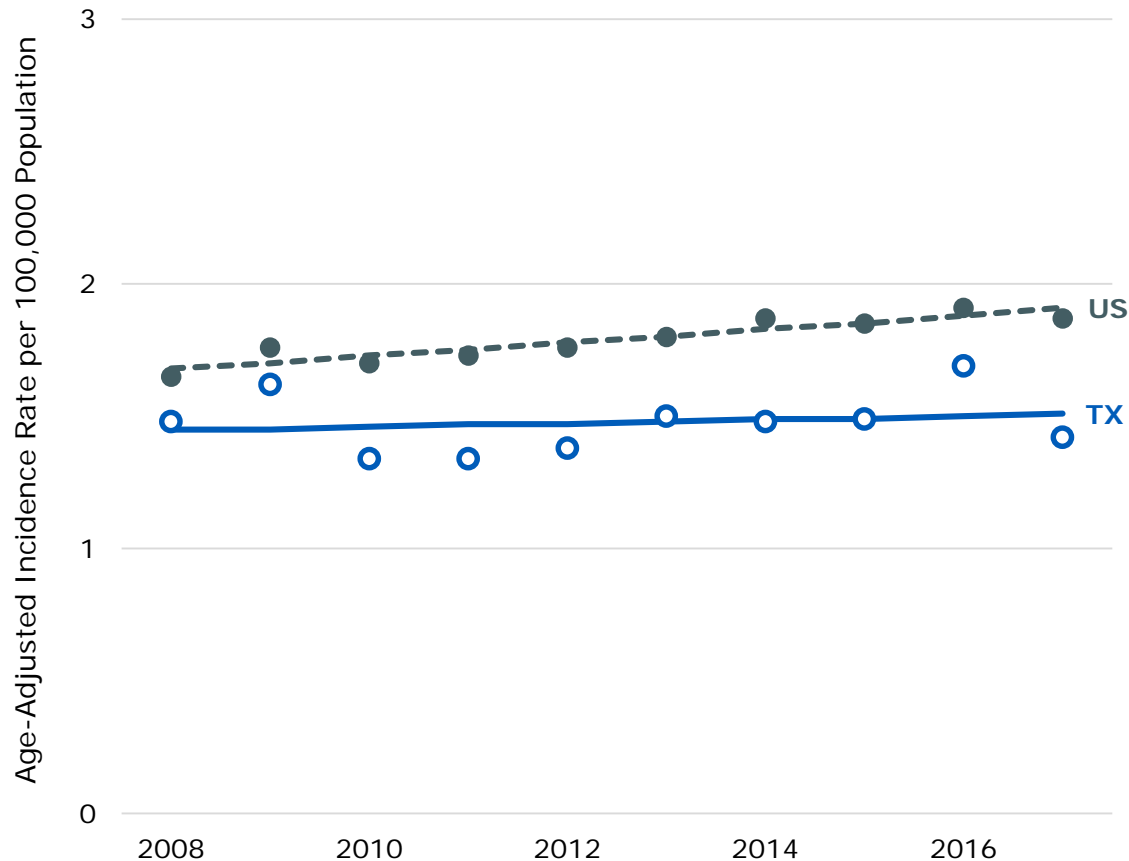
- HPV is associated with anal squamous cell carcinomas, the most common type of anal cancer.¹
- An estimated 70% of anal squamous cell carcinoma cases are attributed to HPV.²
- In Texas, the incidence rate for HPV-associated anal cancer in Texas was 1.5 cases per 100,000 population from 2013-2017.

¹ American Cancer Society, [cancer.org/cancer/anal-cancer/about/what-is-anal-cancer.html](https://www.cancer.org/cancer/anal-cancer/about/what-is-anal-cancer.html)

² Centers for Disease Control and Prevention, [cdc.gov/cancer/hpv/statistics/cases.htm](https://www.cdc.gov/cancer/hpv/statistics/cases.htm)

Anal Cancer Incidence Rate Trends

HPV-Associated Anal Cancer,
Texas vs US, 2008-2017

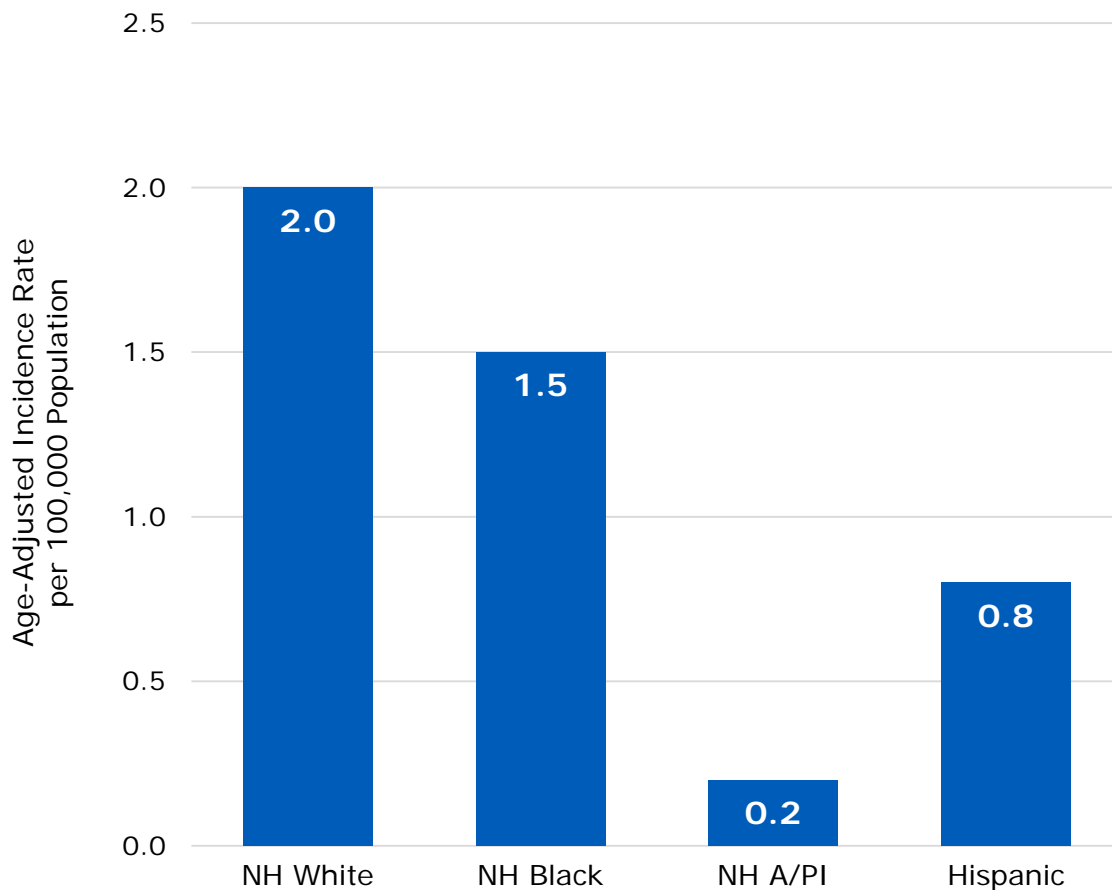


- While the incidence rate of HPV-associated anal cancer trended towards increasing in Texas from 2008-2017, the change was not statistically significant.
- The US rates saw a significant increase of 1.4% per year over the same time period.

Lines represent the Joinpoint modeled trend, and points represent observed data.

