

ADOLESCENT VACCINATION RATES IN AMERICA

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BLUE CROSS BLUE SHIELD, THE HEALTH OF AMERICA REPORT

EXECUTIVE SUMMARY

In this report, the Blue Cross Blue Shield Association, in collaboration with HealthCore and Blue Health Intelligence (BHI), examines vaccination rates for U.S. commercially insured adolescents. The study focuses on three vaccines recommended by the Centers for Disease Control and Prevention (CDC) for adolescents: human papillomavirus (HPV), meningococcal and tetanus, diphtheria and pertussis (Tdap).¹ It follows four birth cohorts of adolescents (born in 2000, 2001, 2002 and 2003) from ages 10 to 13 to determine whether they completed the recommended vaccine regimens “on time” by their 13th birthday (and thereby measures completion rates for the years 2013 through 2016).²

This study finds that national adolescent vaccination rates are fairly high for Tdap and meningococcal, but substantially lower for HPV. Wide geographic variation occurs in vaccination rates for all three vaccines throughout the country at both the state and local levels. Tdap and meningococcal vaccination rates are approximately equal for both boys and girls, while girls receive the HPV vaccine at higher rates than boys. Completion of the HPV vaccine regime for adolescents is a crucial step to protect against future infections, as the CDC estimates 31,500 deaths from cancers relating to the HPV virus occur each year.³

**Vaccines Recommended
by the Centers for Disease
Control and Prevention
(CDC) for Adolescents**

Human Papillomavirus (HPV)

Meningococcal

Tdap (Tetanus, Diphtheria
and Pertussis)

¹ The CDC recommends that adolescents receive several vaccinations to help protect against serious infectious diseases, including HPV, meningococcal and Tdap, and that adolescents complete these series of vaccines from ages 11 to 12. The meningococcal and Tdap vaccines are well established in medical practice and require only one dose. The HPV vaccine is relatively new to the recommended adolescent vaccine regimen, approved for use starting in 2006, and requires multiple doses. The CDC also suggests an influenza vaccine for adolescents. However, because influenza vaccinations are frequently administered outside of a doctor's office, with no associated medical claim, they were excluded from the scope of this report.

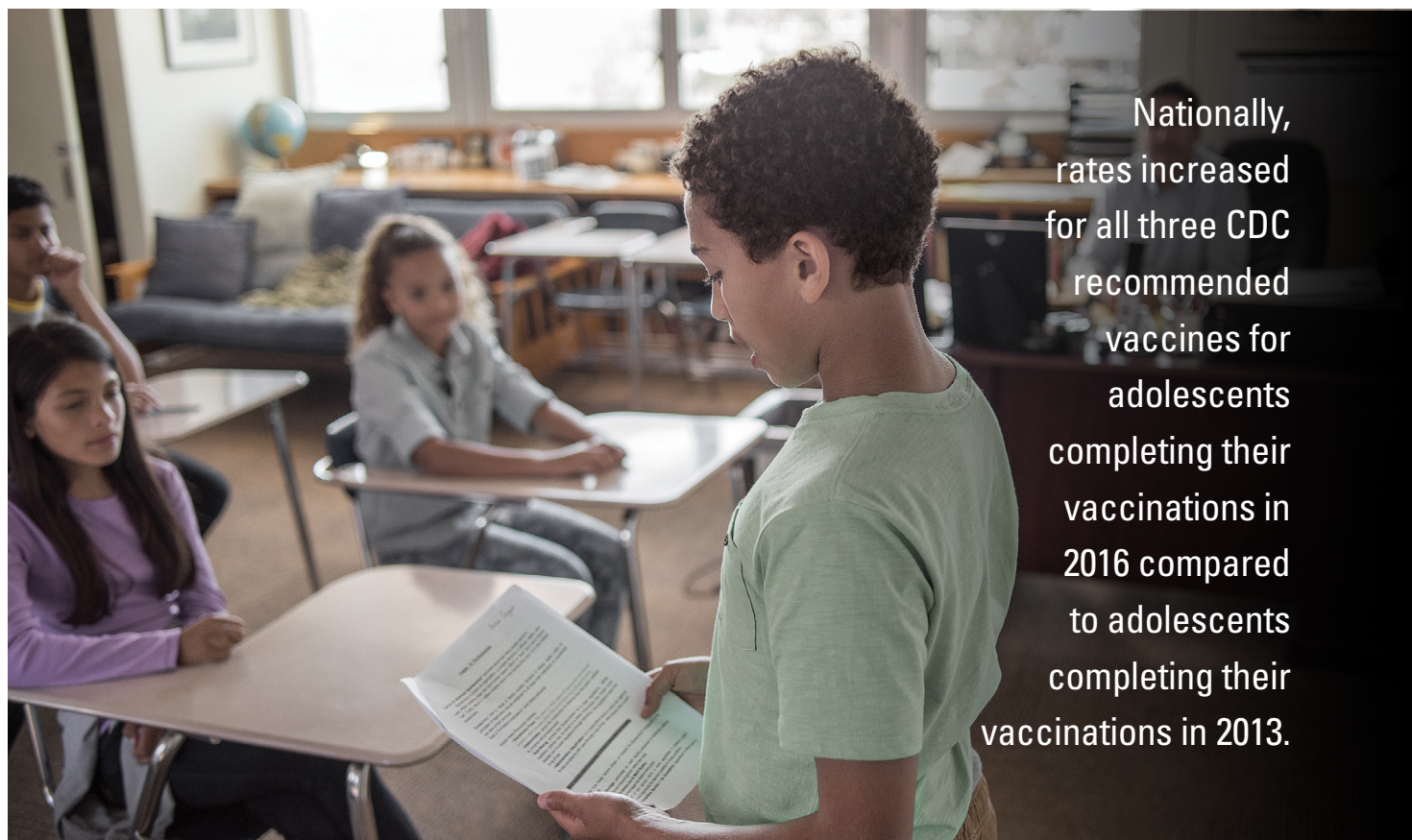
² For the purposes of this analysis, a vaccine is considered “on time” if it is completed between the adolescent's 10th and 13th birthdays, which aligns with the CDC-recommended timeframe of ages 11 to 12. All adolescents considered in this study were born between the years 2000 and 2003 and reached ages 10 to 13 from the years 2013 through 2016. Claims data in this report do not capture vaccinations that are not paid for by the health insurer or vaccinations that occur after 13 years of age. This can result in a modest underestimation of completion rates.

³ For more information, see: <https://www.cdc.gov/cancer/hpv/statistics/cases.htm>

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Specific Findings

- Nationally, rates increased for all three CDC-recommended vaccines for adolescents completing their vaccinations in 2016 compared to adolescents completing their vaccinations in 2013, with Tdap increasing 8 percent, meningococcal increasing 18 percent and HPV increasing 55 percent.
- While the HPV vaccination rate rose substantially, just 34 percent of adolescents received their first dose of the HPV vaccine by 2016, well behind Tdap and meningococcal, which had completion rates of 84 percent and 78 percent, respectively. Girls outpaced boys on HPV vaccine first-dose completion by 37 percent to 32 percent.
- Adolescent vaccination rates varied widely for all three vaccinations across the U.S. For those completing their vaccinations in 2016, Tdap rates ranged from a high of 93 percent in Rhode Island to a low of 53 percent in Wyoming, while first-dose rates for the HPV vaccine ranged from 78 percent in Rhode Island to 21 percent in New Jersey. For two of the three vaccines (Tdap and meningococcal), rates were higher in urban areas than in rural areas.



Nationally, rates increased for all three CDC recommended vaccines for adolescents completing their vaccinations in 2016 compared to adolescents completing their vaccinations in 2013.

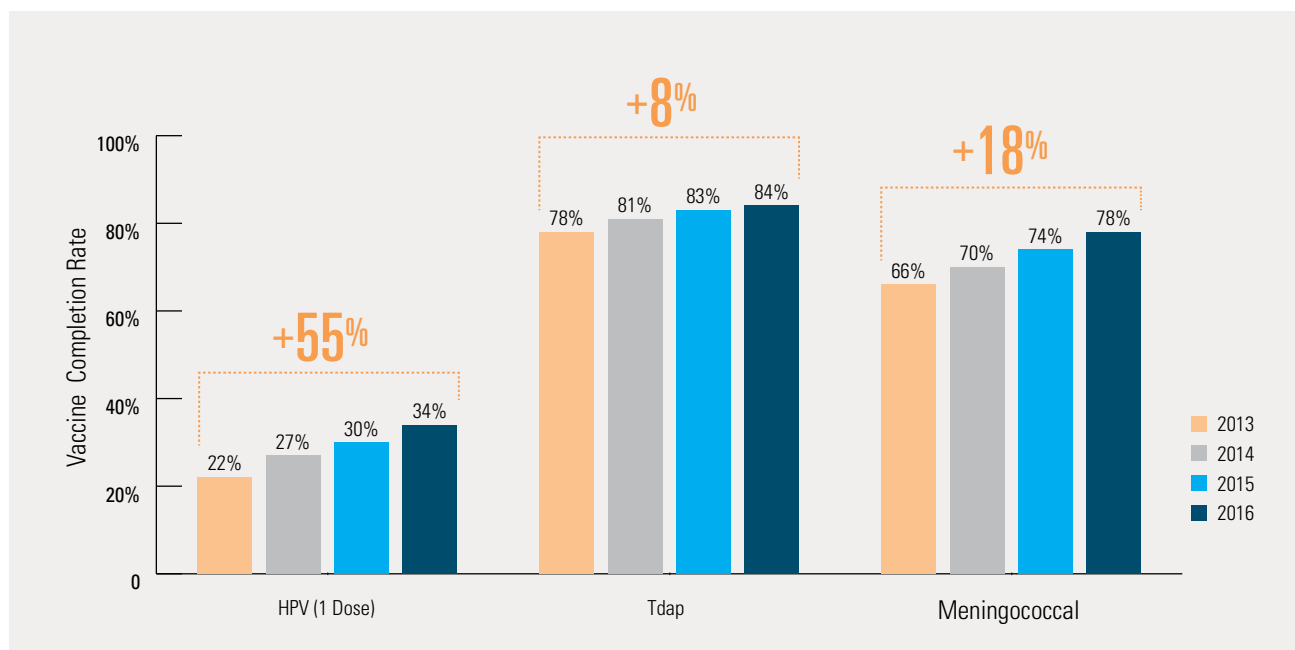
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Adolescent Vaccination Rates

Vaccination rates for all three CDC-recommended adolescent vaccines increased in recent years (see Exhibit 1). Tdap vaccination rates are the highest of the three vaccines, growing from 78 percent for adolescents completing vaccinations in 2013 to 84 percent for those completing them in 2016. Meningococcal vaccination rates rose from 66 percent to 78 percent during the study period. Both vaccines are approaching the high levels needed to achieve herd immunity for certain diseases.⁴

Average first dose rates for the newer HPV vaccine were just 29 percent for adolescents completing their vaccinations between 2013 and 2016 and lagged significantly behind average rates for Tdap (at 82 percent) and meningococcal (at 72 percent). However, this rate did improve from 22 percent to 34 percent for adolescents completing their vaccinations during this period.

EXHIBIT 1: ADOLESCENT VACCINATION RATES FOR VACCINES GIVEN BEFORE THEIR 13TH BIRTHDAY BY COMPLETION YEAR



⁴ The CDC defines herd immunity as: "A situation in which a sufficient proportion of a population is immune to an infectious disease (through vaccination and/or prior illness) to make its spread from person to person unlikely. Even individuals not vaccinated (such as newborns and those with chronic illnesses) are offered some protection because the disease has little opportunity to spread within the community." It is suggested that 90 to 95 percent vaccination rates are needed to achieve herd immunity for certain diseases including Tdap and meningococcal. However, since the HPV virus is spread through sexual contact, the dynamics of herd immunity work differently.

For more information, see: <https://www.cdc.gov/vaccines/terms/glossary.html#commimmunity>; <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC4927017/>; and <https://www.cancer.gov/about-cancer/causes-prevention/risk/infectious-agents/hpv-vaccine-fact-sheet#q7>

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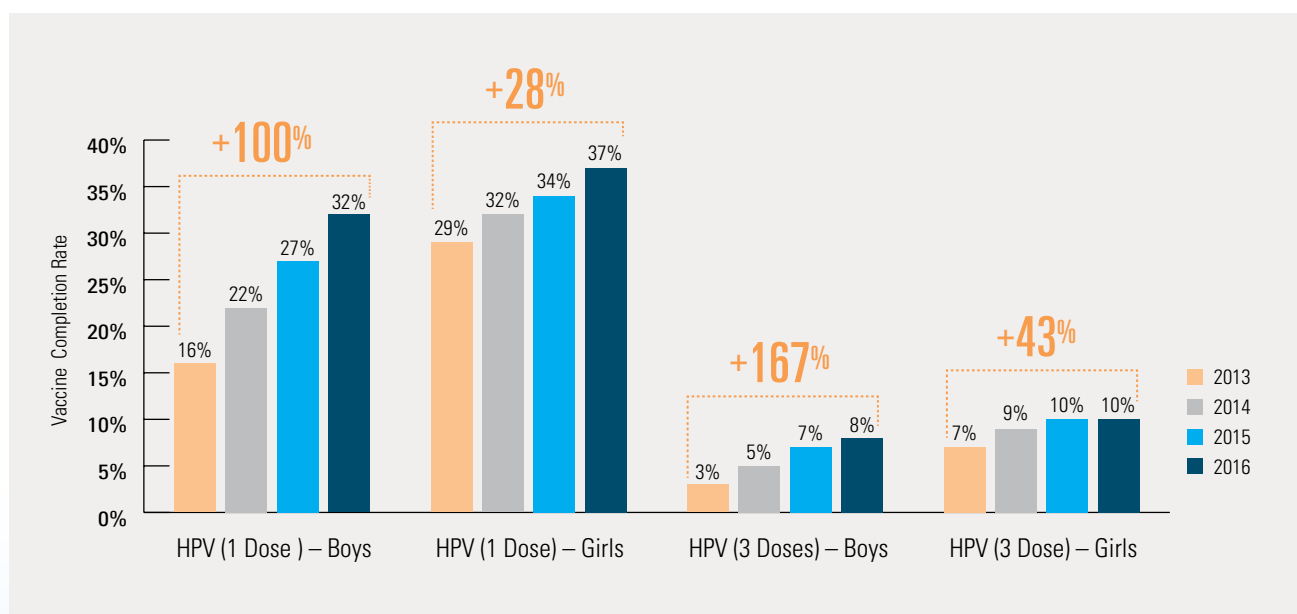
Adolescent Vaccination Rates by Gender

Vaccination rates for the Tdap and meningococcal vaccines were nearly identical between boys and girls completing their vaccines in 2016.⁵ However, rates for the HPV vaccine differed by gender (see Exhibit 2). The rate for girls completing the first dose of the HPV vaccine in 2016 was 37 percent compared to 32 percent for boys. However, this gap is closing as rates for boys were up 100 percent since 2013. The relative risk of death from cancers related to the HPV virus is 60 percent higher for girls than it is for boys. The CDC has recommended the vaccine for girls since it became available in 2006, five years longer than it has recommended the same vaccine for boys.⁶ Therefore, this narrowing gender gap in rates suggests more efforts may be needed to increase vaccination among both girls and boys.

