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Oropharyngeal Cancer & Human Papillomavirus Vaccinations

Texas, 2013-2017

Introduction

Head and neck cancer (HNC) is a group of cancers that affect the oral cavity, pharynx, and larynx. The human papillomavirus (HPV) is an asymptomatic, sexually transmitted virus that infects squamous epithelium,[1] tissues lining the inner cavities and outer surfaces of many organs throughout the body.[2] HPV can cause several types of cervical, vaginal, vulvar, penile, anal, and oropharyngeal cancers.[3] While habitual and cultural factors, like smoking and alcohol,[4-7] play a major role in HPV-negative HNC incidence, HPV-positive HNC tends to be restricted to the oropharynx, which lies behind the oral cavity, extending from the uvula to the level of the hyoid bone.[8] Previous studies have shown that self-reported poor oral hygiene is an independent risk factor for high-risk HPV infections.[9-10] In fact, poor oral hygiene and oral health, measured by such indicators as frequency of tooth brushing or tooth loss, are also recognized risk factors for oral and oropharyngeal cancers, both independently and synergistically with tobacco and alcohol use.[11] Additionally, Sun et al (2017) demonstrated a positive correlation between oral HPV-16 infection and poor oral health status.[12]

The Food and Drug Administration (FDA) has approved several vaccines to provide protection against HPV infections and HPV-associated cancers. Although HPV vaccines protect against several types of HPV, HPV-16 alone accounts for 90 percent of HPV-positive HNC.[8] Recommendations for the HPV vaccination are published by the Centers for Disease Control and Prevention's (CDC) Advisory Committee on Immunization Practices (ACIP).[13] ACIP recommends routine HPV vaccination for all adolescents at age 11 or 12. Yet, vaccination can occur starting at age 9 years. In June 2019, ACIP recommended catch-up HPV vaccination for all persons through age 26 years. Although the FDA approved the catch-up vaccination for adults aged 27 to 45 years in 2018, ACIP did not recommend it due to minimal public health benefits.[14] ACIP does recognize that some persons at risk for new HPV infections might benefit from vaccination in this age range.

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Thus, ACIP recommended shared clinical decision-making for potential HPV vaccination for these persons. HPV vaccines are not licensed for use in adults over age 45.

Methods

Data for HPV-associated cancer incidence rates were provided by the Cancer Epidemiology and Surveillance Branch of the Texas Department of State Health Services Cancer Registry (TCR) SEER*Stat Database. SEER, defined as Surveillance, Epidemiology, and End Results program of the National Cancer Institute, is a source of epidemiologic information on the incidence and survival rates of cancer in the United States. The Texas statewide incidence rates provided in this report, were created in December 2019, and are based on National Program of Cancer Registries – Cancer Surveillance System (NPCR-CSS) Submission.

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. Oropharyngeal cancers were defined as 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 for this type are limited to squamous cell carcinomas only (ICD-O-3 histology codes 8050–8084, 8120–8131). Rates are per 100,000 and age-adjusted to the 2000 U.S. Standard Population.

HPV immunization rates for Texas adults, ages 18 to 49 years, were collected from the Behavioral Risk Factor Surveillance Survey (BRFSS). BRFSS is the nation's premier system of health-related telephone surveys.[15] The BRFSS collects state data about U.S. residents about their health-related risk behaviors, chronic health conditions, and use of preventive services. BRFSS collects data in all 50 states as well as the District of Columbia and three U.S. territories.

HPV immunization rates for Texas adolescents, ages 13-17 years, were collected from the National Immunization Survey-Teen (NIS-Teen). NIS-Teen is a national survey conducted annually by the CDC to assess immunization levels for adolescents 13-17 years of age.[16] The study collects data by interviewing households in all 50 states by telephone. To ensure quality of the vaccination coverage estimates, immunization data for the surveyed adolescent are also collected through a mail survey of their pediatricians, family physicians, and other health care providers.

The purpose of this report is to provide recent data on the incidence of HPV-associated cancers by site, with attention to diagnostic year, age, and sex as related to HPV-associated oropharyngeal cancer. The report also addresses HPV immunizations for adult, ages 18 to 49, and for adolescents, ages 13 to 17, in Texas.