Anal Cancer Incidence Rates by Race/Ethnicity

HPV-Associated Anal Cancer by Race/Ethnicity,
Texas, 2013-2017



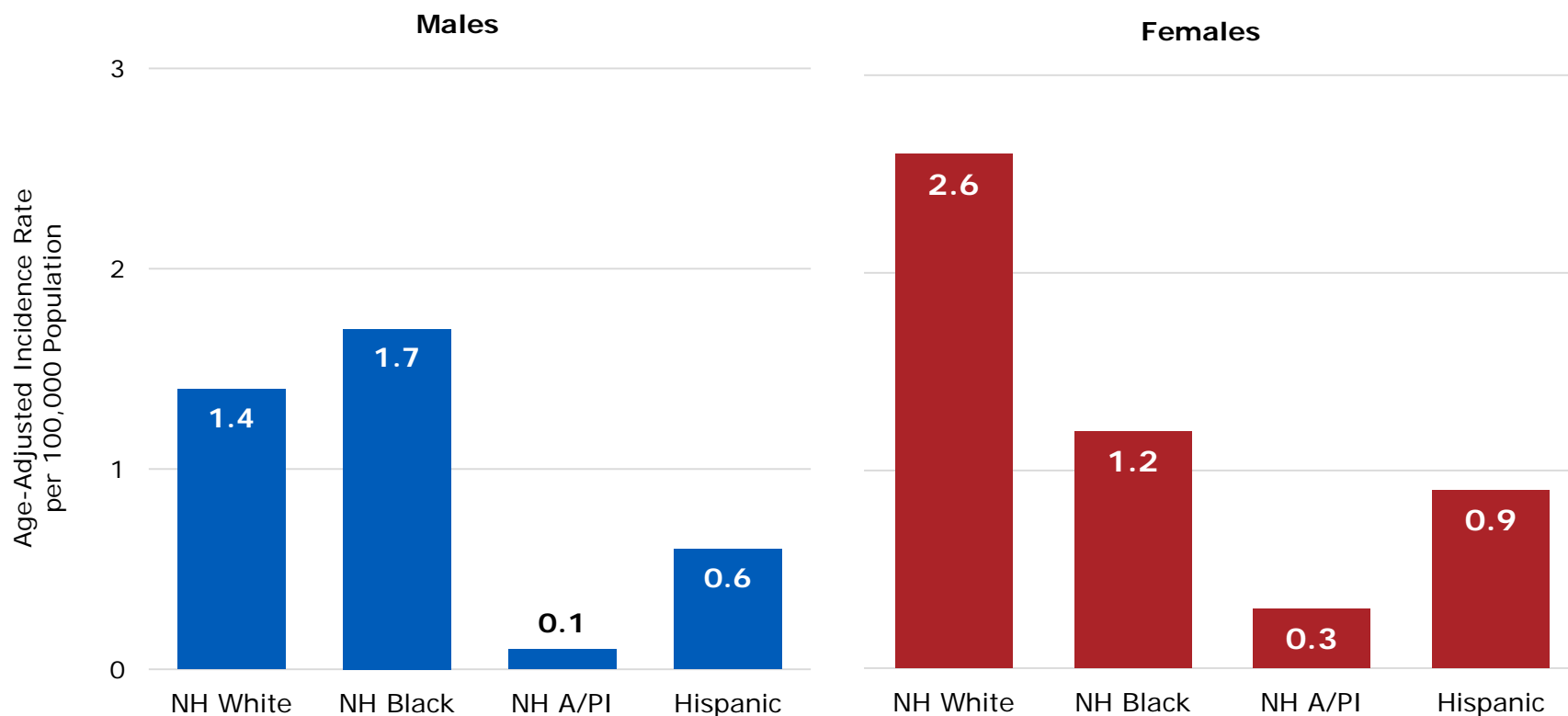
- Incidence rates of HPV-associated anal cancer were highest among non-Hispanic whites.
- Rates were lowest among NH Asian/Pacific Islanders.

The rate for NH American Indian/Alaska Native is suppressed because fewer than 16 cases were reported.
NH = Non-Hispanic; A/PI = Asian/Pacific Islander.

Anal Cancer Incidence Rates by Sex and Race/Ethnicity

For all race/ethnicity groups, incidence rates of HPV-associated anal cancer were higher in females than in males except for non-Hispanic blacks.

HPV-Associated Anal Cancer by Race/Ethnicity and Sex, Texas, 2013-2017

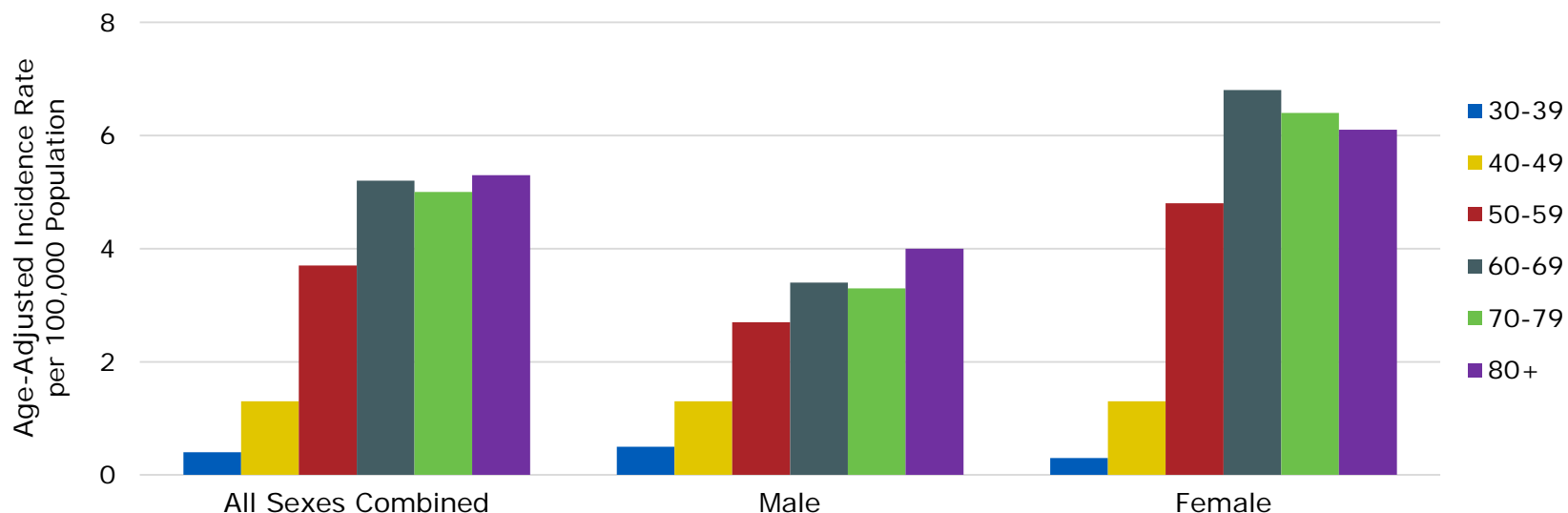


The rates for NH American Indian/Alaska Native are suppressed because fewer than 16 cases were reported in a specific category.
NH = Non-Hispanic; A/PI = Asian/Pacific Islander.

Anal Cancer Incidence Rates by Sex and Age at Diagnosis

- Incidence rates of HPV-associated anal cancer were highest among females ages 60-69 years (6.8 cases per 100,000 population).
- Incidence rates were similar between males and females in age groups 30-39 and 40-49 years. In the older age groups, rates were higher in females than males.

HPV-Associated Anal Cancers by Sex and Age at Diagnosis, Texas, 2013-2017

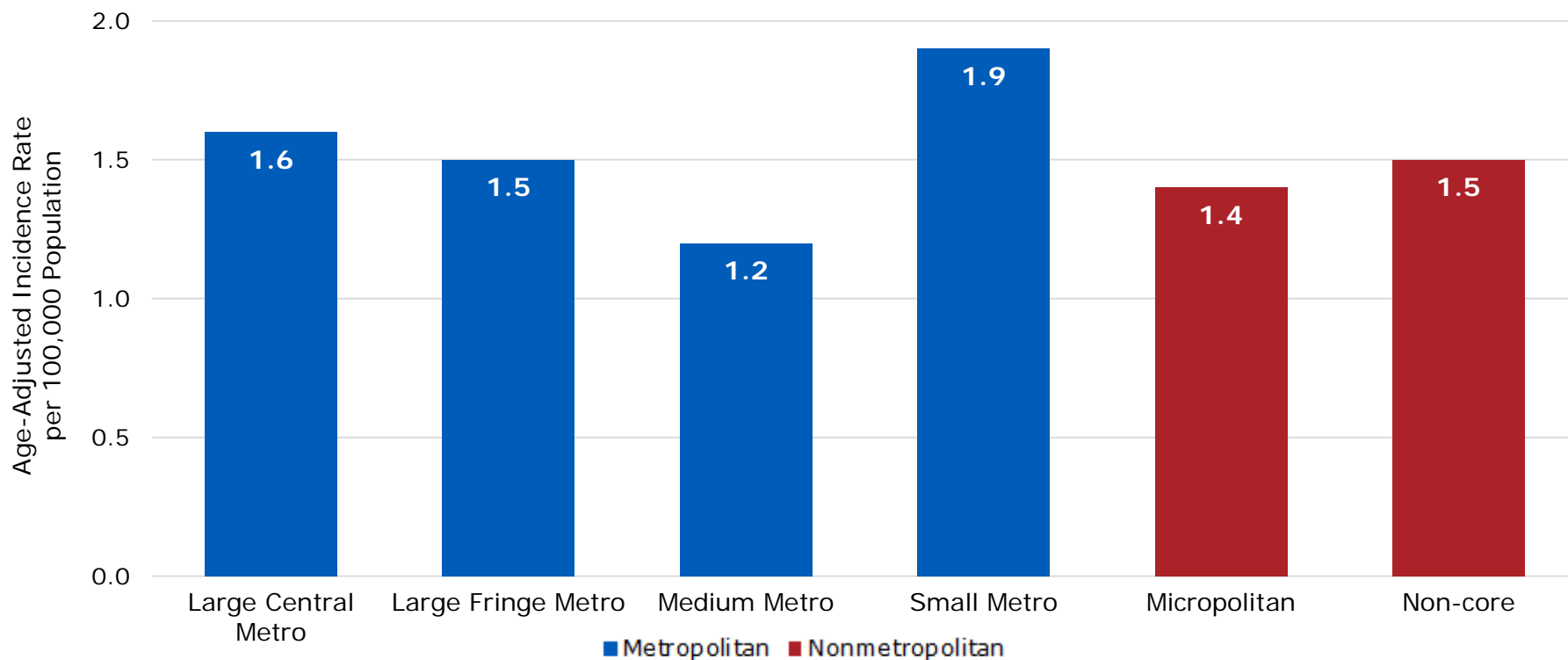


Rates are suppressed if fewer than 16 cases were reported in a specific category, such as sex and age group.