Relatively few adolescents completed all three doses of the HPV vaccine during the study period despite three doses being the CDC recommendation at that time; only 8 percent of boys and 10 percent of girls completed their third dose in 2016.



EXHIBIT 2: PERCENT OF ADOLESCENTS WHO COMPLETED THE FIRST DOSE AND THREE DOSES OF THE HPV VACCINE BEFORE THEIR 13TH BIRTHDAY BY GENDER AND COMPLETION YEAR



⁵ Rates for Tdap were 84 percent for boys and 85 percent for girls while rates for meningococcal were 77 percent for boys and 78 percent for girls.

⁶ The CDC estimates that cancer deaths each year attributable to the HPV virus are 19,400 among females versus 12,100 among males resulting in a 60 percent higher likelihood of death ($19,400/12,100 \times 100 = 160$ percent). For more information, see: <https://www.cdc.gov/cancer/hpv/statistics/cases.htm>.

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Geographic Variation of Adolescent Vaccination Rates

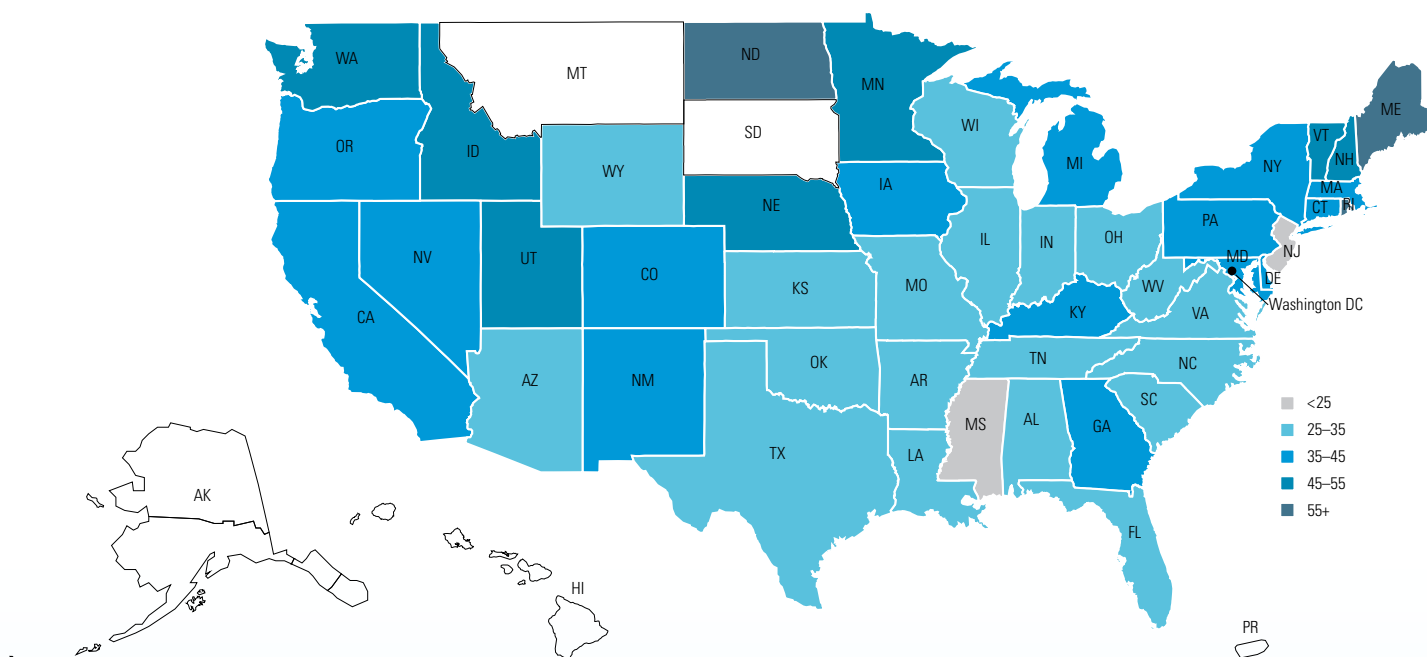
Wide geographic variation exists across the nation in rates of the three CDC-recommended adolescent vaccines. State-level adolescent vaccination rates show some regions meet or exceed public health targets, while others fall far below suggested levels. (See Appendices A and B for detailed information by state.)

Large geographic differences also occur in metropolitan statistical areas (MSAs) across the country in rates of the CDC-recommended adolescent vaccines. Similar to the state-level analysis, some MSAs reach beyond public health vaccination targets, while others fall short of meeting national goals. (See Appendices C and D for detailed information by MSA.)

An in-depth look at the HPV vaccine by state demonstrates that the highest first-dose rates are clustered in New England and parts of the Midwest. The states with the lowest first-dose HPV vaccination rates are at less than half the rate of the highest performing states.⁷ (See Exhibits 3 and 4.)

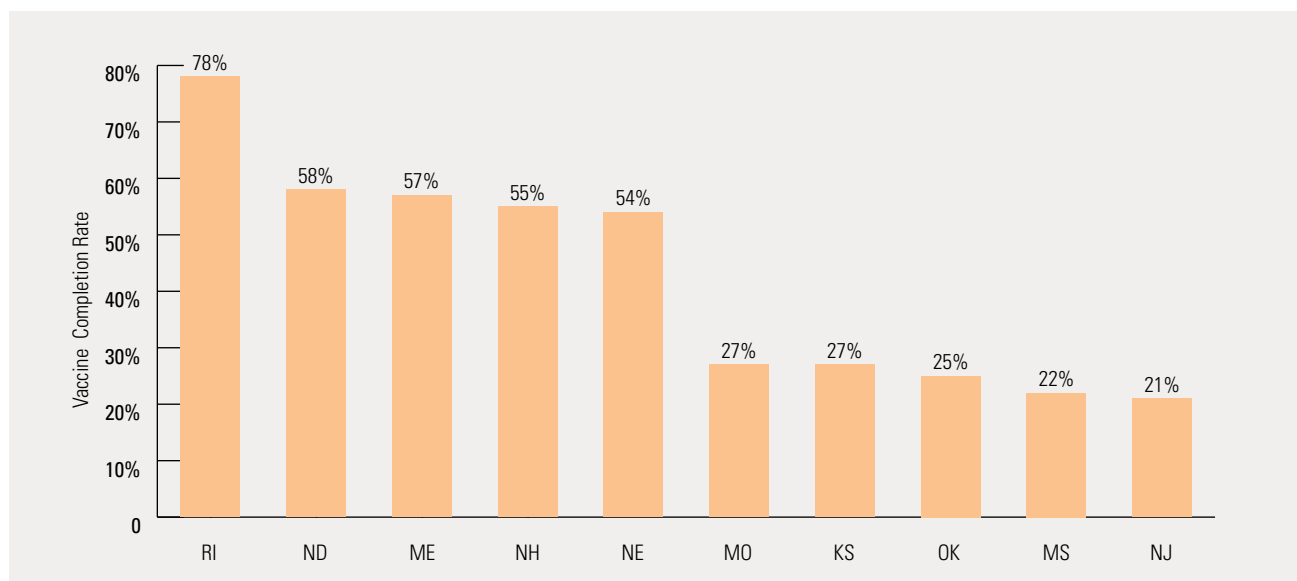
Additionally, a state-level analysis of the Tdap and meningococcal vaccines reveals no strong regional patterns. (See national maps in Appendix E for detailed results.)

EXHIBIT 3: PERCENT OF ALL ADOLESCENTS WHO COMPLETED THE FIRST DOSE OF THE HPV VACCINE BEFORE THEIR 13TH BIRTHDAY BY STATE (COMPLETION YEAR – 2016)

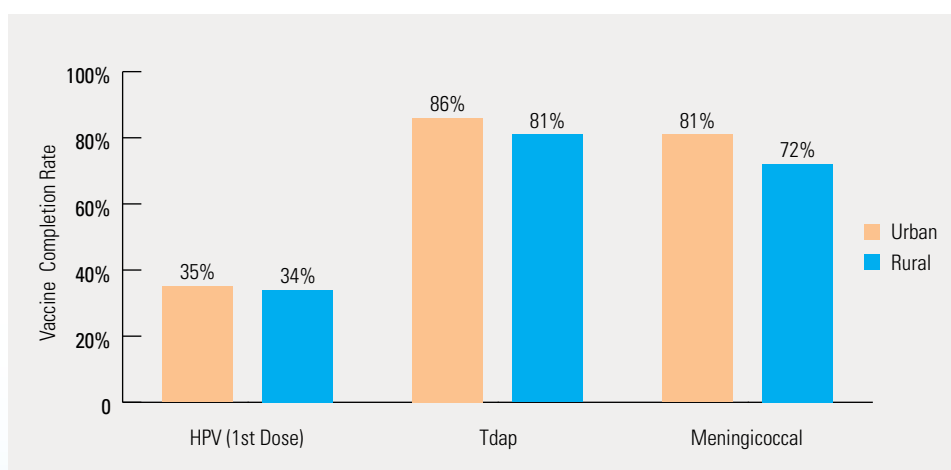


⁷ Alaska, Hawaii, Montana, South Dakota and Washington, D.C. were excluded from reporting due to insufficient study population.

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EXHIBIT 4: STATES WITH THE HIGHEST AND LOWEST RATES OF FIRST-DOSE HPV VACCINATION (2016)**Adolescent Vaccination Rates in Urban and Rural Areas**

Differences in vaccination rates for adolescents who live in urban and rural areas of the country are apparent for two of the three CDC-recommended vaccines.⁸ Adolescents who reside in urban areas in America have higher rates of Tdap and meningococcal vaccinations than do rural adolescents (see Exhibit 5). Nonetheless, first-dose HPV-vaccination rates are nearly the same for adolescents who live in both urban and rural areas.

EXHIBIT 5: PERCENT OF URBAN AND RURAL ADOLESCENTS WHO GET VACCINATED BEFORE THEIR 13TH BIRTHDAY BY VACCINE (COMPLETION YEAR – 2016)

⁸ If no ZIP codes in a county were considered part of an MSA, then the county was coded as rural. If any ZIP code in a county was considered part of an MSA, then the county was coded as urban.

CONCLUSION

Adolescent vaccination rates are an important metric in the prevention of serious infectious diseases. The findings in this report show that the on time completion rates of the three CDC-recommended vaccines of HPV, meningococcal and Tdap for commercially insured American adolescents have all increased between 2013 and 2016. However, while about three-quarters of adolescents in the U.S. complete the more-established meningococcal and Tdap vaccines by age 13, only one-third of adolescents receive the first dose of the newer HPV vaccine.

For certain areas of the country, work is needed to improve completion rates of all three vaccines. For the meningococcal and Tdap vaccines, some areas lag as much as 50 percent behind other areas. Moreover, HPV vaccination rates in all areas are much lower than the other vaccines. Results from this study suggest continued efforts for awareness and education are needed to achieve compliance with the administration of the three CDC-recommended vaccines for adolescents in America.

METHODOLOGY NOTES

This is the eighteenth study of the Blue Cross Blue Shield, The Health of America Report series, a collaboration between Blue Cross Blue Shield Association and Blue Health Intelligence, which uses a market-leading claims database to uncover key trends and insights into healthcare affordability and access to care. Analysis was performed by and also includes medical claims data from HealthCore, a wholly owned and independently operated health outcomes subsidiary of Anthem, Inc.

The report examines the medical claims of more than 1.3 million Blue Cross Blue Shield commercially insured adolescent members per year from 2010 through 2016. This study aims to determine how Tdap, meningococcal and HPV vaccination rates have changed during the study period, with breakouts by gender and geography. For the purposes of this analysis, a vaccine is considered to be on time if it is completed between the adolescent's 10th and 13th birthdays, and thus aligns with the CDC-recommended timeframe of ages 11 to 12. All adolescents considered in this study were born between the years 2000 and 2003, and thereby were ages 10 to 13 from the years 2010 through 2016. There are four adolescent birth groupings, or birth cohorts, analyzed in this study. Each birth cohort is followed for three years. Adolescents in the first birth cohort were born in 2000 and data from 2010 through 2013 are included here. Adolescents in the fourth cohort were born in 2003 and data from 2013 through 2016 are included here.

