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Rural Health
INFORMATION

Closing the Gap between Urban and Rural HPV Vaccination Rates

Housekeeping

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- Slides are available at https://www.ruralhealthinfo.org/webinars/hpv-vaccination-disparities
- Technical difficulties please call 866-229-3239

Featured Speakers

Tanja Walker, MPH, Epidemiologist, CDC's National Center for Immunization and Respiratory Diseases

Robin C. Vanderpool, DrPH, Associate Professor, Department of Health, Behavior & Society, University of Kentucky (UK) College of Public Health

Electra D. Paskett, PhD, Marion N. Rowley Professor of Cancer Research, The Ohio State University

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National Center for Immunization & Respiratory Diseases

Vaccination Coverage among U.S. Adolescents: Results from the 2017 National Immunization Survey-Teen (NIS-Teen)

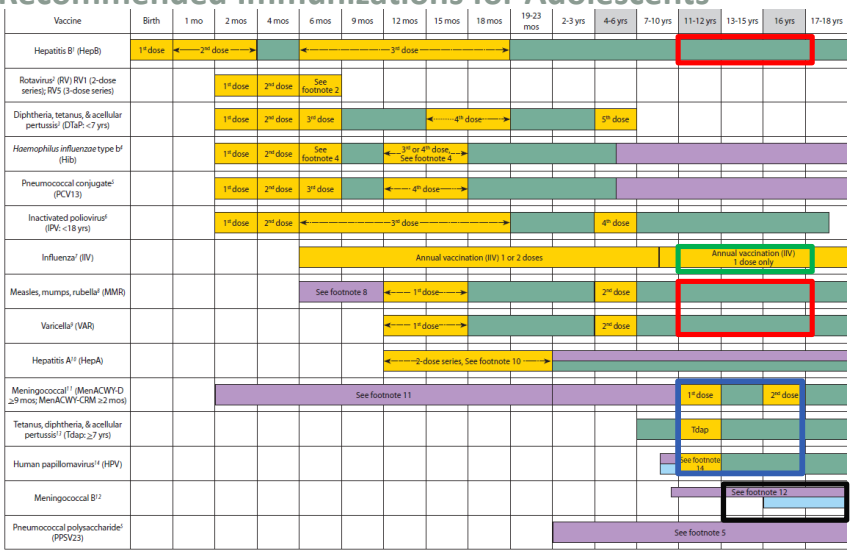
Tanja Y. Walker, MPH
Epidemiologist
Assessment Branch, Immunization Services Division

Rural Health Webinar
September 18, 2018

Outline

- Review of recommended immunizations for adolescents
- NIS-Teen overview
- 2017 NIS-Teen results
  - Published August 24, 2018
- Conclusions

Recommended Immunizations for Adolescents



https://www.cdc.gov/vaccines/schedules/downloads/child/0-18yrs-child-combined-schedule.pdf

NIS-Teen Objectives

- Assess national, state, selected local area, and territorial vaccination coverage among adolescents
- Monitor vaccination coverage trends and progress towards *Healthy People 2020* targets
- Identify disparities in vaccination coverage by selected sociodemographic characteristics
- Evaluate ongoing strategies to improve vaccination coverage
- Monitor adherence to ACIP vaccine recommendations for adolescents

NIS-Teen Methodology

- Conducted annually since 2006
- Conducted among parents and guardians of eligible adolescents identified using a random-digit–dialed sample of landline and cellular telephone numbers
- Two phases:
  - Household interview
  - Mailed survey to vaccination providers to collect vaccination history
- All vaccination coverage estimates based on provider-reported vaccination histories

NIS-Teen Methodology

- Data weighted to adjust for non-response and phoneless households
- T-tests were used to assess differences in vaccination coverage between 2017 and 2016 and between demographic subgroups
- Weighted linear regression to estimate annual percentage point increases by
  - survey year
  - year of birth
- Differences reported are statistically significant at $p<0.05$