Anal Cancer Incidence Rates by Urban-Rural Classification

The incidence rate of HPV-associated anal cancer was highest in small metro counties. It was lowest in medium metro counties.

HPV-Associated Anal Cancer by Urban-Rural Classification, TX, 2013-2017



For more information on county classification, see slide [Texas Urban-Rural Classification](#).

Vulvar Cancer

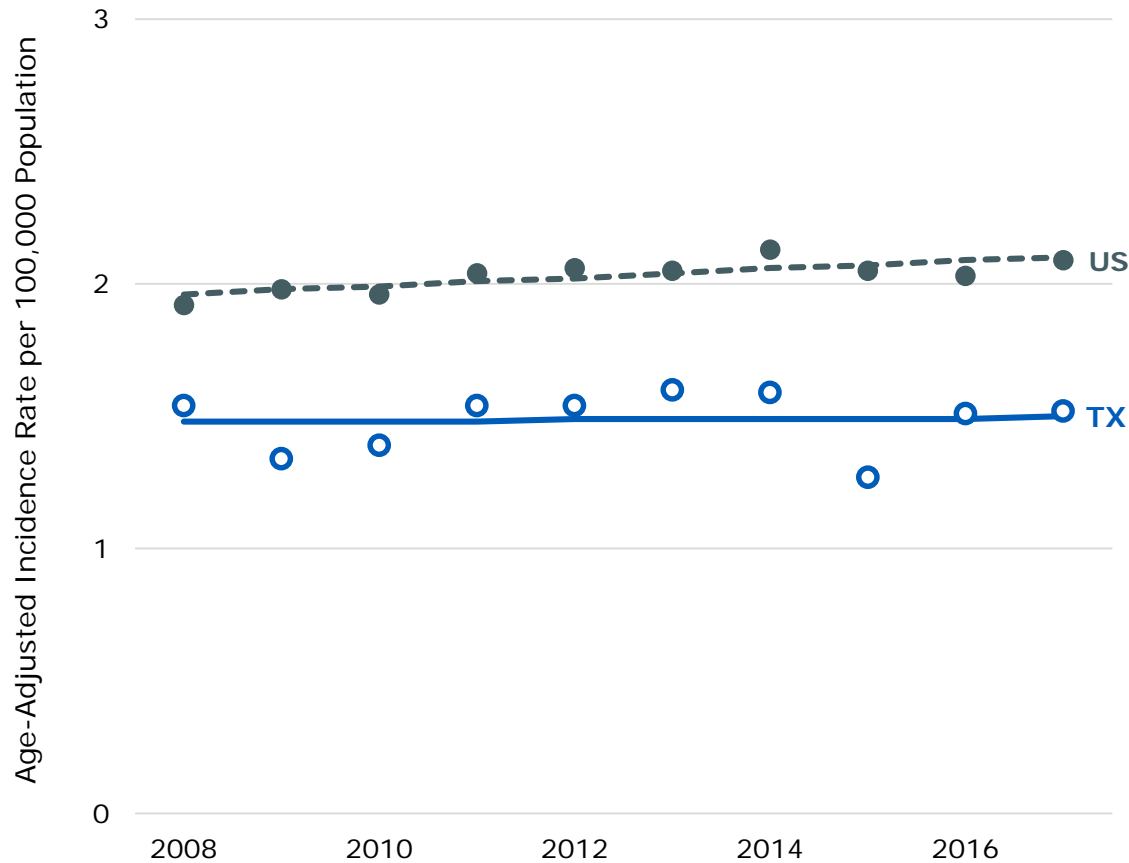
- HPV is associated with vulvar squamous cell carcinomas, the most common type of vulvar cancer.¹
- An estimated 69% of vulvar squamous cell carcinoma cases are attributed to HPV.²
- In Texas, the incidence rate of HPV-associated vulvar cancer was 1.5 cases per 100,000 population from 2013-2017.

¹ American Cancer Society, [cancer.org/cancer/vulvar-cancer/about/what-is-vulvar-cancer.html](https://www.cancer.org/cancer/vulvar-cancer/about/what-is-vulvar-cancer.html)

² Centers for Disease Control and Prevention, [cdc.gov/cancer/hpv/statistics/cases.htm](https://www.cdc.gov/cancer/hpv/statistics/cases.htm)

Vulvar Cancer Incidence Rate Trends

HPV-Associated Vulvar Cancer, Texas, 2008-2017

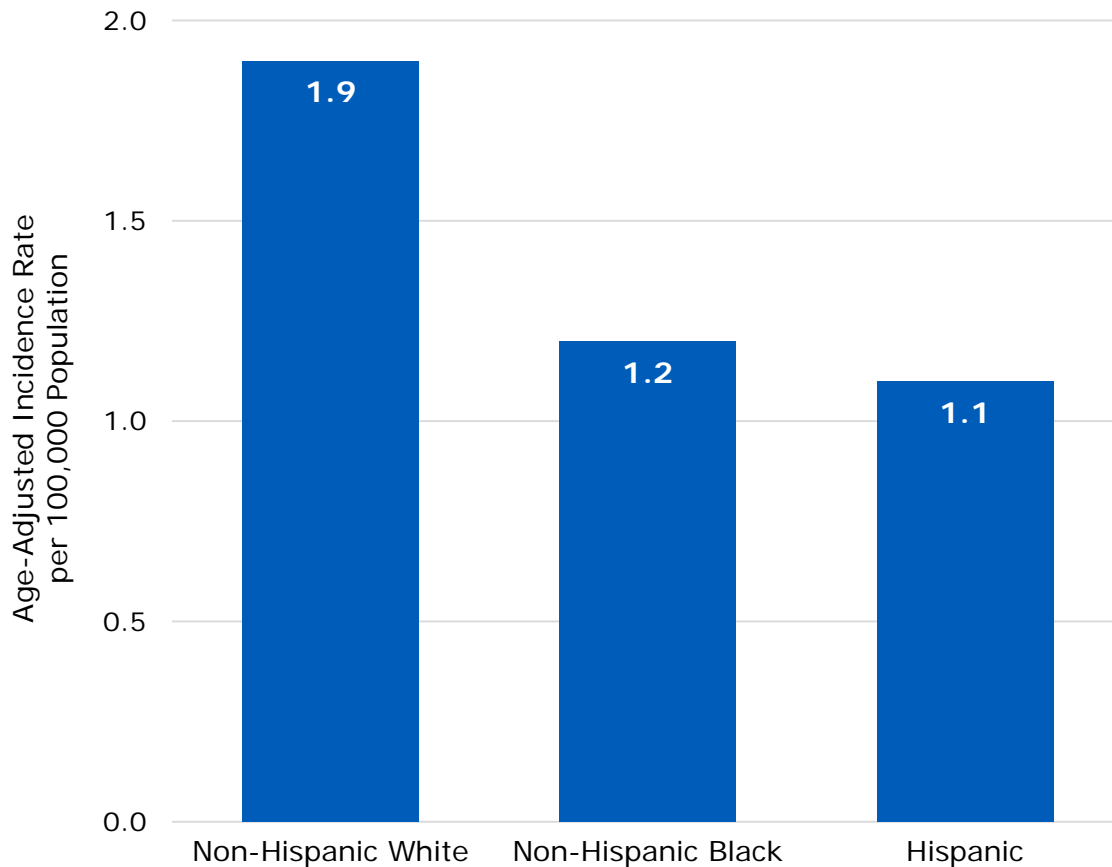


- From 2008-2017, incidence rates of HPV-associated vulvar cancer remained stable in Texas.
- Over the same period, the incidence rate increased significantly by 0.8% per year in the US.

Lines represent the Joinpoint modeled trend, and points represent observed data.