All U.S. states and MSAs included in the report had a sample size of 500 or more adolescents. Alaska, Hawaii, Montana, South Dakota and Washington, D.C. were excluded from state-specific reporting due to an insufficient study population. Data from Anthem Blue Cross were excluded from calculations for the state of California because of the prevalence of capitated payments to primary care providers, reducing the incentive for providers to submit claims for primary care, thereby under-representing adolescent vaccination rates in that state.

Note that this report does not capture adolescent members who receive the HPV vaccine after their 13th birthday or those who received the vaccine from a free public or private local program which does not generate a medical claim.

For more information and to read past reports from the Health of America Report series, visit www.bcbs.com/the-health-of-america.



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APPENDIX

Appendix A: All Adolescent Vaccination Rates by State

State	Completion Year 2013				Completion Year 2016				All Adolescents Completing 2013 to 2016			
	HPV - 1st dose	HPV - 3 doses	Meningococcal	Tdap	HPV - 1st dose	HPV - 3 doses	Meningococcal	Tdap	HPV - 1st dose	HPV - 3 doses	Meningococcal	Tdap
AL	19.7%	4.8%	61.4%	75.0%	34.1%	7.7%	68.9%	80.9%	28.1%	6.7%	65.7%	79.3%
AR	14.2%	3.3%	38.0%	59.6%	29.3%	8.9%	84.2%	85.9%	23.4%	6.3%	66.0%	76.2%
AZ	20.7%	4.5%	70.4%	73.2%	33.3%	7.2%	82.9%	83.5%	27.4%	5.7%	77.6%	78.9%
CA	24.4%	8.2%	62.0%	79.1%	37.3%	15.2%	68.4%	80.4%	31.7%	12.5%	66.2%	80.3%
CO	22.7%	3.0%	65.2%	83.1%	40.1%	6.5%	73.7%	86.0%	31.9%	4.8%	69.7%	84.9%
CT	23.5%	0.7%	90.0%	89.7%	41.9%	1.2%	91.9%	92.1%	31.1%	1.1%	91.1%	91.1%
DE	26.2%	7.3%	77.5%	84.8%	40.3%	17.2%	82.9%	86.3%	35.7%	14.7%	80.4%	86.9%
FL	22.3%	4.5%	64.6%	78.5%	29.0%	7.3%	66.4%	80.0%	26.2%	6.1%	65.7%	79.5%
GA	22.5%	1.2%	67.7%	75.8%	36.0%	2.4%	89.3%	89.3%	29.7%	2.1%	79.6%	83.0%
IA	22.3%	5.0%	50.5%	68.2%	39.0%	9.5%	72.1%	83.9%	31.1%	7.9%	61.7%	76.9%
ID	32.1%	7.8%	77.5%	83.0%	48.3%	14.1%	82.1%	84.4%	41.1%	11.3%	80.1%	84.3%
IL	16.8%	5.7%	61.6%	84.0%	28.5%	10.0%	78.9%	85.6%	22.5%	7.9%	69.0%	85.2%
IN	17.0%	1.4%	70.2%	70.4%	27.9%	2.5%	81.3%	81.0%	22.9%	2.1%	76.5%	76.7%
KS	18.5%	5.0%	56.3%	82.3%	27.0%	8.2%	64.4%	86.0%	24.0%	7.3%	61.2%	86.2%
KY	27.4%	1.5%	85.8%	86.6%	36.4%	2.7%	89.2%	89.8%	32.6%	2.3%	87.9%	88.4%
LA	16.6%	5.3%	60.1%	63.8%	32.8%	13.3%	83.0%	83.6%	28.4%	11.0%	76.1%	77.5%
MA	26.5%	6.0%	76.5%	86.0%	41.5%	10.0%	81.1%	87.6%	33.3%	7.9%	78.2%	86.2%
MD	20.9%	4.3%	71.6%	79.3%	35.8%	7.3%	88.7%	88.2%	27.9%	6.1%	81.2%	84.0%
ME	39.1%	0.9%	71.2%	78.4%	57.0%	2.4%	84.5%	86.5%	49.4%	2.0%	77.4%	82.7%
MI	22.8%	4.6%	70.5%	73.6%	38.4%	13.3%	83.5%	84.7%	31.1%	9.9%	78.3%	80.8%
MN	30.2%	7.8%	65.2%	90.5%	47.2%	14.0%	86.6%	90.1%	39.2%	10.7%	76.7%	89.6%
MO	16.8%	2.8%	49.4%	72.3%	27.4%	4.6%	61.5%	73.8%	22.5%	4.1%	54.9%	74.3%
MS	11.9%	3.3%	37.4%	52.1%	21.8%	4.4%	47.5%	73.0%	17.0%	4.0%	44.0%	67.2%
NC	21.3%	4.2%	62.0%	84.1%	31.7%	4.9%	89.2%	91.4%	27.1%	4.7%	74.6%	87.9%

Appendix A: All Adolescent Vaccination Rates by State (continued)

State	Completion Year 2013				Completion Year 2016				All Adolescents Completing 2013 to 2016			
	HPV - 1st dose	HPV - 3 doses	Meningococcal	Tdap	HPV - 1st dose	HPV - 3 doses	Meningococcal	Tdap	HPV - 1st dose	HPV - 3 doses	Meningococcal	Tdap
ND	36.4%	15.9%	83.7%	90.8%	58.2%	27.5%	88.6%	91.2%	46.9%	21.3%	86.8%	91.5%
NE	42.1%	11.4%	70.0%	86.0%	54.0%	14.3%	80.0%	92.1%	48.6%	13.0%	75.8%	90.3%
NH	40.5%	4.5%	82.0%	87.4%	54.5%	6.2%	86.1%	89.7%	49.0%	5.8%	83.8%	88.5%
NJ	15.8%	3.5%	90.1%	90.3%	20.6%	3.4%	92.1%	92.2%	18.7%	3.8%	91.2%	91.3%
NM	24.1%	7.1%	50.3%	62.0%	36.0%	12.6%	58.9%	68.6%	30.5%	10.0%	53.4%	65.2%
NV	21.4%	1.6%	45.0%	61.6%	36.3%	4.8%	57.9%	74.4%	27.3%	3.2%	49.0%	65.8%
NY	18.8%	3.4%	69.0%	87.1%	35.1%	9.2%	79.6%	89.4%	27.0%	5.7%	73.9%	87.8%
OH	22.9%	1.3%	63.7%	77.3%	31.3%	2.5%	75.3%	82.5%	27.5%	2.2%	68.3%	80.0%
OK	20.3%	6.5%	47.9%	62.5%	25.5%	7.9%	52.7%	69.3%	23.3%	8.0%	50.6%	66.5%
OR	29.9%	5.2%	61.7%	82.9%	43.5%	10.1%	67.3%	79.3%	37.8%	8.3%	65.9%	82.9%
PA	28.6%	12.1%	88.9%	91.3%	36.9%	17.1%	90.6%	91.5%	33.6%	15.2%	89.9%	91.7%
RI	41.6%	17.0%	91.0%	93.2%	77.6%	36.8%	92.9%	93.4%	56.9%	24.4%	91.9%	93.3%
SC	16.2%	4.4%	52.7%	71.2%	28.1%	8.8%	66.5%	84.7%	23.0%	7.2%	61.9%	80.9%
TN	18.2%	4.7%	63.5%	79.1%	27.8%	7.6%	70.8%	84.9%	22.9%	6.6%	65.7%	81.1%
TX	20.5%	5.8%	75.9%	78.3%	31.3%	9.8%	83.1%	84.6%	25.9%	8.1%	79.9%	82.0%
UT	33.7%	4.3%	65.3%	82.0%	49.9%	7.3%	83.7%	85.6%	42.2%	5.5%	72.2%	83.7%
VA	21.9%	0.8%	61.6%	79.0%	32.8%	1.6%	70.8%	87.0%	27.7%	1.3%	65.9%	82.1%
VT	49.0%	19.8%	79.2%	92.7%	49.0%	19.8%	79.2%	92.7%	45.4%	18.5%	76.0%	90.9%
WA	36.9%	10.2%	71.6%	88.9%	49.9%	15.9%	77.7%	86.8%	44.3%	13.8%	74.1%	87.4%
WI	18.4%	3.5%	61.8%	76.1%	33.7%	6.4%	71.1%	81.3%	26.3%	5.2%	67.2%	79.9%
WV	25.1%	9.1%	76.2%	79.9%	28.9%	9.7%	82.0%	84.3%	26.6%	9.7%	78.7%	81.9%
WY	12.2%	3.1%	24.3%	22.2%	32.1%	6.7%	46.1%	52.5%	22.9%	5.3%	36.7%	40.4%
National	22.4%	5.1%	66.5%	78.1%	34.4%	9.1%	77.7%	84.4%	28.7%	7.3%	72.1%	81.7%

Appendix B: HPV Vaccination Rates by State

State	Percent of adolescents who received their first of three doses of HPV vaccine between ages 10 and 13						
	All Adolescents Completing in 2013	Adolescent Boys Completing in 2013	Adolescent Girls Completing in 2013	All Adolescents Completing in 2016	Adolescent Boys Completing in 2016	Adolescent Girls Completing in 2016	Percentage of adolescents who received their first dose of HPV vaccine, all years
AL	19.7%	7.8%	30.3%	34.1%	30.0%	37.7%	28.1%
AR	14.2%	9.6%	18.9%	29.3%	26.6%	32.2%	23.4%
AZ	20.7%	15.6%	25.7%	33.3%	30.5%	36.2%	27.4%
CA	24.4%	18.7%	30.7%	37.3%	34.8%	40.0%	31.7%
CO	22.7%	17.1%	29.4%	40.1%	37.1%	43.3%	31.9%
CT	23.5%	19.7%	27.5%	41.9%	39.4%	44.5%	31.1%
DE	26.2%	22.5%	30.0%	40.3%	37.7%	43.0%	35.7%
FL	22.3%	16.1%	29.0%	29.0%	27.4%	30.7%	26.2%
GA	22.5%	17.6%	27.7%	36.0%	34.0%	38.0%	29.7%
IA	22.3%	17.5%	28.0%	39.0%	39.9%	38.2%	31.1%
ID	32.1%	23.7%	41.2%	48.3%	44.0%	52.8%	41.1%
IL	16.8%	11.9%	21.9%	28.5%	25.4%	31.7%	22.5%
IN	17.0%	10.8%	23.4%	27.9%	25.0%	30.8%	22.9%
KS	18.5%	13.3%	24.7%	27.0%	24.6%	29.6%	24.0%
KY	27.4%	17.9%	37.3%	36.4%	32.2%	40.8%	32.6%
LA	16.6%	12.2%	22.3%	32.8%	29.7%	35.9%	28.4%
MA	26.5%	20.5%	32.4%	41.5%	38.1%	44.9%	33.3%
MD	20.9%	15.6%	27.5%	35.8%	32.9%	39.0%	27.9%
ME	39.1%	31.0%	46.8%	57.0%	54.1%	59.6%	49.4%
MI	22.8%	16.2%	29.7%	38.4%	36.3%	40.6%	31.1%
MN	30.2%	21.3%	39.9%	47.2%	43.8%	50.6%	39.2%
MO	16.8%	10.9%	22.7%	27.4%	24.6%	30.3%	22.5%
MS	11.9%	5.6%	19.9%	21.8%	18.9%	25.0%	17.0%
NC	21.3%	15.8%	26.8%	31.7%	28.5%	35.1%	27.1%
ND	36.4%	27.7%	45.6%	58.2%	55.6%	60.7%	46.9%

Appendix B: HPV Vaccination Rates by State (continued)

State	Percent of adolescents who received their first of three doses of HPV vaccine between ages 10 and 13						
	All Adolescents Completing in 2013	Adolescent Boys Completing in 2013	Adolescent Girls Completing in 2013	All Adolescents Completing in 2016	Adolescent Boys Completing in 2016	Adolescent Girls Completing in 2016	Percentage of adolescents who received their first dose of HPV vaccine, all years
NE	42.1%	33.0%	51.7%	54.0%	49.8%	58.3%	48.6%
NH	40.5%	30.5%	50.0%	54.5%	52.5%	56.5%	49.0%
NJ	15.8%	11.9%	20.0%	20.6%	18.6%	22.8%	18.7%
NM	24.1%	19.5%	29.1%	36.0%	31.5%	41.0%	30.5%
NV	21.4%	17.1%	26.4%	36.3%	33.8%	39.1%	27.3%
NY	18.8%	15.0%	22.7%	35.1%	32.6%	37.7%	27.0%
OH	22.9%	16.7%	29.4%	31.3%	28.6%	34.2%	27.5%
OK	20.3%	16.8%	24.0%	25.5%	22.8%	28.2%	23.3%
OR	29.9%	22.3%	39.9%	43.5%	39.0%	47.7%	37.8%
PA	28.6%	22.0%	35.4%	36.9%	33.6%	40.4%	33.6%
RI	41.6%	38.4%	44.9%	77.6%	78.1%	77.1%	56.9%
SC	16.2%	9.9%	22.9%	28.1%	24.2%	31.9%	23.0%
TN	18.2%	12.9%	23.3%	27.8%	24.9%	31.0%	22.9%
TX	20.5%	15.7%	25.4%	31.3%	28.2%	34.4%	25.9%
UT	33.7%	23.9%	43.1%	49.9%	43.7%	56.7%	42.2%
VA	21.9%	15.1%	29.1%	32.8%	29.6%	36.0%	27.7%
VT	-	-	-	49.0%	47.1%	51.3%	47.8%
WA	36.9%	28.4%	45.7%	49.0%	47.1%	51.3%	45.4%
WI	18.4%	13.1%	24.8%	49.9%	47.7%	52.0%	44.3%
WV	25.1%	20.6%	29.2%	33.7%	30.7%	36.7%	26.3%
WY	12.2%	9.1%	16.1%	28.9%	25.7%	32.7%	26.6%
National	22.4%	16.4%	28.6%	34.4%	31.5%	37.4%	28.7%