Sociodemographic Characteristics

- Race/Ethnicity
  - White, non-Hispanic
  - Black, non-Hispanic
  - Hispanic
- Poverty Level*
  - Below poverty level
  - At or above poverty level
- Metropolitan Statistical Area (MSA)
  - MSA principal city
  - MSA non-principal city
  - Non-MSA
- Health Insurance Status
  - Private Insurance Only
  - Any Medicaid
  - Other Insurance
  - Uninsured

*Poverty status was unknown for 779 adolescents

2017 NIS-Teen Results

- National sample: 20,949 adolescents from 50 states and DC
  - Landline phone: 3,572 (17%)
  - Cell phone: 17,377 (83%)
  - Guam, Puerto Rico, and U.S. Virgin Islands sampled separately, but are not included in the national estimate
- Overall household CASRO* response rate: 25.7%
  - Landline phone: 51.5%
  - Cell phone: 23.5%
- Proportion of adolescents with adequate provider data: 48.1%
  - Landline phone: 53.6%
  - Cell phone: 47.1%

* Council of American Survey Research Organizations Response Rate = product of resolution rate, screening rate and cooperation rate

Estimated Vaccination Coverage among Adolescents Aged 13-17 Years, NIS-Teen, United States, 2016 vs. 2017

	2016	2017	Difference
	(n=20,475)	(n=20,949)	
	% (95% CI)	% (95% CI)	
≥1 Tdap	88.0 (87.1 – 88.9)	88.7 (87.8 – 89.6)	+0.7
MenACWY			
≥1 dose	82.2 (81.2 – 83.2)	85.1 (84.2 – 86.1)*	**+2.9**
≥2 doses†	39.1 (36.1 – 42.1)	44.3 (41.4 – 47.2)*	**+5.2**
≥1 MenB†	NA	14.5 (12.3–17.1)	NA
HPV vaccine§			
≥1 dose	60.4 (59.2 – 61.6)	65.5 (64.3 – 66.7)*	**+5.1**
HPV UTD	43.4 (42.1 – 44.7)	48.6 (47.3 – 49.9)*	**+5.2**

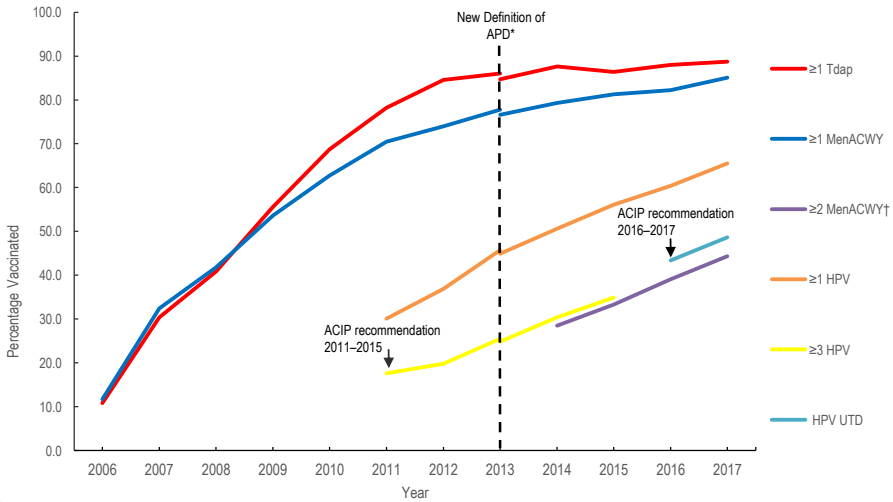
*Statistically different from 2016 estimates ($p<0.05$)
† Calculated among adolescents aged 17 years at interview (n=3,807).
§ Percentages reported include females (n=9,845) and males (n=11,104).