Vulvar Cancer Incidence Rates by Race/Ethnicity

HPV-Associated Vulvar Cancer by Race/Ethnicity, Texas, 2013-2017

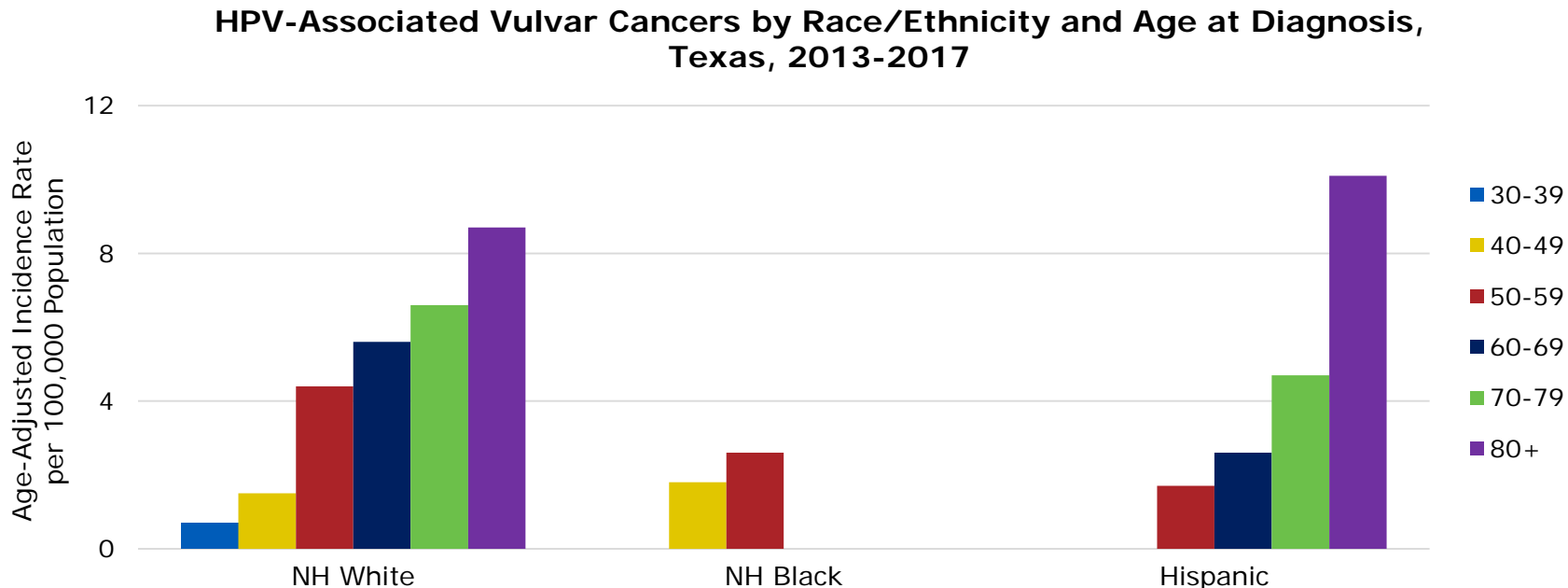


In Texas, the incidence rate of vulvar cancer was highest in non-Hispanic white females.

Rates for NH Asian/Pacific Islander and NH American Indian/Alaskan Native are suppressed because fewer than 16 cases were reported. NH = non-Hispanic.

Vulvar Cancer Incidence Rates by Race/Ethnicity and Age at Diagnosis

- The incidence rate of HPV-associated vulvar cancer were highest among Hispanic females ages 80 years or older (10.1 cases per 100,000 population).
- Rates increased in each age group for non-Hispanic white and Hispanic females.

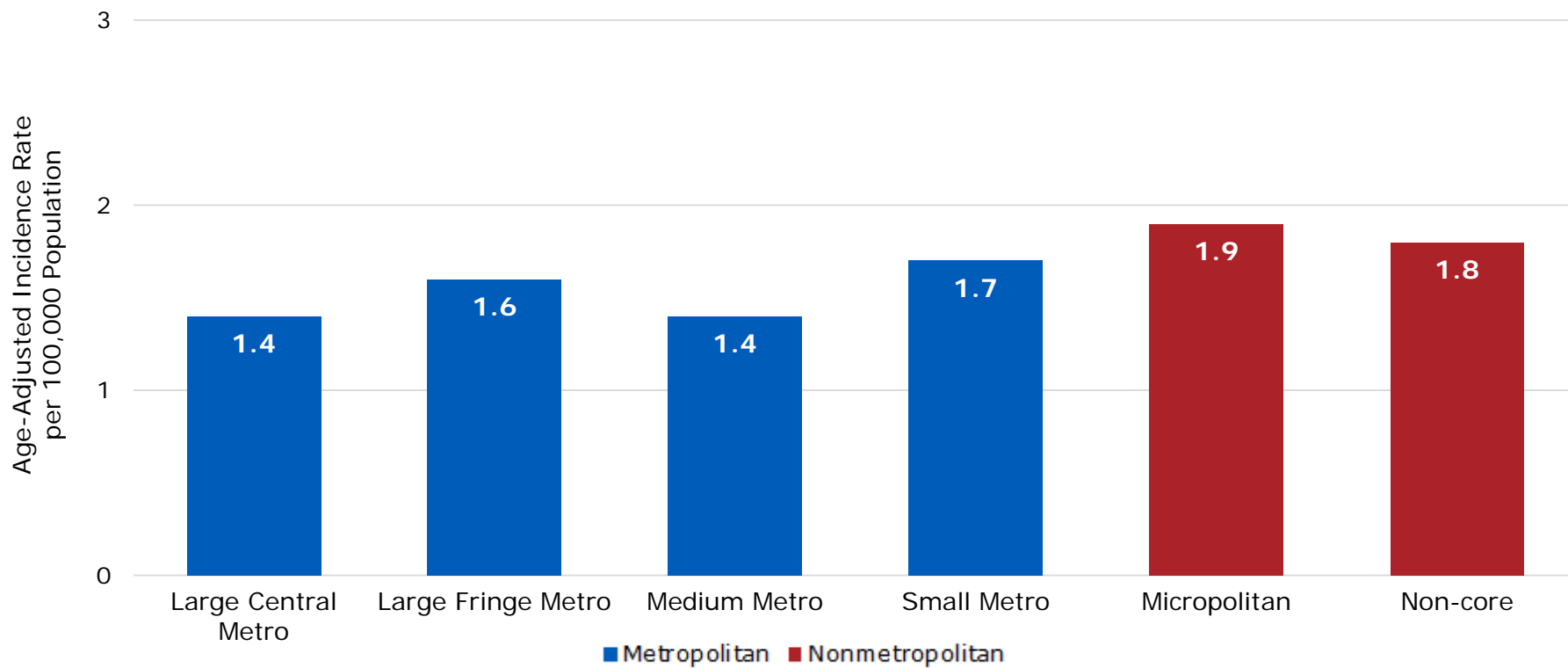


Rates are suppressed if fewer than 16 cases were reported in a specific category, such as race/ethnicity and age group.

Vulvar Cancer Incidence Rates by Urban-Rural Classification

Incidence rates of HPV-associated vulvar cancer were higher in small metro, micropolitan, and non-core counties compared to more urban areas.

HPV-Associated Vulvar Cancer by Urban-Rural Classification, Texas, 2013-2017



For more information on county classification, see slide [Texas Urban-Rural Classification](#).

Vaginal Cancer

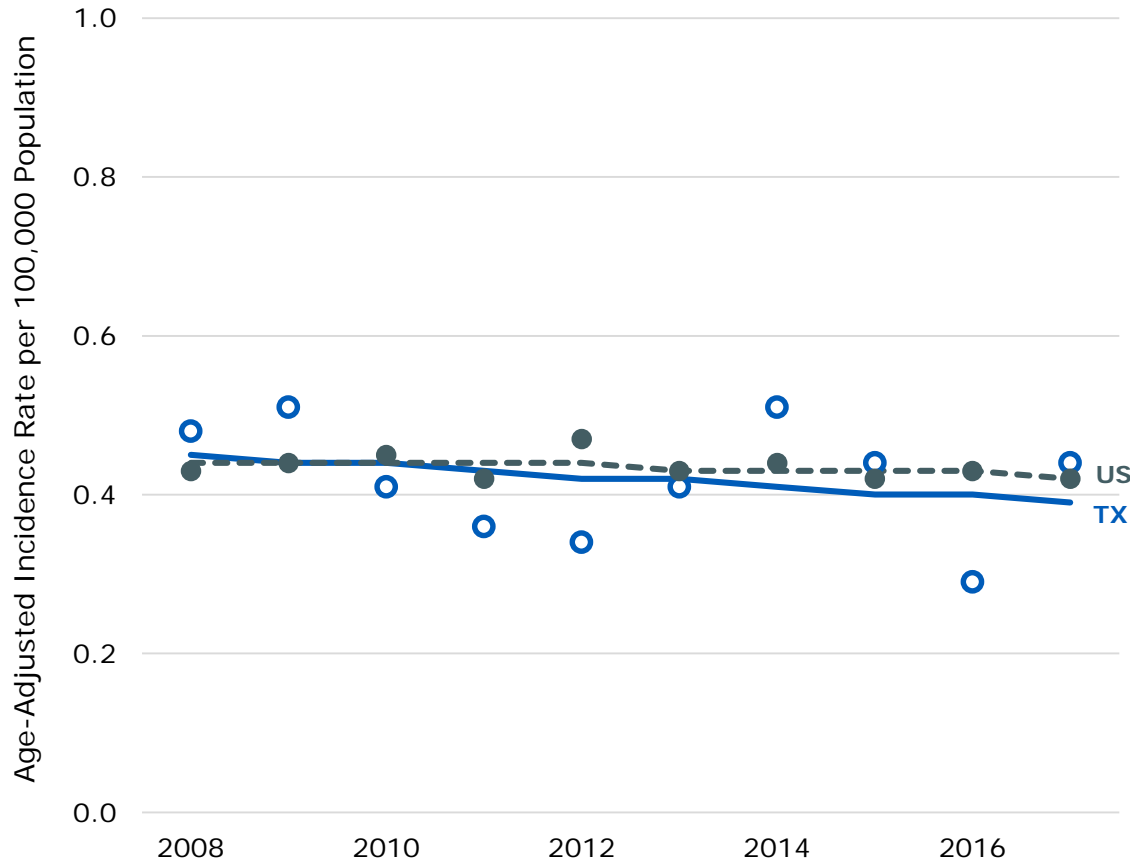
- HPV is associated with vaginal squamous cell carcinomas, the most common type of vaginal cancer.¹
- An estimated 75% of vaginal squamous cell carcinoma cases are attributed to HPV.²
- In Texas, the incidence rate of HPV-associated vaginal cancer was 0.4 cases per 100,000 population from 2013-2017.