Appendix C: All Adolescent Vaccination Rates by MSA

MSA	Completion Year 2013				Completion Year 2016				All Adolescents Completing 2013 to 2016			
	HPV - 1st dose	HPV - 3 doses	Meningococcal	Tdap	HPV - 1st dose	HPV - 3 doses	Meningococcal	Tdap	HPV - 1st dose	HPV - 3 doses	Meningococcal	Tdap
AKRON, OH	21.1%	1.6%	71.1%	83.7%	27.8%	2.6%	76.4%	84.8%	25.1%	3.1%	72.2%	85.5%
ALBANY-SCHENECTADY-TROY, NY	24.1%	5.0%	73.8%	90.5%	39.9%	6.8%	82.1%	88.3%	32.2%	5.9%	77.5%	88.8%
ALBUQUERQUE, NM	24.0%	6.7%	54.6%	72.9%	40.4%	14.0%	62.9%	76.6%	32.6%	11.0%	56.1%	74.0%
ALLENTOWN-BETHLEHEM-EASTON, PA	26.2%	12.6%	88.0%	89.8%	30.1%	13.7%	90.6%	91.9%	27.6%	12.9%	89.3%	91.2%
ALTOONA, PA	36.9%	22.3%	87.3%	90.3%	39.7%	22.8%	90.4%	91.4%	39.6%	23.4%	89.8%	91.7%
AMARILLO, TX	11.0%	5.0%	68.6%	74.7%	17.1%	6.8%	66.3%	70.6%	15.2%	5.8%	68.7%	73.1%
ANCHORAGE, AK	27.7%	9.4%	39.2%	46.8%	38.8%	7.9%	45.9%	57.6%	33.4%	9.5%	42.7%	56.1%
ANN ARBOR, MI	26.5%	5.1%	74.8%	77.9%	42.9%	15.9%	86.0%	87.2%	34.7%	11.6%	81.3%	83.8%
APPLETON-OSHKOSH-NEENAH, WI	22.9%	3.8%	75.9%	84.0%	40.8%	13.7%	78.7%	87.8%	31.7%	8.6%	77.4%	86.0%
ATLANTA, GA	23.7%	1.5%	69.6%	76.7%	36.4%	2.8%	88.9%	89.0%	30.5%	2.5%	80.5%	83.6%
AUGUSTA-AIKEN, GA-SC	13.6%	0.8%	58.4%	70.1%	26.8%	3.6%	80.3%	87.9%	20.3%	3.0%	71.1%	80.5%
AUSTIN-SAN MARCOS, TX	19.6%	4.9%	81.6%	85.1%	34.5%	7.9%	86.5%	88.2%	27.4%	6.8%	84.7%	87.1%
BALTIMORE, MD	20.3%	5.0%	69.6%	78.8%	34.7%	7.3%	89.4%	89.7%	28.6%	6.2%	80.7%	84.2%
BATON ROUGE, LA	13.1%	6.1%	72.5%	76.2%	36.8%	12.9%	89.3%	89.8%	30.0%	11.1%	83.0%	84.7%
BEAUMONT-PORT ARTHUR, TX	11.5%	3.1%	63.8%	66.5%	16.8%	4.2%	67.2%	69.2%	12.8%	3.3%	66.8%	69.6%
BENTON HARBOR, MI	27.5%	7.4%	76.1%	77.8%	39.9%	17.8%	86.4%	87.8%	34.5%	14.3%	82.1%	84.2%
BERGEN-PASSAIC, NJ	14.4%	1.4%	90.8%	90.1%	20.5%	1.5%	90.4%	91.4%	18.7%	1.5%	90.3%	90.6%
BIRMINGHAM, AL	18.6%	7.4%	65.0%	79.9%	33.0%	8.2%	78.0%	87.2%	27.3%	7.7%	72.6%	84.9%
BISMARCK, ND	34.8%	15.3%	84.5%	90.5%	47.3%	20.6%	84.5%	89.4%	42.3%	19.4%	87.2%	91.5%
BLOOMINGTON, IN	31.9%	0.0%	89.1%	86.3%	59.7%	1.7%	88.6%	86.4%	45.0%	1.9%	86.7%	86.0%

Appendix C: All Adolescent Vaccination Rates by MSA (continued)

MSA	Completion Year 2013				Completion Year 2016				All Adolescents Completing 2013 to 2016			
	HPV - 1st dose	HPV - 3 doses	Meningococcal	Tdap	HPV - 1st dose	HPV - 3 doses	Meningococcal	Tdap	HPV - 1st dose	HPV - 3 doses	Meningococcal	Tdap
BLOOMINGTON-NORMAL, IL	35.5%	15.4%	67.4%	93.9%	36.9%	10.6%	89.9%	94.2%	37.1%	12.6%	78.6%	93.7%
BOISE CITY, ID	35.2%	9.7%	79.3%	83.9%	52.8%	19.2%	84.3%	86.1%	45.6%	14.2%	83.1%	86.4%
BRAZORIA, TX	21.9%	6.1%	81.8%	85.3%	34.6%	13.5%	85.7%	86.7%	28.7%	10.0%	83.9%	86.4%
BROWNSVILLE-HARLINGEN-SAN BENITO, TX	24.0%	7.3%	71.7%	68.8%	36.1%	11.8%	85.8%	82.7%	31.0%	11.8%	80.3%	78.0%
BRYAN-COLLEGE STATION, TX	15.5%	4.9%	77.0%	78.8%	31.8%	11.1%	85.8%	87.0%	24.9%	7.6%	81.5%	84.1%
BUFFALO-NIAGARA FALLS, NY	24.3%	9.4%	73.5%	89.9%	28.3%	8.8%	83.7%	89.8%	27.4%	10.2%	78.0%	89.6%
CANTON-MASSILLON, OH	15.6%	2.3%	63.7%	80.1%	20.9%	0.3%	76.1%	85.6%	19.8%	2.9%	67.6%	81.3%
CEDAR RAPIDS, IA	27.6%	2.9%	67.8%	81.2%	39.6%	5.2%	79.4%	91.7%	33.0%	4.8%	73.7%	85.3%
CHARLESTON, WV	28.1%	8.2%	84.1%	86.7%	23.1%	6.0%	85.8%	88.2%	24.0%	7.1%	82.9%	86.6%
CHARLESTON-NORTH CHARLESTON, SC	21.5%	5.7%	56.4%	69.0%	31.0%	10.7%	67.6%	84.7%	27.5%	9.7%	65.9%	80.4%
CHARLOTTE-GASTONIA-ROCK HILL, NC-SC	20.1%	4.5%	64.8%	84.1%	32.5%	5.2%	85.5%	90.6%	27.1%	4.8%	74.9%	88.0%
CHATTANOOGA, TN-GA	17.1%	4.9%	60.4%	76.6%	24.5%	5.4%	76.7%	87.1%	20.1%	5.4%	69.5%	81.9%
CHICAGO, IL	16.2%	5.0%	65.2%	85.2%	29.0%	10.1%	79.9%	86.0%	22.3%	7.4%	71.8%	86.3%
CINCINNATI, OH-KY-IN	21.6%	0.9%	79.8%	87.3%	32.7%	1.9%	86.5%	90.7%	27.3%	1.5%	82.5%	89.2%
CLEVELAND-LORAIN-ELYRIA, OH	25.4%	1.9%	70.5%	80.2%	34.2%	4.1%	80.5%	84.6%	30.3%	3.4%	74.3%	83.0%
COLORADO SPRINGS, CO	24.3%	2.5%	66.5%	83.2%	33.0%	5.0%	72.2%	83.1%	26.2%	2.8%	68.8%	82.0%
COLUMBIA, SC	18.8%	4.3%	58.3%	79.0%	31.8%	8.9%	72.3%	88.9%	26.2%	6.9%	68.0%	86.2%
COLUMBUS, GA-AL	15.7%	0.2%	68.9%	78.3%	39.7%	0.6%	90.9%	90.6%	29.0%	0.3%	80.5%	84.2%
COLUMBUS, OH	27.9%	1.6%	71.8%	85.3%	37.9%	3.3%	81.4%	87.9%	33.4%	2.6%	76.0%	86.9%
CORPUS CHRISTI, TX	26.0%	7.0%	75.2%	81.0%	32.7%	8.5%	84.1%	84.1%	27.4%	8.0%	78.3%	82.0%

Appendix C: All Adolescent Vaccination Rates by MSA (continued)

MSA	Completion Year 2013				Completion Year 2016				All Adolescents Completing 2013 to 2016			
	HPV - 1st dose	HPV - 3 doses	Meningococcal	Tdap	HPV - 1st dose	HPV - 3 doses	Meningococcal	Tdap	HPV - 1st dose	HPV - 3 doses	Meningococcal	Tdap
DALLAS, TX	15.8%	4.2%	80.3%	82.4%	25.6%	7.4%	86.9%	88.2%	20.7%	6.1%	83.7%	85.3%
DAVENPORT-ROCK ISLAND-MOLINE, IA-IL	16.1%	4.8%	43.5%	71.1%	25.2%	8.7%	72.2%	83.5%	19.6%	6.9%	57.2%	77.6%
DAYTON-SPRINGFIELD, OH	30.3%	1.1%	68.5%	82.0%	39.0%	2.5%	78.7%	87.5%	35.7%	2.1%	72.8%	84.8%
DECATUR, IL	15.5%	5.5%	37.5%	80.2%	14.0%	5.7%	62.0%	80.0%	15.0%	6.2%	44.9%	80.0%
DENVER, CO	24.2%	3.4%	68.5%	85.2%	43.5%	7.2%	75.2%	86.7%	34.4%	5.6%	72.2%	86.3%
DETROIT, MI	18.1%	3.2%	68.2%	71.7%	32.7%	9.4%	83.1%	83.9%	25.6%	6.9%	76.6%	78.9%
DULUTH-SUPERIOR, MN-WI	28.1%	7.9%	62.2%	89.2%	31.2%	8.1%	84.4%	90.5%	32.1%	7.9%	73.7%	87.1%
DUTCHESS COUNTY, NY	11.9%	0.0%	69.0%	93.4%	29.8%	0.6%	81.7%	95.0%	22.0%	0.3%	74.4%	92.6%
EL PASO, TX	32.6%	8.3%	66.2%	66.0%	50.8%	16.2%	74.8%	77.8%	42.7%	13.3%	72.0%	73.2%
ELKHART-GOSHEN, IN	17.2%	3.4%	77.6%	76.7%	29.4%	4.0%	85.3%	83.5%	23.5%	3.8%	82.7%	82.1%
ERIE, PA	30.9%	14.2%	85.6%	89.1%	37.1%	18.1%	86.3%	87.7%	34.1%	17.8%	86.9%	89.6%
EVANSVILLE-HENDERSON, IN-KY	19.7%	1.5%	84.9%	84.6%	29.9%	1.7%	91.4%	89.9%	24.2%	1.9%	88.5%	88.3%
FARGO-MOORHEAD, ND-MN	37.5%	14.7%	86.1%	93.5%	66.2%	33.5%	92.0%	93.9%	51.7%	22.9%	89.0%	93.4%
FAYETTEVILLE-SPRINGDALE-ROGERS, AR	12.6%	3.6%	35.8%	63.4%	27.2%	8.2%	85.8%	87.9%	21.0%	5.8%	66.9%	79.7%
FLINT, MI	17.5%	2.6%	70.3%	75.6%	30.5%	8.9%	83.2%	86.2%	24.8%	6.8%	78.2%	82.5%
FLORENCE, SC	11.3%	1.8%	48.4%	63.4%	14.4%	3.7%	64.8%	81.8%	12.6%	3.2%	58.4%	74.0%
FORT COLLINS-LOVELAND, CO	16.4%	2.6%	62.3%	84.2%	38.1%	4.8%	74.0%	89.4%	29.3%	4.6%	68.9%	87.5%
FORT LAUDERDALE, FL	24.4%	4.8%	78.2%	83.3%	28.0%	6.5%	79.9%	85.9%	27.8%	6.5%	78.1%	84.5%
FORT SMITH, AR-OK	11.0%	5.2%	21.5%	45.2%	23.0%	10.0%	82.7%	82.7%	17.8%	6.7%	55.1%	69.1%
FORT WAYNE, IN	10.6%	1.4%	64.0%	64.8%	20.8%	2.2%	70.7%	70.8%	16.3%	1.9%	66.6%	67.0%

Appendix C: All Adolescent Vaccination Rates by MSA (continued)