Estimated Vaccination Coverage among Adolescents Aged 13-17 Years, NIS-Teen, United States, 2016 vs. 2017

	2016	2017	Difference
	(n=20,475)	(n=20,949)	
	% (95% CI)	% (95% CI)	
HPV vaccine			
Females (n=9,845)			
≥1 dose	65.1(63.3 – 66.8)	68.6 (66.9 – 70.2)*	**+3.5**
HPV UTD	49.5(47.6 – 51.4)	53.1 (51.2 – 55.0)*	**+3.6**
Males (n=11,104)			
≥1 dose	56.0(54.3 – 57.7)	62.6 (60.9 – 64.2)*	**+6.6**
HPV UTD	37.5(35.8 – 39.2)	44.3 (42.6 – 46.0)*	**+6.8**

* Statistically different from 2016 estimates (p<0.05)

Estimated Vaccination Coverage among Adolescents Aged 13-17 Years, NIS-Teen, United States, 2006-2017



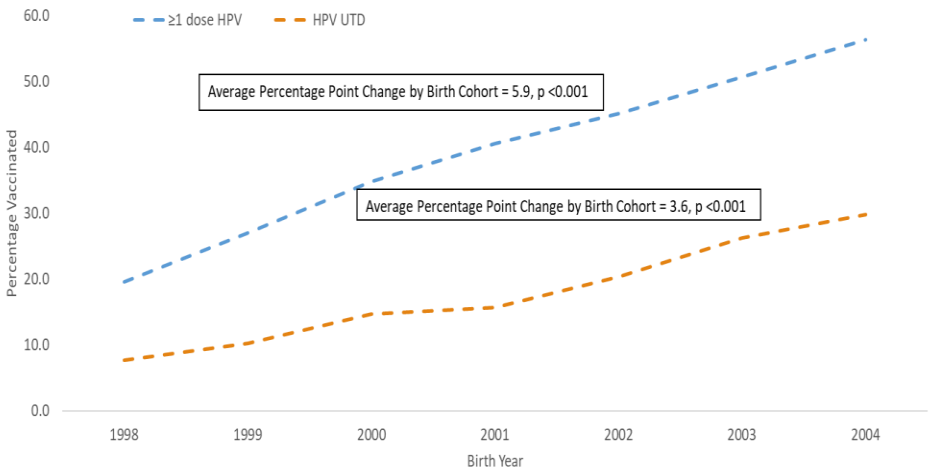
* APD = Adequate provider data
†≥2 doses MenACWY among adolescents aged 17 years

Estimated HPV Vaccination Coverage among Adolescents Aged 13-17 Years, NIS-Teen, United States, 2017

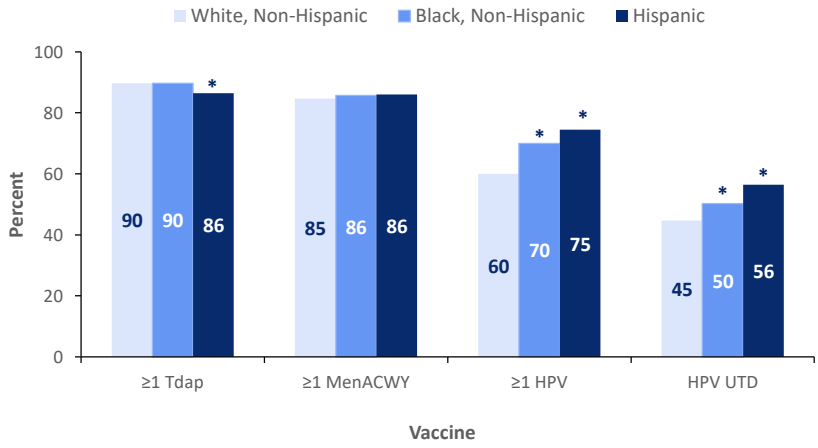
	Overall
	% (95% CI)
HPV vaccine	
≥1 dose	65.5 (64.3 – 66.7)
≥1 Tdap	88.7 (87.8 – 89.6)
≥1 MenACWY	85.1 (84.2 – 86.1)