¹ American Cancer Society, [cancer.org/cancer/vaginal-cancer/about/what-is-vaginal-cancer.html](https://www.cancer.org/cancer/vaginal-cancer/about/what-is-vaginal-cancer.html)

² Centers for Disease Control and Prevention, [cdc.gov/cancer/hpv/statistics/cases.htm](https://www.cdc.gov/cancer/hpv/statistics/cases.htm)

Vaginal Cancer Incidence Rate Trends

HPV-Associated Vaginal Cancer,
Texas vs US, 2008-2017

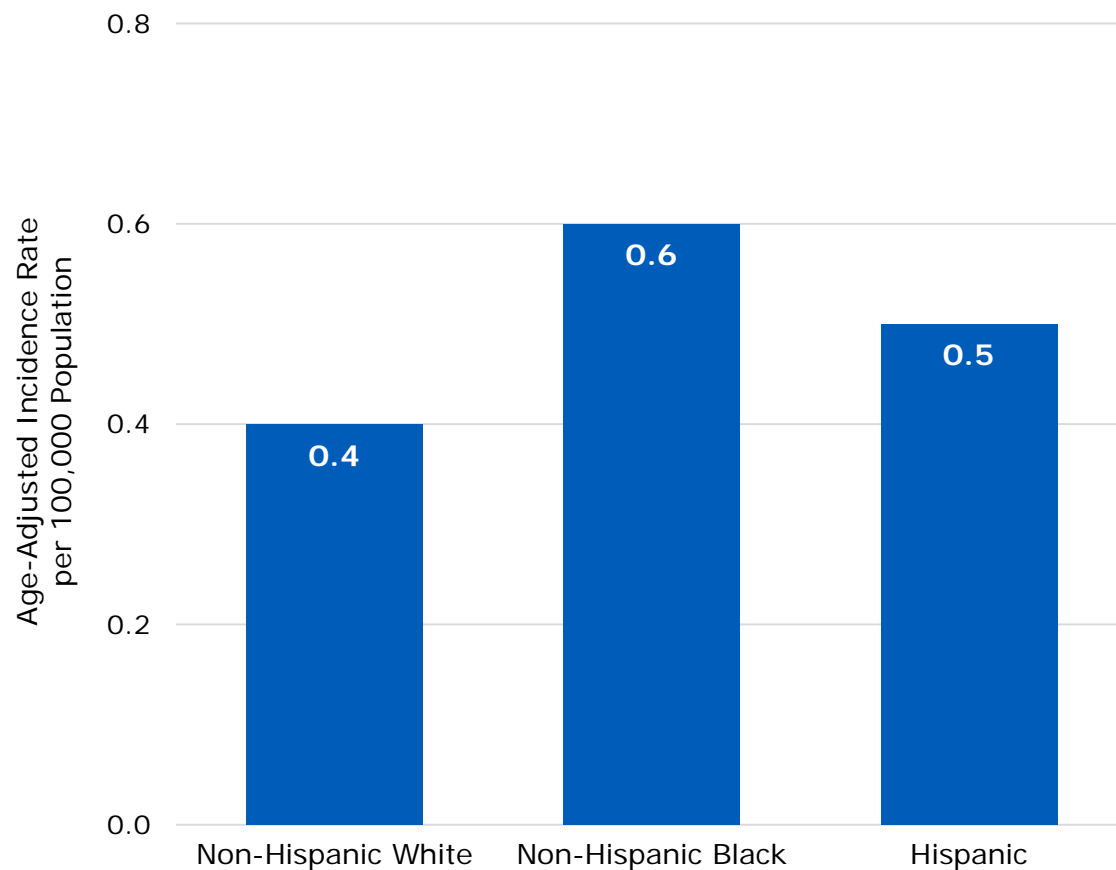


From 2008-2017, incidence rates of HPV-associated vaginal cancer were similar between US and TX. Neither had a statistically significant change.

Lines represent the Joinpoint modeled trend, and points represent observed data.

Vaginal Cancer Incidence Rates by Race/Ethnicity

HPV-Associated Vaginal Cancer by Race/Ethnicity, Texas, 2013-2017



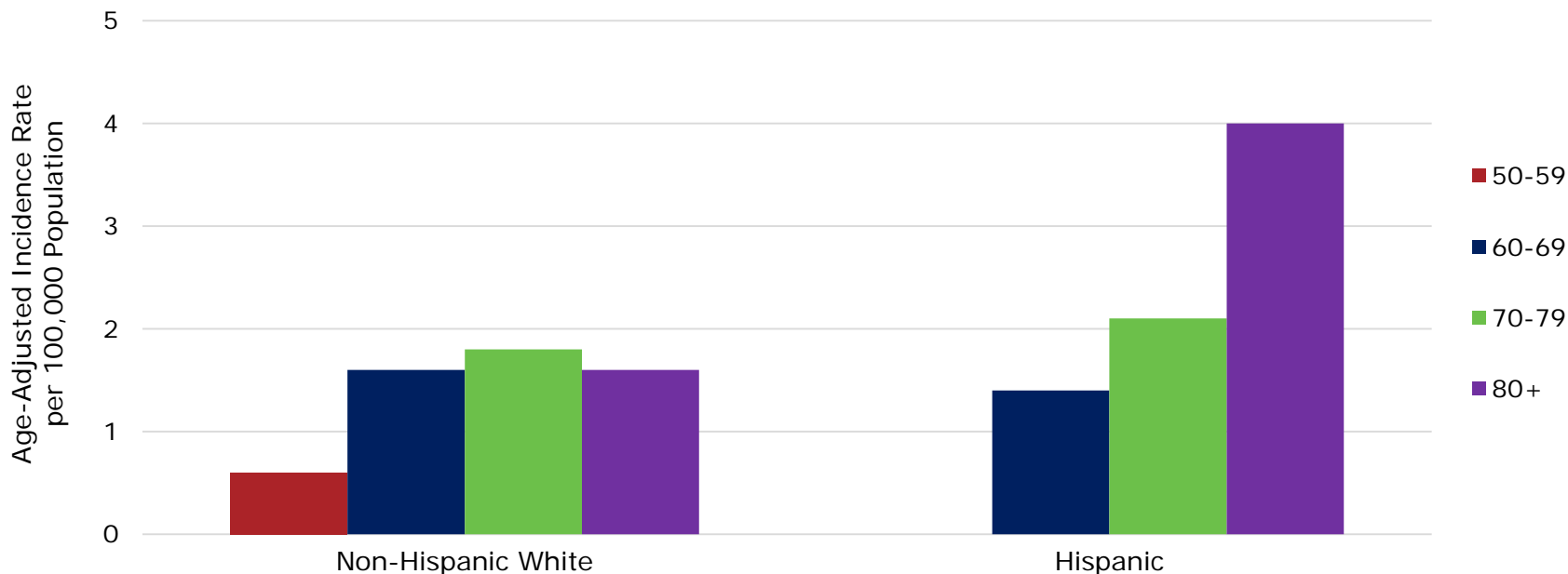
In Texas, the incidence rate of vaginal cancer was highest in non-Hispanic black females.

Rates for NH Asian/Pacific Islander and NH American Indian/Alaskan Native are suppressed because fewer than 16 cases were reported.

Vaginal Cancer Incidence Rates by Race/Ethnicity and Age at Diagnosis

The highest incidence rate of HPV-associated vaginal was among Hispanic females ages 80 years or older (4.0 cases per 100,000 population).