MSA	Completion Year 2013				Completion Year 2016				All Adolescents Completing 2013 to 2016			
	HPV - 1st dose	HPV - 3 doses	Meningococcal	Tdap	HPV - 1st dose	HPV - 3 doses	Meningococcal	Tdap	HPV - 1st dose	HPV - 3 doses	Meningococcal	Tdap
FORT WORTH-ARLINGTON, TX	19.1%	5.1%	75.7%	78.8%	29.8%	9.7%	81.4%	83.3%	24.8%	7.9%	79.9%	82.1%
GALVESTON-TEXAS CITY, TX	22.0%	6.7%	82.2%	82.2%	37.7%	10.7%	88.3%	89.6%	29.8%	8.9%	83.7%	86.1%
GARY, IN	12.6%	2.9%	59.6%	61.0%	20.5%	4.0%	78.7%	79.2%	17.5%	4.0%	69.3%	70.8%
GLENS FALLS, NY	25.0%	6.6%	71.9%	88.8%	39.9%	6.0%	80.5%	88.1%	30.6%	6.5%	76.0%	88.1%
GRAND FORKS, ND-MN	29.7%	15.0%	69.2%	83.9%	55.5%	26.4%	88.3%	91.3%	43.0%	18.8%	77.4%	86.1%
GRAND RAPIDS-MUSKEGON-HOLLAND, MI	26.3%	7.0%	78.8%	80.4%	48.9%	19.8%	88.0%	88.4%	37.8%	14.1%	84.5%	86.2%
GREELEY, CO	18.1%	2.5%	66.4%	83.3%	36.6%	7.1%	78.7%	85.7%	28.5%	3.7%	72.1%	84.7%
GREENSBORO--WINSTON-SALEM--HIGH POINT, NC	22.2%	4.9%	57.2%	80.4%	31.3%	7.2%	89.3%	90.6%	26.8%	6.5%	69.7%	83.6%
GREENVILLE-SPARTANBURG-ANDERSON, SC	12.1%	3.4%	50.8%	70.3%	24.3%	8.9%	63.7%	83.7%	18.8%	6.2%	59.5%	81.0%
HAMILTON-MIDDLETOWN, OH	21.3%	0.7%	70.4%	86.6%	30.1%	1.7%	78.7%	86.1%	26.3%	1.5%	74.9%	85.8%
HARRISBURG-LEBANON-CARLISLE, PA	30.7%	15.1%	89.1%	90.8%	39.1%	21.3%	90.7%	92.6%	35.4%	18.5%	89.3%	91.7%
HOUSTON, TX	24.4%	7.6%	78.8%	80.7%	36.3%	13.2%	85.6%	86.0%	30.1%	10.6%	82.9%	84.3%
HUNTINGTON-ASHLAND, WV-KY-OH	24.2%	3.6%	64.7%	71.6%	27.1%	3.9%	78.0%	79.8%	25.1%	4.0%	69.1%	74.0%
HUNTSVILLE, AL	15.5%	2.8%	57.7%	75.6%	24.2%	6.7%	58.0%	72.2%	21.6%	5.7%	57.2%	74.9%
INDIANAPOLIS, IN	19.7%	0.9%	78.9%	78.6%	30.8%	2.0%	86.4%	86.1%	25.4%	1.6%	83.2%	83.0%
JACKSON, MI	25.2%	2.8%	75.6%	77.0%	41.9%	13.5%	83.3%	84.6%	33.1%	8.0%	80.2%	82.1%
JACKSONVILLE, FL	18.8%	5.7%	63.5%	77.3%	24.7%	6.4%	58.4%	76.1%	21.5%	5.3%	62.8%	77.7%
JAMESTOWN, NY	24.7%	14.5%	72.9%	91.5%	26.9%	11.1%	82.5%	88.3%	26.1%	12.8%	77.0%	88.5%

Appendix C: All Adolescent Vaccination Rates by MSA (continued)

MSA	Completion Year 2013				Completion Year 2016				All Adolescents Completing 2013 to 2016			
	HPV - 1st dose	HPV - 3 doses	Meningococcal	Tdap	HPV - 1st dose	HPV - 3 doses	Meningococcal	Tdap	HPV - 1st dose	HPV - 3 doses	Meningococcal	Tdap
JOHNSON CITY-KINGSPORT-BRISTOL, TN-VA	16.4%	3.5%	57.7%	65.4%	29.0%	8.0%	78.4%	86.5%	27.6%	7.1%	73.0%	82.1%
JOHNSTOWN, PA	29.7%	15.5%	86.4%	89.4%	32.2%	13.4%	91.6%	90.8%	31.1%	14.6%	89.4%	90.8%
JONESBORO, AR	7.2%	2.2%	34.1%	48.3%	19.5%	3.0%	87.2%	87.7%	16.9%	3.7%	63.0%	71.4%
JOPLIN, MO	11.2%	1.2%	24.5%	41.7%	13.5%	3.7%	36.3%	45.7%	12.4%	2.5%	30.5%	45.6%
KALAMAZOO-BATTLE CREEK, MI	30.1%	4.9%	72.9%	75.0%	45.9%	17.1%	84.8%	85.6%	41.1%	13.7%	81.0%	82.8%
KANKAKEE, IL	15.4%	6.9%	58.9%	86.0%	12.4%	6.0%	73.6%	86.9%	15.4%	6.6%	67.1%	85.9%
KANSAS CITY, MO-KS	15.7%	4.5%	50.2%	79.5%	24.1%	6.7%	64.0%	80.6%	20.3%	6.2%	56.7%	81.8%
KENOSHA, WI	16.9%	5.6%	59.6%	71.3%	24.4%	9.9%	71.7%	81.3%	22.0%	9.4%	64.1%	77.1%
KNOXVILLE, TN	16.1%	4.4%	50.7%	76.6%	23.1%	6.2%	69.9%	87.7%	19.5%	5.8%	60.9%	82.9%
KOKOMO, IN	9.0%	1.1%	38.8%	43.9%	18.2%	4.1%	50.9%	52.5%	16.8%	4.0%	50.3%	52.4%
LAFAYETTE, IN	21.1%	3.7%	70.3%	69.5%	34.5%	4.1%	83.3%	83.9%	30.9%	4.2%	80.4%	80.6%
LAKELAND-WINTER HAVEN, FL	24.8%	5.9%	63.7%	79.6%	32.6%	5.2%	65.7%	78.3%	31.7%	7.2%	65.2%	80.6%
LANCASTER, PA	22.5%	8.5%	88.8%	91.3%	32.0%	13.5%	91.5%	92.2%	28.8%	12.4%	90.1%	91.6%
LANSING-EAST LANSING, MI	28.3%	6.0%	72.3%	74.7%	42.0%	13.2%	81.5%	83.6%	35.2%	10.4%	79.2%	81.9%
LAREDO, TX	19.8%	5.5%	62.6%	53.9%	34.5%	14.7%	73.2%	73.0%	27.6%	9.0%	69.7%	67.2%
LAS VEGAS, NV-AZ	17.3%	0.9%	42.5%	61.4%	28.0%	4.8%	57.3%	76.5%	21.1%	2.7%	47.8%	66.1%
LEXINGTON, KY	33.8%	1.4%	85.9%	89.2%	35.7%	1.1%	91.0%	91.8%	36.2%	1.8%	89.3%	90.4%
LIMA, OH	15.1%	1.2%	20.6%	48.7%	23.4%	0.4%	50.4%	65.1%	19.8%	0.9%	33.0%	56.9%
LINCOLN, NE	41.6%	13.4%	73.2%	90.7%	53.9%	17.9%	83.2%	94.4%	47.0%	15.6%	78.5%	93.2%
LITTLE ROCK-NORTH LITTLE ROCK, AR	22.7%	4.2%	55.8%	73.4%	38.2%	11.5%	87.2%	89.3%	31.8%	8.9%	74.6%	82.7%
LONGVIEW-MARSHALL, TX	14.6%	5.6%	72.7%	76.2%	27.3%	8.5%	83.8%	83.3%	20.5%	6.1%	75.8%	79.2%

Appendix C: All Adolescent Vaccination Rates by MSA (continued)

MSA	Completion Year 2013				Completion Year 2016				All Adolescents Completing 2013 to 2016			
	HPV - 1st dose	HPV - 3 doses	Meningococcal	Tdap	HPV - 1st dose	HPV - 3 doses	Meningococcal	Tdap	HPV - 1st dose	HPV - 3 doses	Meningococcal	Tdap
LOS ANGELES-LONG BEACH, CA	23.4%	7.3%	58.9%	76.3%	32.9%	13.0%	67.1%	79.0%	29.6%	11.5%	64.2%	78.2%
LOUISVILLE, KY-IN	25.9%	1.9%	85.1%	86.0%	37.0%	4.3%	88.3%	88.3%	32.9%	3.3%	86.9%	87.1%
LUBBOCK, TX	12.0%	2.7%	71.6%	79.5%	22.6%	7.9%	76.9%	80.6%	17.0%	5.4%	75.0%	80.4%
LYNCHBURG, VA	15.3%	0.2%	55.2%	81.9%	30.2%	0.2%	67.9%	91.1%	22.3%	0.3%	60.8%	85.3%
MACON, GA	21.9%	0.4%	64.9%	77.6%	26.5%	0.0%	86.1%	84.4%	26.1%	0.3%	76.0%	82.1%
MADISON, WI	28.4%	7.1%	68.4%	77.6%	51.0%	11.2%	76.2%	77.2%	40.6%	8.5%	70.0%	77.9%
MANSFIELD, OH	16.2%	1.2%	45.1%	64.2%	27.3%	0.7%	62.8%	72.7%	22.9%	1.2%	52.5%	66.7%
MCCALLEN-EDINBURG-MISSION, TX	33.7%	12.8%	74.1%	70.4%	38.0%	11.2%	81.0%	81.3%	35.8%	12.4%	75.8%	75.6%
MEMPHIS, TN-AR-MS	17.3%	2.8%	63.5%	74.5%	25.6%	5.1%	67.5%	77.1%	21.4%	4.5%	65.3%	76.3%
MIAMI, FL	19.5%	3.7%	67.9%	76.7%	27.8%	5.9%	73.1%	81.8%	24.9%	5.1%	70.1%	80.4%
MIDDLESEX-SOMERSET-HUNTERDON, N	11.0%	1.9%	89.6%	89.8%	15.2%	0.9%	94.0%	94.1%	13.7%	1.5%	91.7%	91.9%
MILWAUKEE-WAUKESHA, WI	18.1%	3.5%	64.9%	79.0%	25.9%	4.7%	70.8%	81.5%	22.3%	4.2%	69.4%	81.6%
MINNEAPOLIS-ST. PAUL, MN-WI	30.0%	7.8%	69.5%	90.7%	48.9%	13.7%	87.3%	90.4%	39.7%	10.7%	79.6%	90.6%
MOBILE, AL	27.1%	6.2%	57.8%	65.1%	44.4%	8.4%	65.4%	80.0%	36.8%	8.3%	61.9%	73.9%
MONMOUTH-OCEAN, NJ	12.2%	2.0%	89.4%	90.6%	12.4%	0.8%	93.4%	91.3%	11.7%	1.3%	91.1%	90.7%
MYRTLE BEACH, SC	16.9%	5.5%	44.4%	70.0%	22.2%	9.2%	55.5%	78.6%	20.0%	8.9%	52.7%	78.1%
NASHVILLE, TN	19.7%	4.9%	70.9%	83.8%	32.7%	8.9%	74.9%	87.3%	25.3%	7.0%	71.3%	84.6%
NASSAU-SUFFOLK, NY	12.7%	0.3%	71.1%	89.7%	23.6%	0.7%	75.9%	89.5%	17.4%	0.6%	73.5%	90.0%
NEW ORLEANS, LA	20.1%	5.7%	70.1%	71.6%	34.9%	15.8%	88.3%	89.1%	32.2%	12.5%	80.2%	81.0%
NEW YORK-NEWARK, NY-NJ-PA	17.4%	0.8%	65.0%	81.5%	32.7%	1.6%	73.0%	83.5%	25.2%	1.1%	68.4%	82.3%
NEWARK, NJ	15.3%	2.3%	86.3%	87.2%	21.1%	2.4%	90.9%	91.5%	18.2%	2.2%	89.3%	90.0%
NEWBURGH, NY-PA	20.1%	0.3%	68.6%	87.3%	28.7%	0.0%	77.1%	90.3%	26.3%	0.4%	72.6%	87.9%

Appendix C: All Adolescent Vaccination Rates by MSA (continued)

MSA	Completion Year 2013				Completion Year 2016				All Adolescents Completing 2013 to 2016			
	HPV - 1st dose	HPV - 3 doses	Meningococcal	Tdap	HPV - 1st dose	HPV - 3 doses	Meningococcal	Tdap	HPV - 1st dose	HPV - 3 doses	Meningococcal	Tdap
NORFOLK-VIRGINIA BEACH-NEWPORT NEWS, VA-NC	25.0%	0.7%	62.3%	81.4%	35.6%	1.3%	70.5%	85.4%	30.8%	1.0%	65.9%	81.4%
OAKLAND, CA	24.7%	12.1%	74.2%	82.1%	45.2%	20.2%	72.8%	82.0%	39.9%	16.8%	75.8%	83.2%
ODESSA-MIDLAND, TX	19.2%	6.2%	62.1%	67.0%	28.5%	8.7%	72.7%	75.5%	25.2%	7.2%	68.9%	72.7%
OKLAHOMA CITY, OK	18.3%	6.4%	46.3%	61.8%	23.7%	8.0%	48.5%	69.2%	21.4%	8.2%	48.5%	67.4%
OMAHA, NE-IA	46.4%	14.5%	79.3%	88.7%	57.6%	16.5%	85.5%	92.8%	53.3%	15.7%	83.3%	91.4%
ORANGE COUNTY, CA	19.6%	9.3%	66.8%	85.5%	36.5%	18.6%	74.0%	86.7%	30.6%	15.5%	71.0%	85.4%
ORLANDO, FL	18.4%	4.4%	58.5%	76.4%	28.9%	7.6%	63.4%	79.4%	25.0%	6.4%	62.5%	78.2%
OWENSBORO, KY	29.5%	4.6%	85.7%	85.7%	48.3%	3.9%	95.1%	94.2%	36.9%	2.7%	90.1%	89.5%
PEORIA-PEKIN, IL	18.3%	10.0%	38.4%	74.5%	24.1%	7.7%	71.2%	81.0%	22.6%	9.6%	52.4%	77.4%
PHILADELPHIA, PA-NJ	28.4%	10.3%	90.8%	92.5%	37.1%	14.7%	91.9%	92.0%	33.7%	13.0%	91.6%	92.7%
PHOENIX-MESA, AZ	20.9%	4.6%	74.2%	77.0%	32.8%	7.1%	85.6%	86.0%	27.5%	5.7%	80.8%	81.8%
PITTSBURGH, PA	28.2%	11.6%	88.8%	91.3%	38.8%	20.0%	91.0%	92.3%	34.4%	16.6%	90.0%	91.9%
POCATELLO, ID	22.3%	3.6%	82.5%	85.6%	49.8%	10.1%	85.8%	88.1%	38.4%	7.9%	83.6%	86.5%
PORTLAND-VANCOUVER, OR-WA	31.5%	4.8%	63.5%	85.2%	43.7%	9.4%	71.1%	82.5%	38.3%	8.2%	68.2%	84.9%
PROVO-OREM, UT	18.2%	0.5%	59.4%	84.5%	42.1%	2.4%	85.6%	89.3%	32.2%	3.0%	68.8%	86.2%
RALEIGH-DURHAM-CHAPEL HILL, NC	20.9%	3.8%	64.2%	86.3%	34.2%	5.2%	90.2%	92.9%	28.7%	4.8%	75.9%	90.3%
READING, PA	28.8%	13.6%	88.5%	92.2%	35.4%	16.7%	91.1%	92.3%	32.7%	14.4%	89.9%	92.6%
RENO, NV	29.3%	3.0%	49.8%	61.8%	49.0%	8.2%	64.9%	77.2%	37.8%	5.3%	53.8%	67.2%
RICHLAND-KENNEWICK-PASCO, WA	33.2%	6.9%	61.1%	81.5%	41.9%	11.9%	67.1%	82.1%	37.2%	9.9%	63.7%	82.7%
RICHMOND-PETERSBURG, VA	22.1%	0.8%	65.9%	67.9%	33.1%	1.8%	73.3%	80.4%	27.8%	1.4%	69.4%	73.5%
RIVERSIDE-SAN BERNADINO, CA	20.2%	5.7%	54.5%	70.7%	32.8%	11.5%	58.6%	70.9%	26.6%	8.9%	56.6%	71.9%