N = 20,949 adolescents

HPV Vaccination Initiation (≥1 dose) and HPV up-to-date (UTD) status estimates among adolescents by age 13 Years, by birth cohort — NIS-Teen, United States, 2016–2017

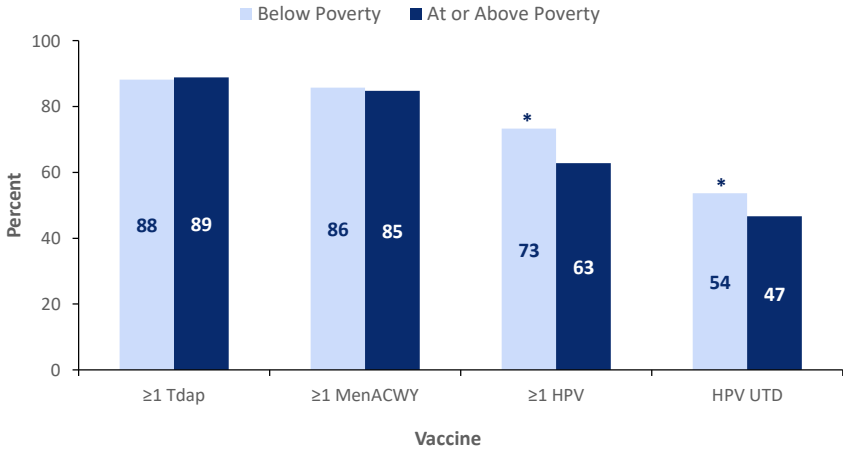


Vaccination Coverage Estimates among Adolescents Aged 13-17 Years by Race/Ethnicity, NIS-Teen, United States, 2017



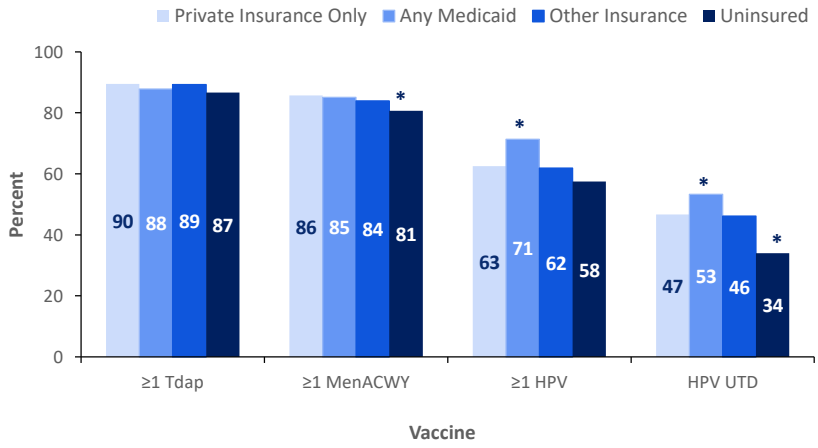
* Statistically different from White, Non-Hispanic adolescents (p<0.05).

Vaccination Coverage Estimates among Adolescents Aged 13-17 Years by Poverty Status, NIS-Teen, United States, 2017