HPV-Associated Vaginal Cancers by Race/Ethnicity and Age at Diagnosis, Texas, 2013-2017

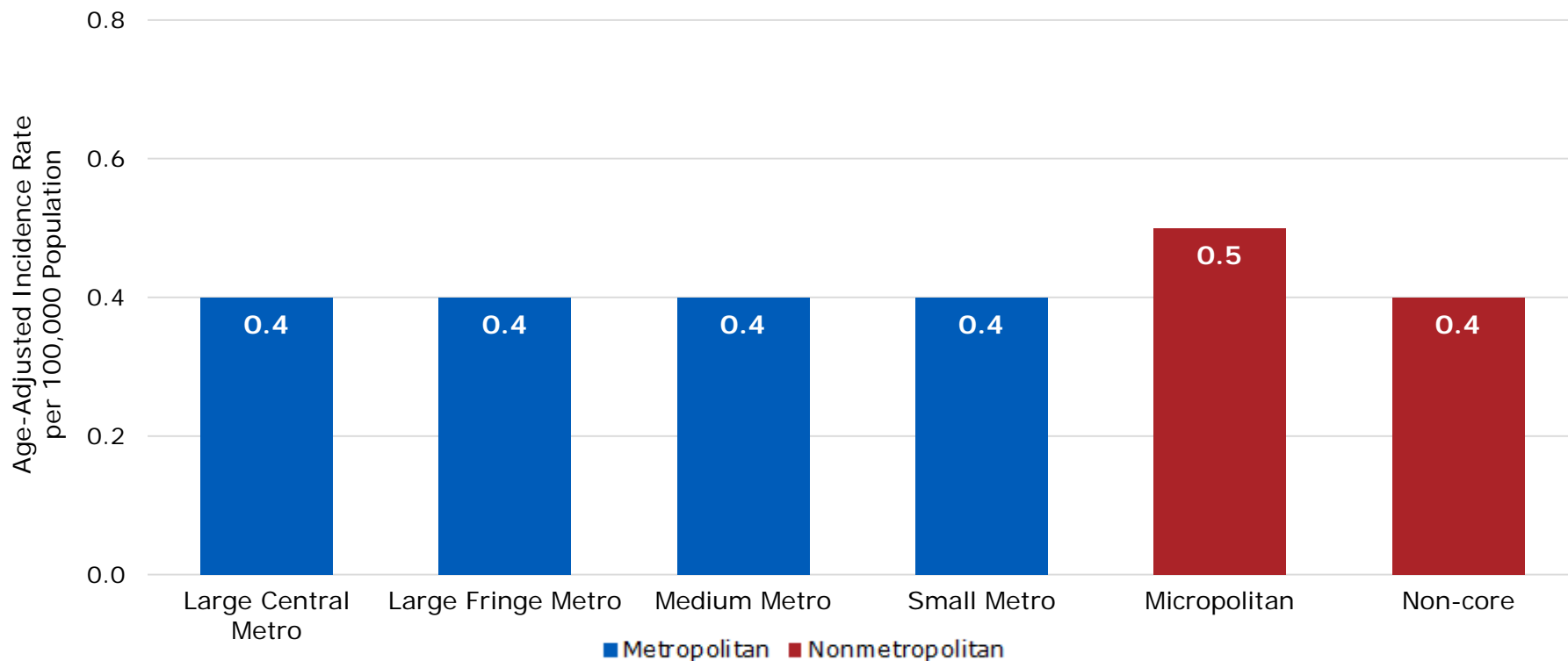


Rates are suppressed if fewer than 16 cases were reported in a specific category, such as race/ethnicity and age group.

Vaginal Cancer Incidence Rates by Urban-Rural Classification

Incidence rates for HPV-associated vaginal cancer are similar across all urban-rural classification groups.

HPV-Associated Vaginal Cancer by Urban-Rural Classification, Texas, 2013-2017



For more information on county classification, see slide [Texas Urban-Rural Classification](#).

Penile Cancer

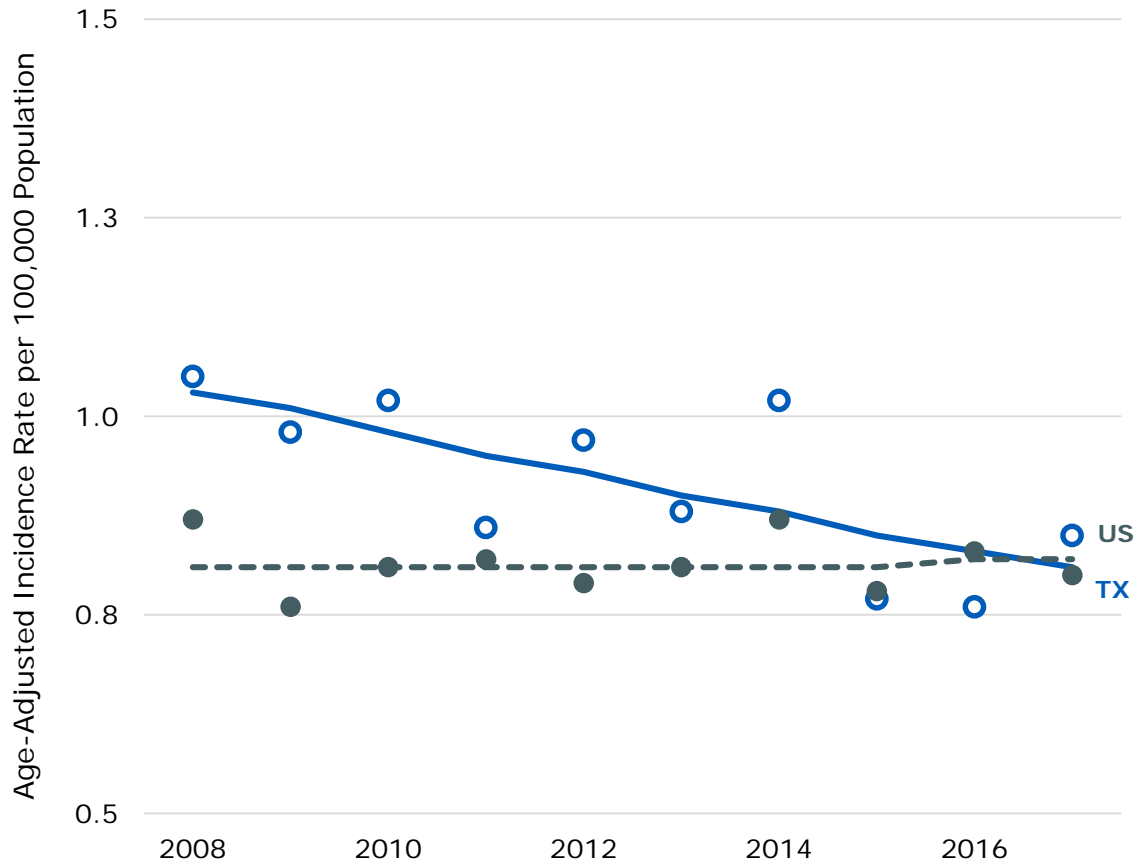
- HPV is associated with penile squamous cell carcinomas, the most common type of penile cancer.¹
- An estimated 63% of penile squamous cell carcinoma cases are attributed to HPV.²
- In Texas, the incidence rate of HPV-associated penile cancer was 0.9 cases per 100,000 population from 2013-2017.

¹ American Cancer Society, [cancer.org/cancer/penile-cancer/about/what-is-penile-cancer.html](https://www.cancer.org/cancer/penile-cancer/about/what-is-penile-cancer.html)

² Centers for Disease Control and Prevention, [cdc.gov/cancer/hpv/statistics/cases.htm](https://www.cdc.gov/cancer/hpv/statistics/cases.htm)