Appendix C: All Adolescent Vaccination Rates by MSA (continued)

MSA	Completion Year 2013				Completion Year 2016				All Adolescents Completing 2013 to 2016			
	HPV - 1st dose	HPV - 3 doses	Meningococcal	Tdap	HPV - 1st dose	HPV - 3 doses	Meningococcal	Tdap	HPV - 1st dose	HPV - 3 doses	Meningococcal	Tdap
ROANOKE, VA	22.6%	0.6%	70.9%	89.8%	36.5%	0.3%	76.7%	92.6%	29.7%	0.5%	73.8%	91.4%
ROCHESTER, NY	29.1%	7.8%	81.0%	93.9%	48.6%	20.5%	92.4%	96.2%	46.1%	18.5%	90.5%	95.6%
ROCKFORD, IL	17.6%	7.3%	47.1%	83.6%	24.5%	11.1%	75.6%	86.2%	21.6%	9.4%	57.2%	85.0%
SACRAMENTO, CA	31.7%	9.3%	61.5%	79.8%	42.2%	25.7%	61.5%	77.6%	34.6%	14.5%	62.2%	81.3%
SAGINAW-BAY CITY-MIDLAND, MI	24.2%	6.9%	68.9%	73.3%	41.5%	20.2%	82.3%	83.4%	33.9%	14.4%	77.0%	80.5%
SALT LAKE CITY-OGDEN, UT	37.3%	4.3%	67.5%	80.7%	53.5%	8.2%	82.9%	84.3%	45.1%	5.7%	73.3%	82.8%
SAN ANTONIO, TX	21.8%	5.8%	76.6%	80.3%	31.9%	8.1%	83.2%	85.0%	27.3%	7.9%	80.0%	82.6%
SAN DIEGO, CA	24.1%	7.4%	59.9%	81.2%	38.1%	13.7%	77.3%	85.5%	30.1%	10.7%	69.9%	82.7%
SAN FRANCISCO, CA	29.9%	8.1%	70.8%	87.7%	43.6%	17.6%	78.4%	87.9%	37.6%	14.6%	74.9%	87.7%
SANTA FE, NM	21.5%	5.0%	59.4%	79.3%	34.3%	13.3%	68.9%	81.7%	28.1%	9.3%	65.3%	80.2%
SCRANTON-WILKES-BARRE-HAZLETON, PA	24.9%	8.4%	88.6%	91.4%	33.7%	15.3%	84.2%	85.2%	30.1%	12.6%	85.3%	88.6%
SEATTLE-BELLEVUE-EVERETT, WA	37.6%	11.1%	75.1%	91.7%	52.7%	17.5%	81.7%	89.7%	46.0%	15.1%	77.7%	90.0%
SHARON, PA	30.6%	15.1%	87.7%	91.7%	39.9%	21.1%	89.9%	92.2%	35.5%	18.1%	88.8%	92.2%
SOUTH BEND, IN	19.0%	2.6%	75.3%	76.6%	31.0%	3.6%	82.6%	83.1%	26.4%	3.2%	79.2%	80.7%
SPOKANE, WA	35.3%	8.2%	63.2%	85.2%	46.9%	14.7%	69.2%	82.0%	39.4%	10.8%	65.5%	83.9%
SPRINGFIELD, IL	25.8%	12.1%	74.6%	91.4%	33.7%	16.1%	87.8%	90.0%	30.4%	15.0%	80.3%	88.9%
SPRINGFIELD, MO	18.3%	2.9%	43.3%	58.2%	30.9%	6.0%	59.1%	65.6%	27.9%	5.2%	50.6%	63.9%
ST. CLOUD, MN	37.1%	8.7%	68.5%	93.7%	54.9%	17.6%	84.1%	89.6%	44.4%	12.8%	76.6%	91.2%
ST. JOSEPH, MO	16.4%	5.7%	29.6%	77.4%	24.2%	6.1%	55.2%	77.6%	18.4%	5.7%	40.8%	79.2%
ST. LOUIS, MO-IL	21.1%	2.2%	67.6%	79.9%	35.0%	4.5%	78.5%	83.1%	28.7%	3.8%	72.2%	81.0%
STATE COLLEGE, PA	31.8%	16.0%	91.8%	94.2%	36.5%	17.9%	92.1%	92.1%	36.6%	18.2%	91.0%	92.9%
SYRACUSE, NY	29.5%	8.0%	75.1%	88.4%	46.5%	18.4%	87.5%	94.8%	43.4%	14.8%	83.9%	93.1%
TACOMA, WA	42.1%	11.1%	75.5%	84.9%	46.9%	15.0%	72.4%	80.0%	45.4%	13.5%	71.7%	81.3%

Appendix C: All Adolescent Vaccination Rates by MSA (continued)

MSA	Completion Year 2013				Completion Year 2016				All Adolescents Completing 2013 to 2016			
	HPV - 1st dose	HPV - 3 doses	Meningococcal	Tdap	HPV - 1st dose	HPV - 3 doses	Meningococcal	Tdap	HPV - 1st dose	HPV - 3 doses	Meningococcal	Tdap
TAMPA-ST. PETERSBURG-CLEARWATER, FL	26.4%	3.3%	66.1%	79.1%	33.7%	7.3%	70.7%	83.1%	30.7%	5.3%	69.4%	81.8%
TERRE HAUTE, IN	22.8%	0.8%	69.5%	70.4%	23.2%	1.8%	68.2%	68.6%	21.7%	1.5%	69.5%	69.6%
TOLEDO, OH	15.7%	2.7%	53.0%	75.1%	23.8%	2.6%	66.2%	76.5%	19.9%	3.1%	59.8%	76.4%
TOPEKA, KS	34.3%	4.4%	53.7%	74.4%	47.3%	15.2%	75.4%	91.6%	42.9%	13.4%	70.4%	88.9%
TRENTON, NJ	16.9%	2.3%	89.9%	92.3%	30.1%	3.6%	91.7%	90.5%	21.2%	2.5%	92.3%	92.4%
TUCSON, AZ	27.7%	6.8%	82.0%	86.8%	45.7%	9.3%	83.9%	86.7%	36.4%	8.0%	83.5%	86.4%
TULSA, OK	21.9%	6.9%	59.2%	71.0%	28.4%	8.6%	64.5%	74.1%	24.8%	7.9%	61.1%	72.4%
TYLER, TX	19.9%	6.9%	71.0%	74.7%	29.9%	12.6%	81.9%	84.4%	27.8%	10.0%	78.0%	81.8%
WACO, TX	22.1%	6.6%	73.5%	79.6%	40.7%	19.6%	87.0%	89.1%	33.4%	11.8%	79.8%	83.2%
WASHINGTON, DC-MD-VA-WV	19.6%	2.0%	63.8%	83.9%	29.9%	3.3%	73.1%	89.2%	25.0%	2.7%	68.6%	86.2%
WEST PALM BEACH-BOCA RATON, FL	25.5%	4.0%	72.4%	86.5%	29.0%	5.4%	72.0%	83.1%	26.9%	5.4%	72.7%	85.6%
WICHITA, KS	12.1%	2.8%	40.5%	76.3%	19.1%	6.1%	54.0%	85.9%	15.8%	4.8%	49.2%	84.0%
WILMINGTON-NEWARK, DE-MD	26.0%	6.8%	76.8%	83.8%	40.4%	14.4%	83.2%	86.5%	35.3%	12.9%	79.6%	85.9%
YORK, PA	22.9%	10.5%	87.3%	90.3%	31.1%	13.2%	89.0%	91.5%	28.3%	13.2%	89.1%	91.4%
YOUNGSTOWN-WARREN, OH	14.4%	1.3%	49.2%	66.6%	23.1%	3.3%	64.1%	74.3%	18.8%	2.8%	54.4%	69.4%
National	22.4%	5.1%	66.5%	78.1%	34.4%	9.1%	77.7%	84.4%	28.7%	7.3%	72.1%	81.7%

Appendix D: HPV Vaccination Rates by MSA

MSA	Percent of adolescents who received their first dose of HPV vaccine between ages 10 and 13						
	All Adolescents Completing in 2013	Adolescent Boys Completing in 2013	Adolescent Girls Completing in 2013	All Adolescents Completing in 2016	Adolescent Boys Completing in 2016	Adolescent Girls Completing in 2016	Percentage of adolescents who received their first dose of HPV vaccine, all birth years
AKRON, OH	21.1%	13.1%	28.5%	27.8%	26.2%	30.1%	25.1%
ALBANY-SCHENECTADY-TROY, NY	24.1%	20.6%	28.3%	39.9%	38.4%	41.5%	32.2%
ALBUQUERQUE, NM	24.0%	18.7%	29.9%	40.4%	34.8%	46.4%	32.6%
ALLENTOWN-BETHLEHEM-EASTON, PA	26.2%	18.5%	33.4%	30.1%	25.7%	34.6%	27.6%
ALTOONA, PA	36.9%	24.2%	51.8%	39.7%	36.8%	42.7%	39.6%
AMARILLO, TX	11.0%	4.7%	17.0%	17.1%	14.8%	19.2%	15.2%
ANCHORAGE, AK	27.7%	23.6%	32.9%	38.8%	42.5%	35.0%	33.4%
ANN ARBOR, MI	26.5%	17.6%	34.3%	42.9%	42.2%	43.6%	34.7%
APPLETON-OSHKOSH-NEENAH, WI	22.9%	19.8%	26.5%	40.8%	36.0%	45.3%	31.7%
ATLANTA, GA	23.7%	18.7%	28.9%	36.4%	34.1%	38.7%	30.5%
AUGUSTA-AIKEN, GA-SC	13.6%	8.5%	20.1%	26.8%	24.1%	30.2%	20.3%
AUSTIN-SAN MARCOS, TX	19.6%	16.4%	23.1%	34.5%	33.6%	35.5%	27.4%
BALTIMORE, MD	20.3%	17.4%	25.1%	34.7%	36.4%	32.6%	28.6%
BATON ROUGE, LA	13.1%	9.0%	18.8%	36.8%	33.1%	40.5%	30.0%
BEAUMONT-PORT ARTHUR, TX	11.5%	6.1%	16.5%	16.8%	10.3%	23.2%	12.8%
BENTON HARBOR, MI	27.5%	21.9%	37.6%	39.9%	33.0%	48.9%	34.5%
BERGEN-PASSAIC, NJ	14.4%	11.4%	17.9%	20.5%	17.4%	24.2%	18.7%
BIRMINGHAM, AL	18.6%	7.8%	26.4%	33.0%	30.3%	35.7%	27.3%
BISMARCK, ND	34.8%	27.2%	43.6%	47.3%	45.0%	50.0%	42.3%
BLOOMINGTON, IN	31.9%	26.0%	38.5%	59.7%	55.5%	64.0%	45.0%
BLOOMINGTON-NORMAL, IL	35.5%	30.6%	39.9%	36.9%	34.3%	39.7%	37.1%
BOISE CITY, ID	35.2%	26.4%	44.2%	52.8%	49.5%	56.2%	45.6%

Appendix D: HPV Vaccination Rates by MSA (continued)