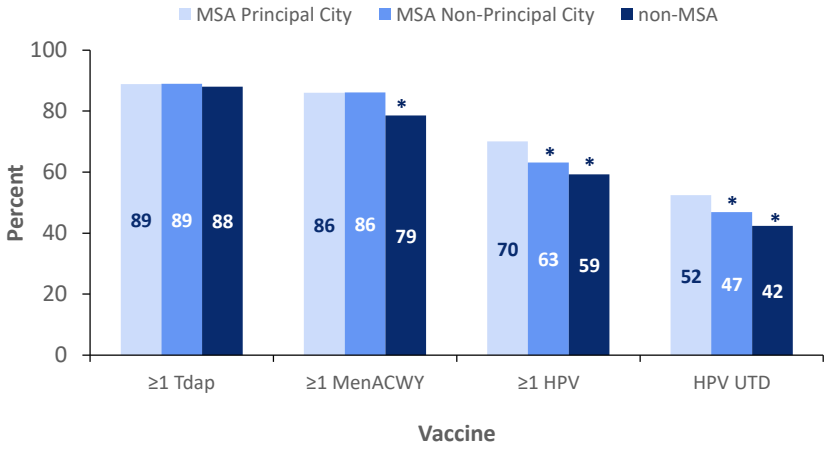
* Statistically different from adolescents at or above the poverty level (p<0.05).
Adolescents with unknown poverty status (n=779) were excluded from analysis.

Vaccination Coverage Estimates among Adolescents Aged 13-17 Years by Health Insurance Status, NIS-Teen, United States, 2017



* Statistically different from adolescents with private insurance only (p<0.05).

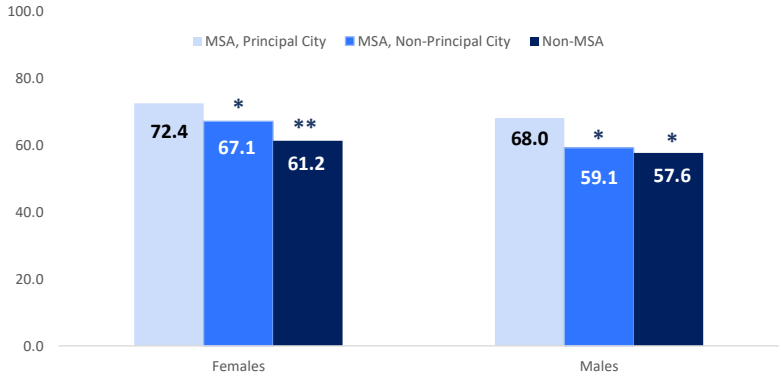
Vaccination Coverage Estimates among Adolescents Aged 13-17 Years by MSA status, NIS-Teen, United States, 2017



MSA = Metropolitan statistical area

* Statistically different from adolescents living in MSA principal cities (p<0.05).

Coverage with ≥ 1 HPV Vaccine among Adolescents Aged 13 – 17 Years Stratified by MSA Status and Sex, NIS-Teen, 2017

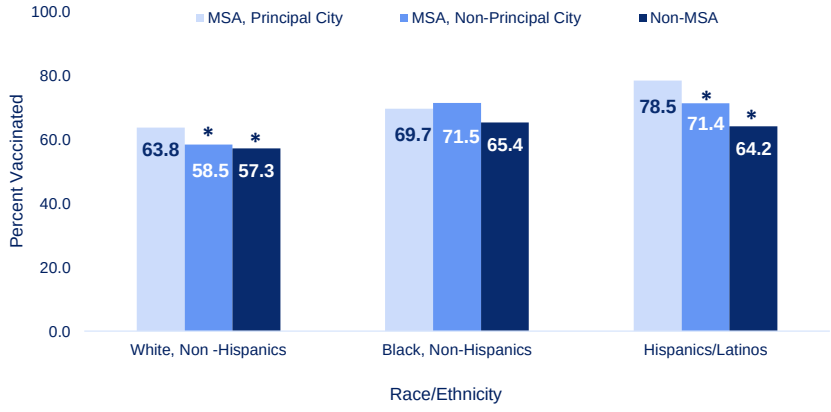


MSA = Metropolitan statistical area

*Statistically different from adolescents living in MSA, Principal Cities (p<0.05).