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Results

HPV-Associated Cancer Incidence Rates, Texas, 2013-2017

Table 1 shows the HPV-associated cancer incidence rates by anatomical site. Overall, the HPV-associated cancer rate for Texans in 2013-2017 was 11.7 per 100,000 population. HPV-associated cervical cancer had the highest incidence rate (8.3 per 100,000 population) followed by HPV-associated oropharyngeal cancer (4.5 per 100,000 population). Texas females are more likely to experience overall HPV-associated cancers compared to their male counterparts (13.5 vs. 9.9 per 100,000 population, respectively). However, this trend is reversed for HPV-associated oropharyngeal cancers, with Texas males (7.9 per 100,000 population) having a higher rate than females (1.5 per 100,000 population). Overall, HPV-associated cancer incidence rates increase with increasing age, with adults ≥65 experiencing a higher rate compared to younger adults in any other age group. A similar trend is seen for HPV-associated oropharyngeal cancer by age groups.

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Table 1: HPV-Associated Cancer Incidence Rates and 95% Confidence Intervals (CI) by Site, Texas, 2013-2017

Site	Rate	Lower CI	Upper CI	Count
Cervix	8.3	8.1	8.5	5,617
Vagina	0.4	0.4	0.5	301
Vulva	1.5	1.4	1.6	1,090
Penis	0.9	0.8	0.9	517
Anus [a]	1.5	1.5	1.6	2,127
Oropharynx	4.5	4.4	4.6	6,516
All HPV-Associated Cancers	11.7	11.5	11.9	16,168

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 (Tiwari mod). Confidence intervals provide a range of values that have a specified probability of containing the rate or trend. For 95% confidence intervals, it can be stated that 95% of the time the true rate will lie within these limits. Count is the total number of cases for the 5-year time-period, 2013-2017.

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-0-3 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).

a. Includes anal and rectal squamous cell carcinomas.

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 11/7/2019.

Prepared by: Texas Cancer Registry, Cancer Epidemiology and Surveillance Branch, Texas Department of State Health Services, Data Request #20005, 1/17/2020.

HPV-Associated Oropharyngeal Cancer Incidence Rates by Year, Texas

As noted in Table 2, the overall rate of HPV-associated oropharyngeal cancer incidence rate in Texas has remained steady from 2013 through 2017. Additionally, as with overall HPV-associated cancers, the HPV-associated oropharyngeal cancer incidence rate (Table 3) increases with increasing age, with adults over 65 years of age having an HPV-associated oropharyngeal cancer incidence rate of 14.7 per 100,000 population compared to 13.7 for adults 50-64 years of age and 1.3 for those 18 to 49 years of age.

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Table 2: Oropharyngeal HPV-Associated Cancer Incidence Rates and 95% Confidence Intervals (CI) by Year, Texas, 2013-2017

Year	Rate	Lower CI	Upper CI	Count
2013	4.3	4.0	4.5	1,166
2014	4.5	4.2	4.7	1,250
2015	4.8	4.5	5.0	1,373
2016	4.7	4.5	5.0	1,394
2017	4.4	4.1	4.6	1,333

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 (Tiwari mod). Confidence intervals provide a range of values that have a specified probability of containing the rate or trend. For 95% confidence intervals, it can be stated that 95% of the time the true rate will lie within these limits.
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. 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).
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 11/7/2019.
Prepared by: Texas Cancer Registry, Cancer Epidemiology and Surveillance Branch, Texas Department of State Health Services, Data Request #20005, 1/17/2020.

Table 3: Oropharyngeal HPV-Associated Cancer Incidence Rates and 95% Confidence Intervals (CI) by Age Group, Texas, 2013-2017

Age Group	Rate	Lower CI	Upper CI	Count
< 18 years	0	0	0	2
18-49 years	1.3	1.2	1.3	695
50-64 years	13.7	13.2	14.2	3,368
65+ years	14.7	14.2	15.4	2,452

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 (Tiwari mod). Confidence intervals provide a range of values that have a specified probability of containing the rate or trend. For 95% confidence intervals, it can be stated that 95% of the time the true rate will lie within these limits. Count is the total number of cases for the 5-year time-period, 2013-2017.
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. 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).
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 11/7/2019.
Prepared by: Texas Cancer Registry, Cancer Epidemiology and Surveillance Branch, Texas Department of State Health Services, Data Request #20111, 3/13/2020.