MSA	Percent of adolescents who received their first dose of HPV vaccine between ages 10 and 13						
	All Adolescents Completing in 2013	Adolescent Boys Completing in 2013	Adolescent Girls Completing in 2013	All Adolescents Completing in 2016	Adolescent Boys Completing in 2016	Adolescent Girls Completing in 2016	Percentage of adolescents who received their first dose of HPV vaccine, all birth years
BRAZORIA, TX	21.9%	15.6%	27.0%	34.6%	30.8%	38.6%	28.7%
BROWNSVILLE-HARLINGEN- SAN BENITO, TX	24.0%	20.1%	28.4%	36.1%	28.9%	44.2%	31.0%
BRYAN-COLLEGE STATION, TX	15.5%	6.2%	25.8%	31.8%	29.1%	34.2%	24.9%
BUFFALO-NIAGARA FALLS, NY	24.3%	19.6%	29.0%	28.3%	26.9%	29.7%	27.4%
CANTON-MASSILLON, OH	15.6%	7.8%	23.9%	20.9%	20.8%	21.1%	19.8%
CEDAR RAPIDS, IA	27.6%	25.7%	29.7%	39.6%	37.8%	41.0%	33.0%
CHARLESTON, WV	28.1%	26.6%	29.3%	23.1%	19.2%	26.9%	24.0%
CHARLESTON-NORTH CHARLESTON, SC	21.5%	8.5%	34.2%	31.0%	28.2%	33.8%	27.5%
CHARLOTTE-GASTONIA-ROCK HILL, NC-SC	20.1%	13.6%	26.7%	32.5%	29.1%	36.1%	27.1%
CHATTANOOGA, TN-GA	17.1%	15.0%	19.3%	24.5%	24.0%	25.1%	20.1%
CHICAGO, IL	16.2%	11.6%	20.8%	29.0%	25.9%	32.2%	22.3%
CINCINNATI, OH-KY-IN	21.6%	14.4%	29.5%	32.7%	29.8%	35.8%	27.3%
CLEVELAND-LORAIN-ELYRIA, OH	25.4%	18.8%	32.3%	34.2%	30.4%	38.5%	30.3%
COLORADO SPRINGS, CO	24.3%	18.7%	30.3%	33.0%	29.9%	36.5%	26.2%
COLUMBIA, SC	18.8%	13.3%	25.0%	31.8%	25.8%	37.7%	26.2%
COLUMBUS, GA-AL	15.7%	7.0%	24.7%	39.7%	34.4%	44.1%	29.0%
COLUMBUS, OH	27.9%	20.5%	36.1%	37.9%	33.9%	42.2%	33.4%
CORPUS CHRISTI, TX	26.0%	22.8%	29.3%	32.7%	32.5%	32.9%	27.4%
DALLAS, TX	15.8%	12.2%	19.6%	25.6%	21.9%	29.5%	20.7%
DAVENPORT-ROCK ISLAND- MOLINE, IA-IL	16.1%	11.7%	21.3%	25.2%	20.9%	29.4%	19.6%
DAYTON-SPRINGFIELD, OH	30.3%	23.9%	36.6%	39.0%	37.1%	41.0%	35.7%

Appendix D: HPV Vaccination Rates by MSA (continued)

MSA	Percent of adolescents who received their first dose of HPV vaccine between ages 10 and 13						
	All Adolescents Completing in 2013	Adolescent Boys Completing in 2013	Adolescent Girls Completing in 2013	All Adolescents Completing in 2016	Adolescent Boys Completing in 2016	Adolescent Girls Completing in 2016	Percentage of adolescents who received their first dose of HPV vaccine, all birth years
DECATUR, IL	15.5%	9.6%	21.3%	14.0%	12.2%	15.8%	15.0%
DENVER, CO	24.2%	19.5%	29.3%	43.5%	41.0%	46.1%	34.4%
DETROIT, MI	18.1%	12.9%	23.3%	32.7%	31.1%	34.5%	25.6%
DULUTH-SUPERIOR, MN-WI	28.1%	14.4%	41.7%	31.2%	24.6%	38.0%	32.1%
DUTCHESS COUNTY, NY	11.9%	8.1%	15.4%	29.8%	25.6%	33.7%	22.0%
EL PASO, TX	32.6%	26.4%	39.4%	50.8%	48.8%	52.7%	42.7%
ELKHART-GOSHEN, IN	17.2%	10.8%	24.3%	29.4%	24.0%	34.1%	23.5%
ERIE, PA	30.9%	22.1%	39.8%	37.1%	34.2%	40.2%	34.1%
EVANSVILLE-HENDERSON, IN-KY	19.7%	12.5%	28.3%	29.9%	25.1%	34.8%	24.2%
FARGO-MOORHEAD, ND-MN	37.5%	28.8%	48.3%	66.2%	65.3%	67.0%	51.7%
FAYETTEVILLE-SPRINGDALE- ROGERS, AR	12.6%	8.6%	16.8%	27.2%	26.6%	28.0%	21.0%
FLINT, MI	17.5%	11.8%	22.5%	30.5%	28.1%	32.9%	24.8%
FLORENCE, SC	11.3%	5.4%	16.5%	14.4%	12.5%	16.5%	12.6%
FORT COLLINS-LOVELAND, CO	16.4%	6.2%	27.5%	38.1%	36.3%	40.2%	29.3%
FORT LAUDERDALE, FL	24.4%	21.3%	27.6%	28.0%	26.5%	29.7%	27.8%
FORT SMITH, AR-OK	11.0%	6.5%	14.1%	23.0%	18.4%	28.2%	17.8%
FORT WAYNE, IN	10.6%	7.3%	14.8%	20.8%	19.3%	22.4%	16.3%
FORT WORTH-ARLINGTON, TX	19.1%	12.6%	26.2%	29.8%	27.0%	32.6%	24.8%
GALVESTON-TEXAS CITY, TX	22.0%	17.6%	25.9%	37.7%	33.9%	41.9%	29.8%
GARY, IN	12.6%	9.2%	16.2%	20.5%	17.4%	23.8%	17.5%
GLENS FALLS, NY	25.0%	16.8%	35.6%	39.9%	37.6%	41.4%	30.6%
GRAND FORKS, ND-MN	29.7%	19.3%	41.0%	55.5%	52.7%	58.4%	43.0%

Appendix D: HPV Vaccination Rates by MSA (continued)

MSA	Percent of adolescents who received their first dose of HPV vaccine between ages 10 and 13						
	All Adolescents Completing in 2013	Adolescent Boys Completing in 2013	Adolescent Girls Completing in 2013	All Adolescents Completing in 2016	Adolescent Boys Completing in 2016	Adolescent Girls Completing in 2016	Percentage of adolescents who received their first dose of HPV vaccine, all birth years
GRAND RAPIDS-MUSKEGON- HOLLAND, MI	26.3%	16.5%	36.6%	48.9%	44.9%	53.3%	37.8%
GREELEY, CO	18.1%	13.3%	25.3%	36.6%	30.5%	42.4%	28.5%
GREENSBORO--WINSTON- SALEM--HIGH POINT, NC	22.2%	16.1%	27.8%	31.3%	28.9%	34.1%	26.8%
GREENVILLE-SPARTANBURG- ANDERSON, SC	12.1%	7.9%	16.3%	24.3%	20.5%	28.2%	18.8%
HAMILTON-MIDDLETOWN, OH	21.3%	15.4%	27.6%	30.1%	28.3%	32.1%	26.3%
HARRISBURG-LEBANON- CARLISLE, PA	30.7%	23.4%	38.7%	39.1%	34.2%	43.8%	35.4%
HOUSTON, TX	24.4%	19.8%	29.1%	36.3%	32.9%	39.8%	30.1%
HUNTINGTON-ASHLAND, WV- KY-OH	24.2%	17.7%	31.0%	27.1%	21.1%	34.3%	25.1%
HUNTSVILLE, AL	15.5%	4.7%	25.8%	24.2%	17.8%	31.0%	21.6%
INDIANAPOLIS, IN	19.7%	12.3%	27.2%	30.8%	27.6%	34.1%	25.4%
JACKSON, MI	25.2%	14.9%	38.3%	41.9%	34.6%	47.5%	33.1%
JACKSONVILLE, FL	18.8%	9.3%	28.9%	24.7%	22.1%	27.6%	21.5%
JAMESTOWN, NY	24.7%	16.8%	33.1%	26.9%	26.9%	26.9%	26.1%
JOHNSON CITY-KINGSPORT- BRISTOL, TN-VA	16.4%	13.0%	19.6%	29.0%	26.5%	32.7%	27.6%
JOHNSTOWN, PA	29.7%	21.4%	36.9%	32.2%	26.3%	38.7%	31.1%
JONESBORO, AR	7.2%	5.8%	8.6%	19.5%	15.7%	23.3%	16.9%
JOPLIN, MO	11.2%	9.1%	13.3%	13.5%	9.6%	16.9%	12.4%
KALAMAZOO-BATTLE CREEK, MI	30.1%	20.8%	40.2%	45.9%	41.9%	50.4%	41.1%
KANKAKEE, IL	15.4%	9.2%	21.2%	12.4%	10.2%	14.4%	15.4%
KANSAS CITY, MO-KS	15.7%	11.4%	20.3%	24.1%	22.8%	25.5%	20.3%

Appendix D: HPV Vaccination Rates by MSA (continued)

MSA	Percent of adolescents who received their first dose of HPV vaccine between ages 10 and 13						
	All Adolescents Completing in 2013	Adolescent Boys Completing in 2013	Adolescent Girls Completing in 2013	All Adolescents Completing in 2016	Adolescent Boys Completing in 2016	Adolescent Girls Completing in 2016	Percentage of adolescents who received their first dose of HPV vaccine, all birth years
KENOSHA, WI	16.9%	17.4%	16.3%	24.4%	19.5%	29.5%	22.0%
KNOXVILLE, TN	16.1%	11.9%	20.5%	23.1%	18.3%	28.3%	19.5%
KOKOMO, IN	9.0%	4.3%	13.9%	18.2%	17.1%	19.3%	16.8%
LAFAYETTE, IN	21.1%	9.9%	33.9%	34.5%	34.1%	34.9%	30.9%
LAKELAND-WINTER HAVEN, FL	24.8%	16.9%	32.8%	32.6%	35.2%	30.3%	31.7%
LANCASTER, PA	22.5%	15.1%	30.1%	32.0%	26.5%	37.1%	28.8%
LANSING-EAST LANSING, MI	28.3%	20.5%	35.8%	42.0%	39.2%	44.9%	35.2%
LAREDO, TX	19.8%	14.8%	25.3%	34.5%	31.1%	38.5%	27.6%
LAS VEGAS, NV-AZ	17.3%	11.8%	23.2%	28.0%	24.1%	32.8%	21.1%
LEXINGTON, KY	33.8%	26.5%	41.0%	35.7%	31.5%	40.0%	36.2%
LIMA, OH	15.1%	13.7%	16.1%	23.4%	20.3%	27.6%	19.8%
LINCOLN, NE	41.6%	30.9%	52.6%	53.9%	50.9%	57.6%	47.0%
LITTLE ROCK-NORTH LITTLE ROCK, AR	22.7%	14.2%	31.9%	38.2%	33.9%	43.1%	31.8%
LONGVIEW-MARSHALL, TX	14.6%	10.9%	19.6%	27.3%	25.0%	29.7%	20.5%
LOS ANGELES-LONG BEACH, CA	23.4%	18.4%	28.7%	32.9%	29.7%	36.1%	29.6%
LOUISVILLE, KY-IN	25.9%	16.1%	35.7%	37.0%	32.6%	41.8%	32.9%
LUBBOCK, TX	12.0%	10.4%	13.6%	22.6%	17.3%	28.5%	17.0%
LYNCHBURG, VA	15.3%	8.8%	21.3%	30.2%	28.8%	31.4%	22.3%
MACON, GA	21.9%	21.7%	22.1%	26.5%	23.1%	30.1%	26.1%
MADISON, WI	28.4%	18.4%	38.0%	51.0%	50.8%	51.1%	40.6%
MANSFIELD, OH	16.2%	11.4%	23.2%	27.3%	25.0%	29.5%	22.9%
MCALLEN-EDINBURG-MISSION, TX	33.7%	30.5%	36.5%	38.0%	37.5%	38.5%	35.8%

Appendix D: HPV Vaccination Rates by MSA (continued)

MSA	Percent of adolescents who received their first dose of HPV vaccine between ages 10 and 13						
	All Adolescents Completing in 2013	Adolescent Boys Completing in 2013	Adolescent Girls Completing in 2013	All Adolescents Completing in 2016	Adolescent Boys Completing in 2016	Adolescent Girls Completing in 2016	Percentage of adolescents who received their first dose of HPV vaccine, all birth years
MEMPHIS, TN-AR-MS	17.3%	10.5%	23.3%	25.6%	21.9%	29.0%	21.4%
MIAMI, FL	19.5%	12.0%	26.5%	27.8%	27.8%	27.8%	24.9%
MIDDLESEX-SOMERSET- HUNTERDON, N	11.0%	7.6%	14.5%	15.2%	13.3%	17.2%	13.7%
MILWAUKEE-WAUKESHA, WI	18.1%	13.0%	24.0%	25.9%	22.7%	29.1%	22.3%
MINNEAPOLIS-ST. PAUL, MN- WI	30.0%	21.6%	39.1%	48.9%	46.5%	51.3%	39.7%
MOBILE, AL	27.1%	11.1%	44.1%	44.4%	42.5%	46.5%	36.8%
MONMOUTH-OCEAN, NJ	12.2%	7.1%	17.5%	12.4%	10.5%	14.4%	11.7%
MYRTLE BEACH, SC	16.9%	9.0%	23.4%	22.2%	21.1%	23.1%	20.0%
NASHVILLE, TN	19.7%	13.5%	26.0%	32.7%	29.6%	35.7%	25.3%
NASSAU-SUFFOLK, NY	12.7%	9.3%	16.1%	23.6%	20.3%	26.9%	17.4%
NEW ORLEANS, LA	20.1%	18.5%	22.3%	34.9%	31.8%	38.1%	32.2%
NEW YORK-NEWARK, NY-NJ- PA	17.4%	14.7%	20.2%	32.7%	30.9%	34.4%	25.2%
NEWARK, NJ	15.3%	11.4%	19.5%	21.1%	19.3%	23.3%	18.2%
NEWBURGH, NY-PA	20.1%	15.9%	25.2%	28.7%	28.3%	29.1%	26.3%
NORFOLK-VIRGINIA BEACH- NEWPORT NEWS, VA-NC	25.0%	18.1%	32.5%	35.6%	33.6%	37.6%	30.8%
OAKLAND, CA	24.7%	14.2%	35.3%	45.2%	45.9%	44.4%	39.9%
ODESSA-MIDLAND, TX	19.2%	16.7%	21.5%	28.5%	28.5%	28.6%	25.2%
OKLAHOMA CITY, OK	18.3%	14.5%	22.2%	23.7%	20.4%	27.0%	21.4%
OMAHA, NE-IA	46.4%	38.1%	54.7%	57.6%	53.3%	62.4%	53.3%
ORANGE COUNTY, CA	19.6%	14.8%	25.5%	36.5%	36.4%	36.6%	30.6%
ORLANDO, FL	18.4%	15.3%	22.1%	28.9%	28.0%	29.7%	25.0%
OWENSBORO, KY	29.5%	16.7%	43.7%	48.3%	47.6%	49.4%	36.9%