**Statistically different from adolescents living in both MSA, principal Cities and MSA, Non-principal Cities (p <0.05).

Coverage with ≥ 1 HPV Vaccine among Adolescents Aged 13 – 17 Years Stratified by Racial/Ethnic Group and MSA Status, NIS-Teen, 2017



MSA = Metropolitan statistical area

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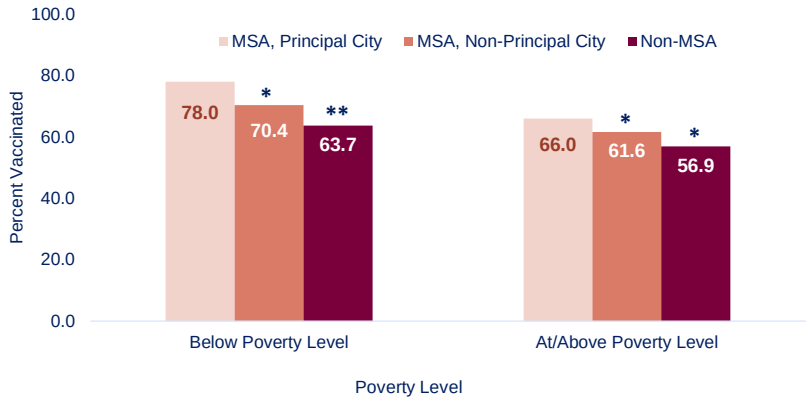
Coverage with ≥ 1 HPV Vaccine among Adolescents Aged 13 – 17 Years Stratified by Poverty Level and MSA Status, NIS-Teen, 2017



MSA = Metropolitan statistical area

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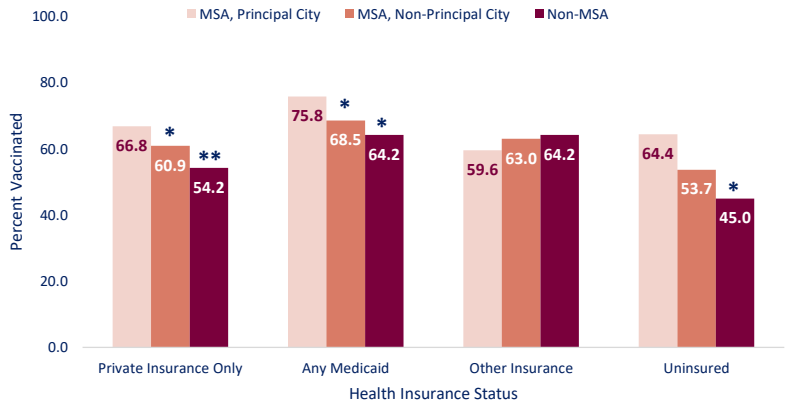
**Statistically different from adolescents living in both MSA, Principal Cities and MSA, Non-Principal Cities (p <0.05).

Coverage with ≥ 1 HPV Vaccine among Adolescents Aged 13 – 17 Years Stratified by Health Insurance Status and MSA Status, NIS-Teen, 2017