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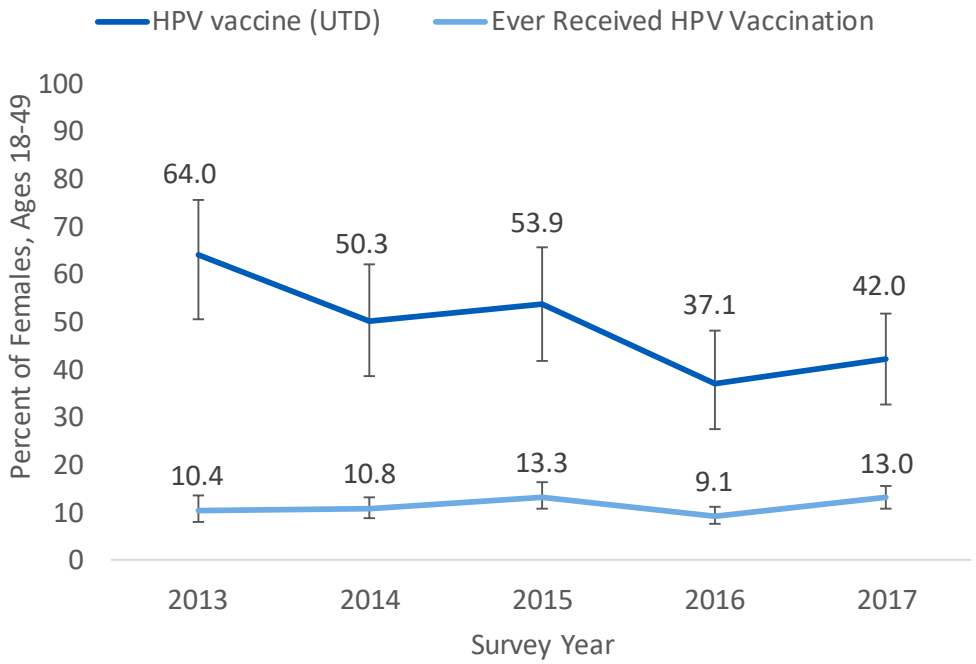
HPV Vaccination Coverage among Adults, Ages 18-49, Texas BRFSS, 2013-2017

Figure 1 presents the estimated coverage of ever receiving a HPV vaccination and the HPV vaccine for adults, ages 18 to 49, in Texas for years 2013-2017. The Centers for Disease Prevention and Control Advisory Committee on Immunization Practices (ACIP) recommends this vaccine to young adults to provide protection from developing cancers caused by HPV infection.[13] Overall in Texas for 2013-2017, 11.4 percent of Texas adults, ages 18 to 49 years, indicated they ever received a HPV vaccination. The trend for ever having received an HPV vaccination among adults remains consistent overtime. Of this 11.4 percent, from 2013-2017, in Texas, nearly 47.5 percent of adults, within this same age group, reported being up-to-date (UTD) on their HPV vaccine - meaning they received all recommended doses to complete the series. The trend over time indicates a statistically significant decline in the percent of adults who are UTD, starting at 64 percent in 2013, to 37.1 percent in 2016, and 42.0 percent in 2017.

Figure 1: Estimated coverage of ever receiving an HPV vaccination and being UTD with the HPV vaccine among adults, ages 18-49, by year, Texas BRFSS



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Demographics for Adults, ages 19 to 49 with an UTD HPV vaccination

Table 4 presents results for Texas adults, ages 18 to 49, with UTD HPV vaccination by demographics. These adults are significantly more likely to be female, white non-Hispanic, have a college degree, and be married. They are also slightly more likely to live in border counties (49.2 percent) than to live in non-border counties (47.9 percent).

Table 4: Percent of Adults, Ages 18-49, with UTD HPV vaccination by Demographics, Texas BRFSS 2013-2017

Characteristic	Percent	95% Confidence Interval
Gender		
Male	21.9	14.7-31.3
Female	53.9	47.8-59.8
Race/Ethnicity		
White, non-Hispanic	57.8	49.1-66.1
Black, non-Hispanic	--	--
Hispanic	42.5	35.2-50.1
Other/Multiracial, non-Hispanic	--	--
Educational Attainment		
Less than high school	--	--
High school grad/some college	44.8	38.3-51.3
College grad	60.1	50.9-68.7
Marital Status		
Married	52.5	43.1-61.6
Unmarried	45.9	39.6-52.3
Body Mass Index		
Normal	49.4	41.4-57.4
Overweight	45.4	35.5-55.7
Obese	42.6	31.8-54.2
Household Income		
Less than $25,000	48.6	40.0-57.3
$25,000 to less than $50,000	44.6	33.5-56.4
$50,000 or more	53.0	43.4-62.3
Geographic Location		
Border	49.2	37.0-61.5
Non-border	47.9	42.0-53.8