Appendix D: HPV Vaccination Rates by MSA (continued)

MSA	Percent of adolescents who received their first dose of HPV vaccine between ages 10 and 13						
	All Adolescents Completing in 2013	Adolescent Boys Completing in 2013	Adolescent Girls Completing in 2013	All Adolescents Completing in 2016	Adolescent Boys Completing in 2016	Adolescent Girls Completing in 2016	Percentage of adolescents who received their first dose of HPV vaccine, all birth years
PEORIA-PEKIN, IL	18.3%	10.2%	27.3%	24.1%	21.4%	27.0%	22.6%
PHILADELPHIA, PA-NJ	28.4%	22.6%	34.5%	37.1%	34.4%	39.8%	33.7%
PHOENIX-MESA, AZ	20.9%	15.7%	26.3%	32.8%	28.7%	37.0%	27.5%
PITTSBURGH, PA	28.2%	23.0%	34.0%	38.8%	37.1%	40.8%	34.4%
POCATELLO, ID	22.3%	13.0%	32.3%	49.8%	50.0%	49.5%	38.4%
PORTLAND-VANCOUVER,OR-WA	31.5%	24.7%	39.6%	43.7%	39.8%	48.2%	38.3%
PROVO-OREM, UT	18.2%	10.9%	26.4%	42.1%	34.5%	48.5%	32.2%
RALEIGH-DURHAM-CHAPEL HILL, NC	20.9%	15.5%	26.6%	34.2%	31.7%	36.9%	28.7%
READING, PA	28.8%	23.5%	33.9%	35.4%	30.4%	40.4%	32.7%
RENO, NV	29.3%	26.2%	33.6%	49.0%	49.7%	48.0%	37.8%
RICHLAND-KENNEWICK-PASCO, WA	33.2%	23.9%	44.2%	41.9%	36.1%	47.6%	37.2%
RICHMOND-PETERSBURG, VA	22.1%	16.8%	28.0%	33.1%	30.0%	36.2%	27.8%
RIVERSIDE-SAN BERNADINO, CA	20.2%	17.9%	22.4%	32.8%	30.3%	35.1%	26.6%
ROANOKE, VA	22.6%	13.5%	32.8%	36.5%	31.8%	41.4%	29.7%
ROCHESTER, NY	29.1%	19.4%	39.5%	48.6%	46.4%	50.9%	46.1%
ROCKFORD, IL	17.6%	12.9%	22.9%	24.5%	20.7%	28.7%	21.6%
SACRAMENTO, CA	31.7%	27.0%	36.3%	42.2%	37.4%	47.2%	34.6%
SAGINAW-BAY CITY-MIDLAND, MI	24.2%	16.4%	32.8%	41.5%	39.0%	44.0%	33.9%
SALT LAKE CITY-OGDEN, UT	37.3%	26.5%	47.9%	53.5%	47.2%	60.5%	45.1%
SAN ANTONIO, TX	21.8%	14.5%	29.3%	31.9%	28.4%	35.3%	27.3%
SAN DIEGO, CA	24.1%	17.9%	31.3%	38.1%	34.7%	42.2%	30.1%

Appendix D: HPV Vaccination Rates by MSA (continued)

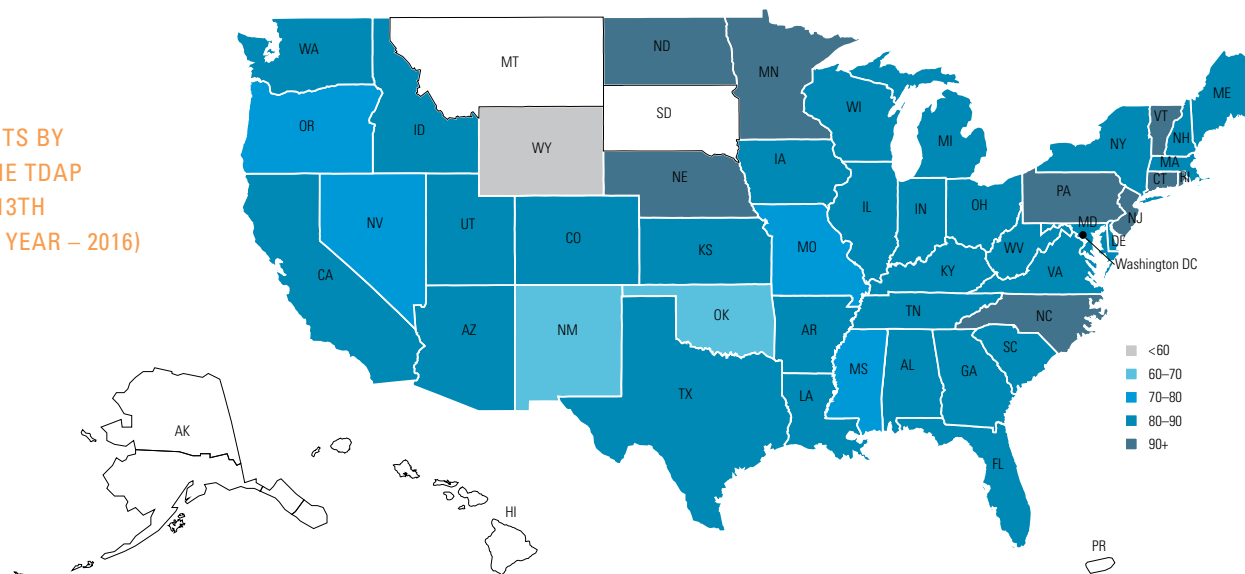
MSA	Percent of adolescents who received their first dose of HPV vaccine between ages 10 and 13						
	All Adolescents Completing in 2013	Adolescent Boys Completing in 2013	Adolescent Girls Completing in 2013	All Adolescents Completing in 2016	Adolescent Boys Completing in 2016	Adolescent Girls Completing in 2016	Percentage of adolescents who received their first dose of HPV vaccine, all birth years
SAN FRANCISCO, CA	29.9%	20.3%	39.7%	43.6%	37.5%	50.3%	37.6%
SANTA FE, NM	21.5%	16.5%	26.5%	34.3%	32.6%	36.0%	28.1%
SCRANTON-WILKES-BARRE- HAZLETON, PA	24.9%	15.8%	33.7%	33.7%	27.6%	38.3%	30.1%
SEATTLE-BELLEVUE-EVERETT, WA	37.6%	28.4%	47.1%	52.7%	50.5%	55.0%	46.0%
SHARON, PA	30.6%	19.5%	40.5%	39.9%	37.0%	42.7%	35.5%
SOUTH BEND, IN	19.0%	11.1%	27.6%	31.0%	27.8%	34.9%	26.4%
SPOKANE, WA	35.3%	28.1%	41.8%	46.9%	44.5%	49.2%	39.4%
SPRINGFIELD, IL	25.8%	13.5%	37.7%	33.7%	30.1%	37.1%	30.4%
SPRINGFIELD, MO	18.3%	13.6%	22.9%	30.9%	27.3%	35.1%	27.9%
ST. CLOUD, MN	37.1%	29.0%	46.6%	54.9%	50.2%	60.4%	44.4%
ST. JOSEPH, MO	16.4%	5.0%	27.8%	24.2%	20.9%	27.8%	18.4%
ST. LOUIS, MO-IL	21.1%	12.9%	28.9%	35.0%	30.8%	39.5%	28.7%
STATE COLLEGE, PA	31.8%	25.0%	39.0%	36.5%	31.1%	41.0%	36.6%
SYRACUSE, NY	29.5%	23.8%	35.3%	46.5%	42.2%	51.0%	43.4%
TACOMA, WA	42.1%	36.7%	47.0%	46.9%	45.7%	48.1%	45.4%
TAMPA-ST. PETERSBURG- CLEARWATER, FL	26.4%	19.4%	33.5%	33.7%	30.3%	37.4%	30.7%
TERRE HAUTE, IN	22.8%	14.8%	31.3%	23.2%	18.3%	26.8%	21.7%
TOLEDO, OH	15.7%	12.9%	19.0%	23.8%	21.5%	26.4%	19.9%
TOPEKA, KS	34.3%	25.9%	43.8%	47.3%	43.3%	52.9%	42.9%
TRENTON, NJ	16.9%	12.5%	20.9%	30.1%	29.1%	31.3%	21.2%
TUCSON, AZ	27.7%	22.8%	31.2%	45.7%	49.5%	42.1%	36.4%
TULSA, OK	21.9%	17.8%	26.3%	28.4%	27.1%	30.0%	24.8%

Appendix D: HPV Vaccination Rates by MSA (continued)

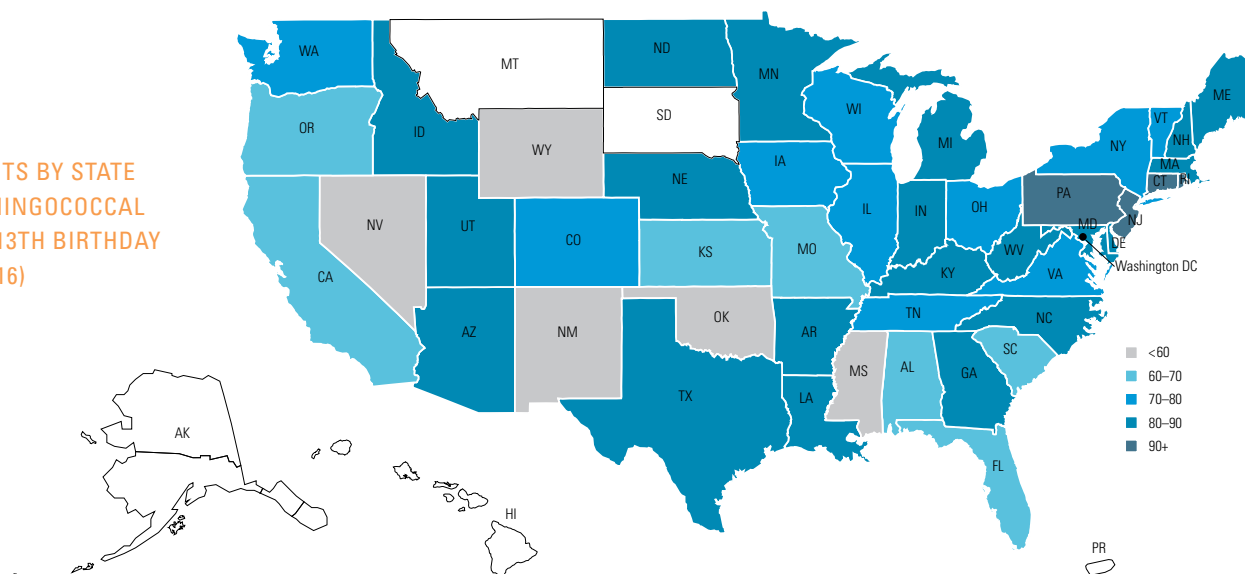
MSA	Percent of adolescents who received their first dose of HPV vaccine between ages 10 and 13						
	All Adolescents Completing in 2013	Adolescent Boys Completing in 2013	Adolescent Girls Completing in 2013	All Adolescents Completing in 2016	Adolescent Boys Completing in 2016	Adolescent Girls Completing in 2016	Percentage of adolescents who received their first dose of HPV vaccine, all birth years
TYLER, TX	19.9%	8.4%	32.0%	29.9%	24.4%	35.7%	27.8%
WACO, TX	22.1%	18.6%	26.7%	40.7%	37.0%	43.8%	33.4%
WASHINGTON, DC-MD-VA-WV	19.6%	13.2%	26.4%	29.9%	26.2%	33.7%	25.0%
WEST PALM BEACH-BOCA RATON, FL	25.5%	17.9%	33.6%	29.0%	25.7%	32.7%	26.9%
WICHITA, KS	12.1%	8.1%	16.4%	19.1%	16.4%	22.0%	15.8%
WILMINGTON-NEWARK, DE- MD	26.0%	20.5%	32.3%	40.4%	37.6%	43.5%	35.3%
YORK, PA	22.9%	15.0%	30.8%	31.1%	28.7%	33.8%	28.3%
YOUNGSTOWN-WARREN, OH	14.4%	9.8%	19.0%	23.1%	18.9%	27.1%	18.8%
National	22.4%	16.4%	28.6%	34.4%	31.5%	37.4%	28.7%

Appendix E: Rates of Tdap and Meningococcal Vaccinations from 2013 through 2016 by State

PERCENT OF ADOLESCENTS BY STATE WHO RECEIVED THE TDAP VACCINE BEFORE THEIR 13TH BIRTHDAY (COMPLETION YEAR – 2016)



PERCENT OF ADOLESCENTS BY STATE WHO RECEIVED THE MENINGOCOCCAL VACCINE BEFORE THEIR 13TH BIRTHDAY (COMPLETION YEAR – 2016)



*Alaska, Hawaii, Montana, South Dakota and Washington, D.C. were excluded from reporting due to insufficient study population.