MSA = Metropolitan statistical area

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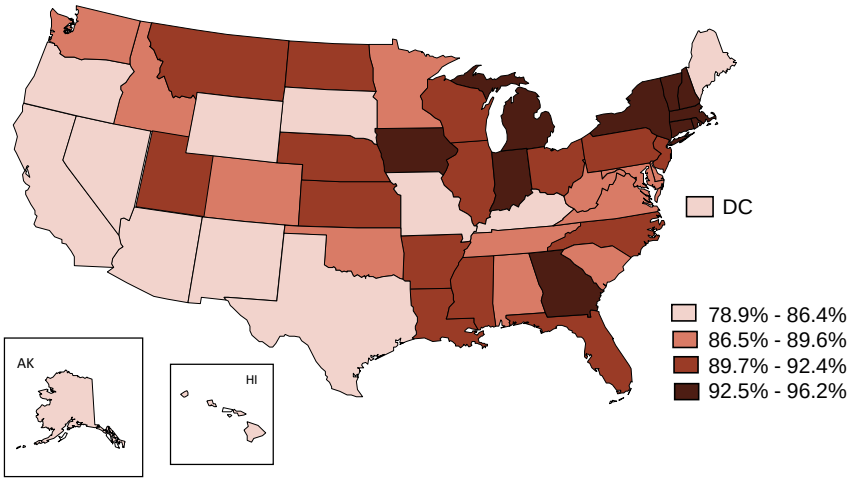
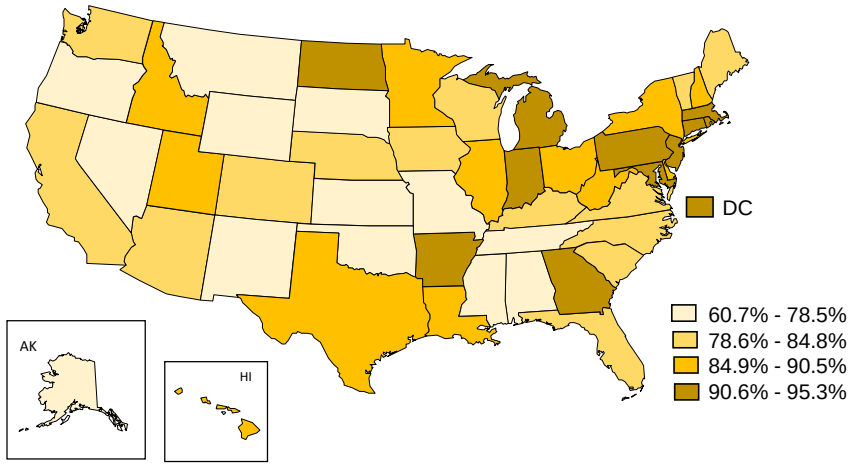
**Statistically different from adolescents living in both MSA, Principal Cities and MSA, Non-Principal Cities (p <0.05).

Estimated Vaccination Coverage with ≥1 Tdap, Adolescents Aged 13-17 Years, NIS-Teen, United States, 2017



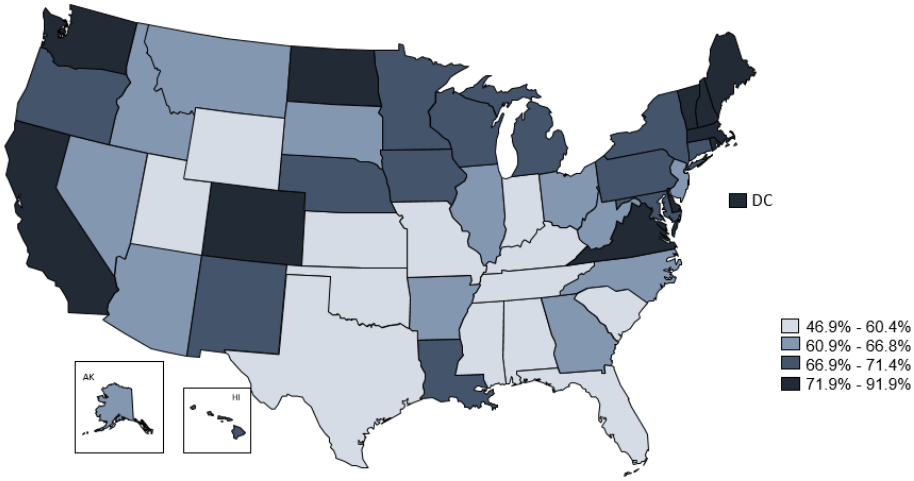
Coverage ranged from 78.9% (Alaska) to 96.2% (Massachusetts)

Estimated Vaccination Coverage with ≥1 MenACWY, Adolescents Aged 13-17 Years, NIS-Teen, United States, 2017