Penile Cancer Incidence Rate Trends

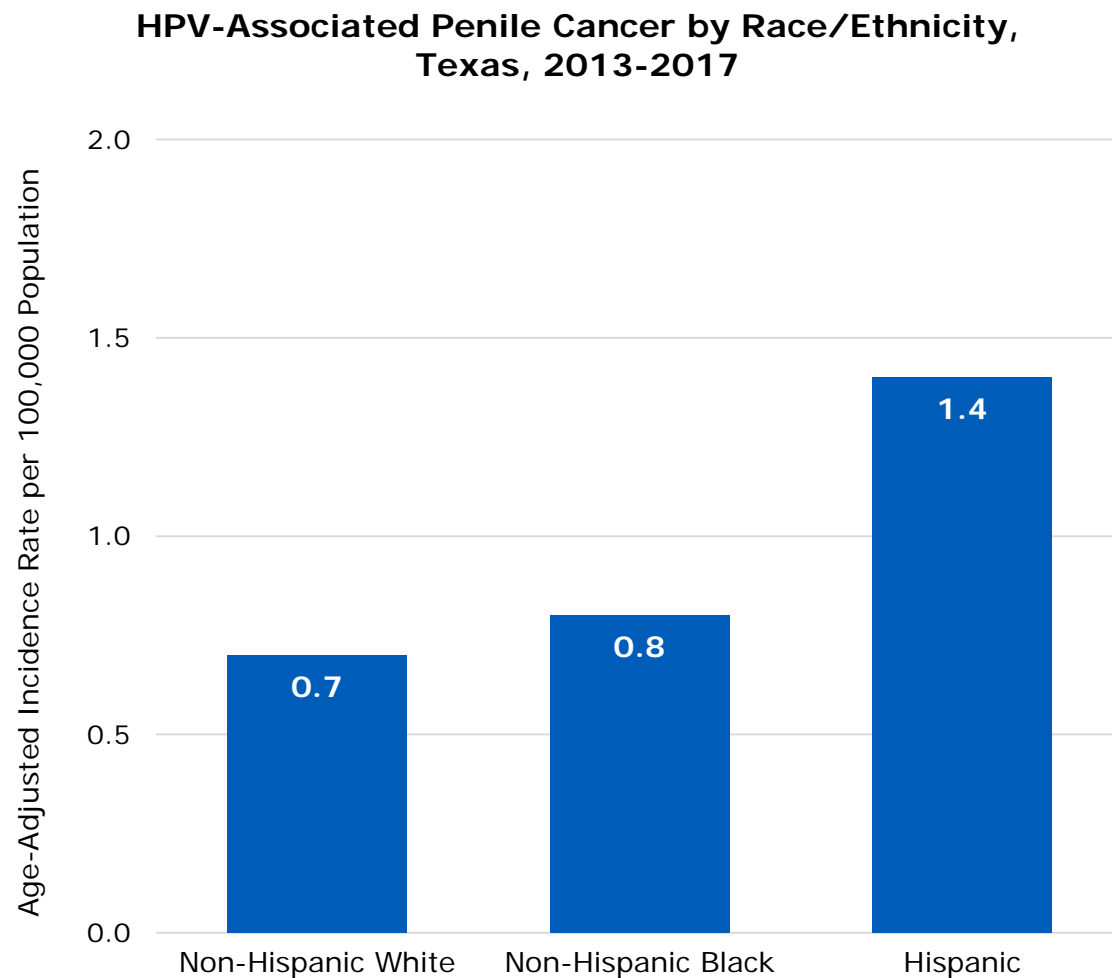
HPV-Associated Penile Cancer,
Texas vs US, 2008-2017



- In Texas, there was a significant decrease in the incidence rate of HPV-associated penile cancer by an average of 2.7% per year from 2008-2017.
- The US incidence rate was stable during the same time period.

Lines represent the Joinpoint modeled trend, and points represent observed data.

Penile Cancer Incidence Rates by Race/Ethnicity



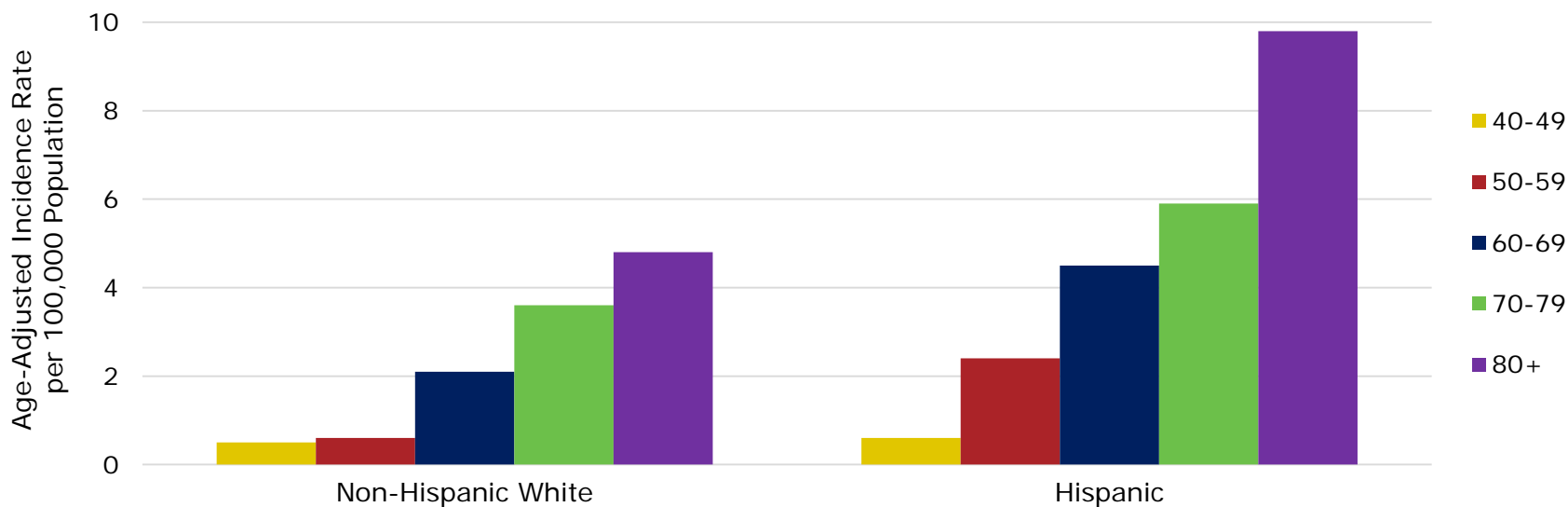
The incidence rate of HPV-associated penile cancer was highest among Hispanic males.

Rates for NH Asian/Pacific Islander and NH American Indian/Alaskan Native are suppressed because fewer than 16 cases were reported.

Penile Cancer Incidence Rates by Race/Ethnicity and Age at Diagnosis

- The incidence rate of HPV-associated penile cancer was highest among Hispanic males ages 80 years and older (9.8 cases per 100,000 population).
- Compared to non-Hispanic white males, Hispanic males had higher incidence rates of HPV-associated penile cancer across all age groups.

HPV-Associated Penile Cancers by Race/Ethnicity and Age at Diagnosis, Texas, 2013-2017

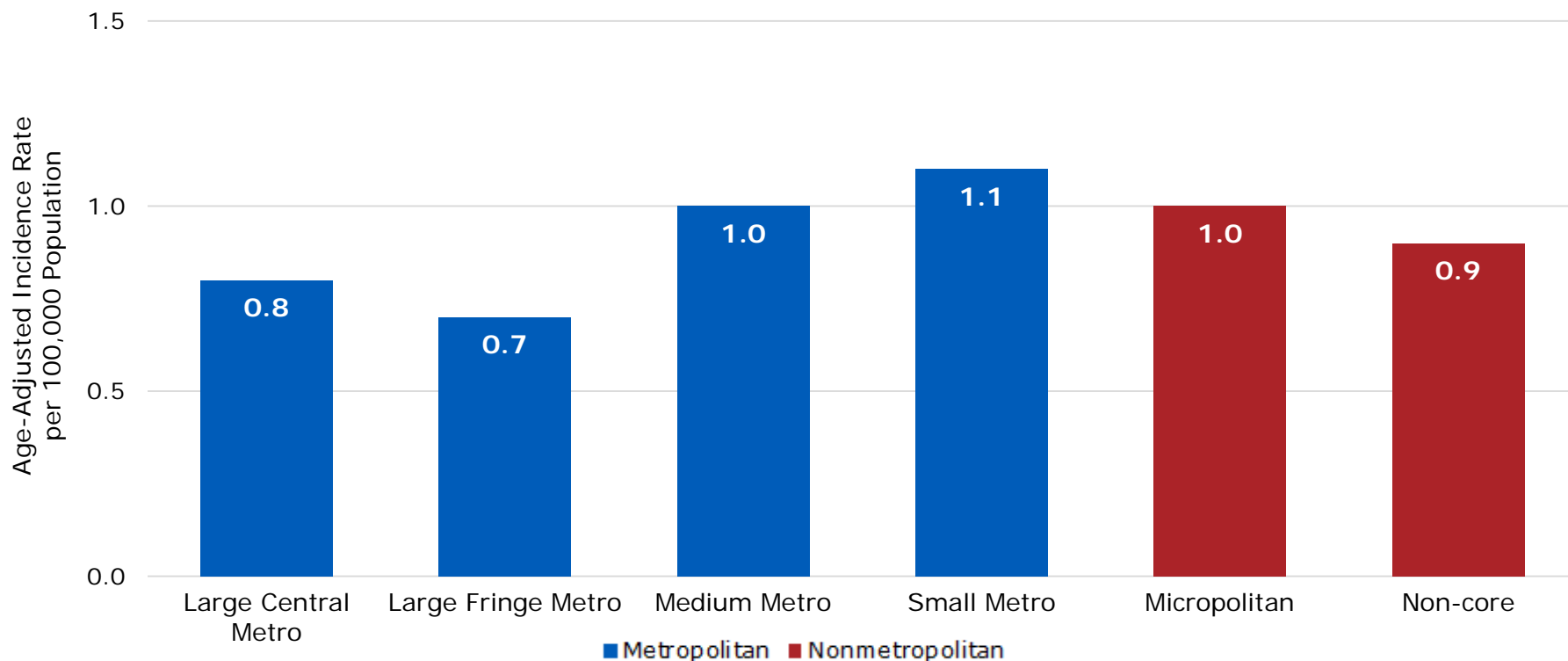


Rates are suppressed if fewer than 16 cases were reported in a specific category, such as race/ethnicity and age group.