UTD – up-to-date
HPV – Human Papillomavirus Vaccine
Border Region defined as Border or Non-Border according to Article 4 of the La Paz Agreement of 1983.
-- Data suppressed as coefficient of variation exceeds 20 percent

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HPV Vaccination Coverage among Adolescents, Ages 13-17, NIS-Teen, Texas 2016-2018

Table 5 shows the estimated coverage of HPV vaccine and doses greater than one for adolescents, ages 13 to 17 years.[17] Due to a change in methodology used for the NIS-Teen survey in 2016, only data from 2016 through 2018 is reported here. Overall, Texas HPV rates are consistently below rates in the US, regardless of survey year. As indicated, an increase in overall coverage for both the HPV vaccine and doses has occurred for adolescent in Texas from 2016 to 2018.

Table 5: Estimated coverage of HPV vaccine and doses among adolescents, ages 13-17, US and Texas NIS-Teen, 2016-2018

Vaccine	2016	2016	2017	2017	2018	2018
	US	Texas	US	Texas	US	Texas
Up To Date	43.4	32.9	48.6	39.7	51.1	43.5
≥1 dose	60.4	49.3	65.5	57.8	65.5	59.9

UTD – up-to-date
HPV – Human Papillomavirus Vaccine
NIS-Teen – National Immunization Survey for Teens

In addition to Texas HPV immunization rates as reported in Table 5, the survey estimates up-to-date (UTD) and ≥1 dose coverage of HPV by gender and jurisdiction.[17] Historically, the survey has provided rates every year for State of Texas as well as Bexar and Harris counties. In addition, various counties of interest are added in given years. Appendix A shows estimated coverage for HPV vaccine and doses among adolescents, ages 13-17, by gender and various jurisdictions from 2016 to 2018. In general, across the state and various jurisdictions, female adolescents are more likely to be UTD and have ≥1 dose of the HPV vaccine than male adolescents.

What's Next

Acceptance rates of the HPV vaccine in adolescents has shown improvement over the two years we evaluated. This is great news, but additional efforts should be continued to help increase rates even further. There has been a decline in HPV vaccination among adults, despite the vaccine being recommended up to age 26. In addition to getting more people to start the vaccine series, greater effort may be needed in getting people to complete the series.

Studies show provider recommendation is the best indicator for vaccine acceptance.[18] Medical and dental providers may educate themselves on HPV and refer patients for vaccinations when appropriate.[19,20] In a dental office, discussions about HPV can easily be introduced during a routine oral cancer screening. Questions about vaccination records can also be added into paper or electronic health records as a prompt to discuss the vaccine with patients.

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In most cases, HPV vaccines are administered by the patient's medical office, however, their pharmacy may offer it as well.[21] To increase access, some states have adopted laws which allow dentists to administer the vaccine.[22] Additionally, low completion rates of the vaccine series have sparked additional research as to whether a one-shot vaccination is effective.[23]

For more information about HPV, email us at dental@dshs.texas.gov. Additional information is also available through the following:

- Texas HPV Coalition – www.texashpvcoalition.org
- American Cancer Society – www.cancer.org

Citation

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Appendix A: Estimated coverage of HPV vaccine and doses among adolescents, ages 13-17, by Gender and Jurisdiction, Texas NIS-Teen, 2016-2018

Survey Year	Vaccine	Texas	City of Houston	Hidalgo County	Dallas County	Bexar County	Travis County	El Paso County	Tarrant County
2016	UTD, females	39.7	44.2		24.3	45.2		69.0	
2016	≥1 dose, females	54.5	59.4		48.8	58.3		78.4	
2016	UTD, males	26.5	48.6		23.6	33.3		63.2	
2016	≥1 dose, males	44.3	65.9		42.7	48.5		81.1	
2017	UTD, females	43.5	50.6		41.7	55.6	57.0	65.4	
2017	≥1 dose, females	60.4	73.6		64.3	68.8	76.8	84.8	
2017	UTD, males	36.0	59.7		29.9	37.2	46.9	54.6	
2017	≥1 dose, males	55.2	72.4		45.2	57.1	62.6	80.9	
2018	UTD, females	47.8	54.2	49.7		52.5			45.5
2018	≥1 dose, females	64.6	77.1	69.4		71.1			63.8
2018	UTD, males	39.4	47.8	49.2		43.6			46.4
2018	≥1 dose, males	55.5	63.6	63.5		59.7			61.7

UTD – up-to-date
HPV – Human Papillomavirus Vaccine
NIS-Teen – National Immunization Survey for Teens