Penile Cancer Incidence Rates by Urban-Rural Classification

The incidence rate of HPV-associated penile cancer was highest in small metro counties. It was lowest in large fringe metro counties.

HPV-Associated Penile Cancer by Urban-Rural Classification, TX, 2013-2017



For more information on county classification, see slide [Texas Urban-Rural Classification](#).

Report Information

Definitions and Abbreviations

- **Age-adjusted incidence rate:** number of new cancers of a specific site/type occurring in a specified population during a year, usually expressed as the number of cancers per 100,000 population at risk. An age-adjusted rate is a weighted average of the age-specific rates, where the weights are the proportions of persons in the corresponding age groups of a standard population. The potential confounding effect of age is reduced when comparing age-adjusted rates computed using the same standard population.
- **Annual percent change (APC):** one way to characterize trends in cancer rates over time. With this approach, the cancer rates are assumed to change at a constant percentage of the rate of the previous year. For example, if the APC is 1%, and the rate is 50 per 100,000 in 1990, the rate is $50 \times 1.01 = 50.5$ in 1991 and $50.5 \times 1.01 = 51.005$ in 1992. Rates that change at a constant percentage every year change linearly on a log scale.
- **Average annual percent change (AAPC):** a summary measure of the trend over a pre-specified fixed interval. It allows us to use a single number to describe the average APCs over a period of multiple years. It is valid even if the joinpoint model indicates that there were changes in trends during those years. It is computed as a weighted average of the APCs from the joinpoint model, with the weights equal to the length of the APC interval.
- **Race/ethnicity group abbreviations:** Non-Hispanic (NH), Asian/Pacific Islander (A/PI), American Indian/Alaska Native (AI/AN).

For more information about defining cancer statistics, visit seer.cancer.gov/statistics/types.html.

Technical Notes

- Texas incidence data source: Texas Cancer Registry (www.dshs.texas.gov/tcr) SEER*Stat Database, 1995-2017 Incidence, Texas statewide, created December 2019, based on NPCR-CSS Submission, cut-off 11/07/2019. **Note: Cases diagnosed by death certificate or autopsy only are excluded from all data in this report to allow direct comparison with national rates.**
- US incidence data source: SEER*Stat Database: NPCR and SEER Incidence - U.S. Cancer Statistics Public Use Database, Nov 2019 submission (2001-2017). United States Department of Health and Human Services, Centers for Disease Control and Prevention and National Cancer Institute. Released June 2020, based on the Nov 2019 submission. Accessed at cdc.gov/cancer/npcr/public-use
- Rates are per 100,000 and age-adjusted to the 2000 U.S. Standard Population (19 age groups - Census P25-1130). Confidence Intervals (CI) are 95% for rates and ratios (Tiwari mod). Small counts frequently produced unstable rates for Texas NH Native American/Alaska Natives and are therefore not always presented.
- The Joinpoint Regression Program is statistical software for the analysis of trends using joinpoint models. The software enables the user to test whether an apparent change in trend is statistically significant. Joinpoint fits the selected trend data (e.g., cancer rates) into the simplest joinpoint model that the data allow.
 - Annual Percent Change (APC) is calculated by fitting a least squares regression line to the natural logarithm of the age-adjusted rates, with year as the regressor variable. This method allows for more than one APC to describe the trend over a time period. The joinpoint model uses statistical criteria to determine when and how often the APC changes. Cancer rates are fit using joined log-linear segments, so each segment can be characterized using an APC.
 - Average Annual Percent Change (AAPC) is computed as a weighted average of the APCs from the joinpoint model. AAPC is derived by first estimating the underlying joinpoint model that best fits the data. The AAPC over any fixed interval is calculated using a weighted average of the slope coefficients of the underlying joinpoint regression line with the weights equal to the length of each segment over the interval.
 - In this report, if the AAPC was significantly greater than zero, rates were reported to have increased. If the AAPC was significantly lower than zero, rates were reported to have decreased. If the AAPC was not significantly different from zero, rates were reported as stable.
- Joinpoint Regression Program, Version 4.7.0.0 – Feb 2019; Statistical Methodology and Applications Branch, Surveillance Research Program, National Cancer Institute.

HPV-Associated Cancer Site Specifications

Cancer	ICD-O-3 site codes	ICD-O-3 histology codes	Additional restrictions
Oropharyngeal squamous cell carcinoma	C01.9, 02.4, 02.8, 05.1–05.2, 09.0–09.1, 09.8–09.9, 10.0–10.4, 10.8–10.9, 14.0, 14.2, 14.8	8050–8084, 8120–8131	Restrict to microscopically confirmed
Anal and rectal squamous cell carcinoma	C21.0–21.8, 20.9	8050–8084, 8120–8131	Restrict to microscopically confirmed
Vulvar squamous cell carcinoma	C51.0–51.9	8050–8084, 8120–8131	Restrict to females and restrict to microscopically confirmed
Vaginal squamous cell carcinoma	C52.9	8050–8084, 8120–8131	Restrict to females and restrict to microscopically confirmed
Cervical carcinoma	C53.0–53.9	8010–8671, 8940–8941	Restrict to females and restrict to microscopically confirmed
Penile squamous cell carcinoma	C60.0–60.9	8050–8084, 8120–8131	Restrict to males and restrict to microscopically confirmed

HPV-associated cancers were defined as cancers at specific anatomic sites with specific cell types in which HPV DNA is frequently found. All cancers were microscopically confirmed. Cervical cancers (ICD-O-3 site codes C53.0–C53.9) are limited to carcinomas only (ICD-O-3 histology codes 8010–8671, 8940–8941). Vaginal (ICD-O-3 site code C52.9), vulvar (ICD-O-3 site codes C51.0–C51.9), penile (ICD-O-3 site codes C60.0–60.9), anal (ICD-O-3 site code C21.0–C21.9), rectal (ICD-O-3 site code C20.9), and oropharyngeal (ICD-O-3 site codes C01.9, C02.4, C02.8, C05.1, C05.2, C09.0, C09.1, C09.8, C09.9, C10.0, C10.1, C10.2, C10.3, C10.4, C10.8, C10.9, C14.0, C14.2 and C14.8) cancer sites are limited to squamous cell carcinomas only (ICD-O-3 histology codes 8050–8084, 8120–8131).

Source: United States Cancer Statistics, Centers for Disease Control and Prevention (CDC). <https://www.cdc.gov/cancer/uscs/public-use/predefined-seer-stat-variables.htm>

References

- Centers for Disease Control and Prevention (2019). Cancers Associated with Human Papillomavirus — United States, 2012–2016. USCS Data Brief, no 10. [cdc.gov/cancer/uscs/about/data-briefs/no10-hpv-assoc-cancers-UnitedStates-2012-2016.htm](https://www.cdc.gov/cancer/uscs/about/data-briefs/no10-hpv-assoc-cancers-UnitedStates-2012-2016.htm)
- Centers for Disease Control and Prevention. HPV and Cancer. [cdc.gov/cancer/hpv](https://www.cdc.gov/cancer/hpv)
- International Agency for Research on Cancer (2007). IARC monographs on the evaluation of carcinogenic risks to humans. Volume 90: Human Papillomaviruses. publications.iarc.fr/108
- National Cancer Institute. HPV and Cancer. [cancer.gov/about-cancer/causes-prevention/risk/infectious-agents/hpv-and-cancer](https://www.cancer.gov/about-cancer/causes-prevention/risk/infectious-agents/hpv-and-cancer)
- Watson M, Saraiya M, Ahmed F, Cardinez CJ, Reichman ME, Weir HK, Richards TB (2008). Using population-based cancer registry data to assess the burden of human papillomavirus-associated cancers in the United States: overview of methods. Cancer 113(10 Suppl): 2841–2854. [ncbi.nlm.nih.gov/pubmed/18980203](https://pubmed.ncbi.nlm.nih.gov/18980203/)
- Saraiya M, Unger ER, Thompson TD, Lynch CF, Hernandez BY, Lyu CW et al. (2015). HPV Typing of Cancers Workgroup. US assessment of HPV types in cancers: implications for current and 9-valent HPV vaccines. Journal of the National Cancer Institute 107(6): djv086. [ncbi.nlm.nih.gov/pmc/articles/PMC4838063/](https://pubmed.ncbi.nlm.nih.gov/pmc/articles/PMC4838063/)
- Viens LJ, Henley SJ, Watson M, et al. (2016). Human Papillomavirus–Associated Cancers — United States, 2008–2012. Morbidity and Mortality Weekly Report (MMWR) 65(26): 661–666. [cdc.gov/mmwr/volumes/65/wr/mm6526a1.htm](https://www.cdc.gov/mmwr/volumes/65/wr/mm6526a1.htm)