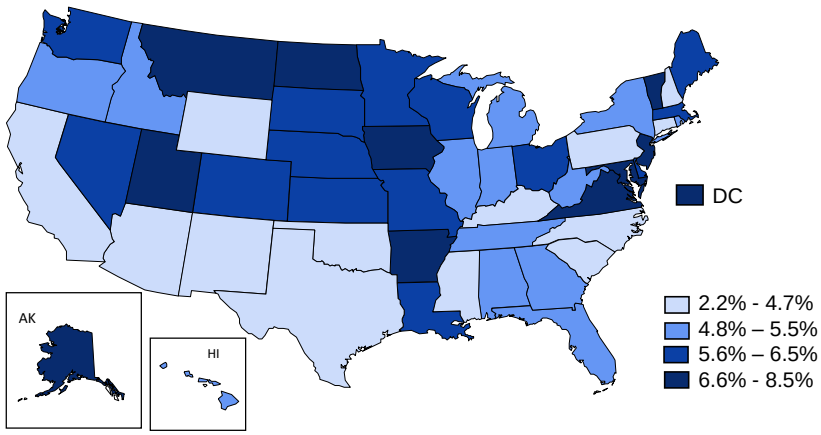
Coverage ranged from 60.7% (Wyoming) to 95.3% (Georgia)

Estimated Vaccination Coverage with ≥1 HPV among Adolescents Aged 13-17 Years, NIS-Teen, United States, 2017



Coverage ranged from 46.9% (Wyoming) to 91.9% (District of Columbia)

Average Annual Increase in Coverage with ≥1 HPV, Adolescents Aged 13-17 Years, NIS-Teen, United States, 2013-2017



National Average Annual Increase = 5.1 percentage points

The greatest statistically significant average annual increases were in Virginia (8.5), DC (7.5), Montana (7.4), Arkansas (7.3), Iowa (7.3), Utah (7.3), and El Paso, Texas (7.3).

Limitations

- Survey response rates are low
- Bias might remain after adjustment for household and provider nonresponse and phoneless households
- Nonresponse bias might change over time affecting comparability of estimates between survey years

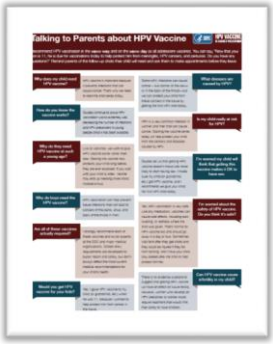
Conclusions

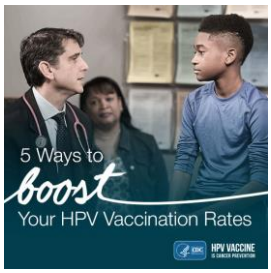
- HPV vaccination initiation and series completion continue to increase
  - HPV vaccination initiation has increased an average of 5.1 percentage points annually since 2013
  - On-time vaccination (receipt of ≥2 or ≥3 doses of HPV vaccine by age 13 years) continues to increase
- Continue to see high national level Tdap and MenACWY vaccine coverage
- Urban-Rural disparities in coverage with ≥1-dose HPV vaccine and ≥ 1 MenACWY continue to persist and were lowest among adolescents living in non-MSAs (mostly rural areas) and highest among those living in MSA principal cities (mostly urban areas)

Next Steps

- Continue to investigate the factors contributing to these lower vaccination rates in rural areas and to identify interventions to improve rates. For example,
  - *Investigate where Tdap vaccination is occurring in rural areas and determine what might be barriers to providing HPV vaccine and MenACWY at these same sites*

Communication Resources





www.cdc.gov/ruralhealth/vaccines

Acknowledgements

- David Yankey
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- Sarah Mbaeyi
- Benjamin Fredua
- Shannon Stokley

For more information, contact CDC
1-800-CDC-INFO (232-4636)
TTY: 1-888-232-6348 www.cdc.gov

The findings and conclusions in this report are those of the authors and do not necessarily represent the official position of the Centers for Disease Control and Prevention.

Additional Slides

Reasons for Not Vaccinating Adolescents with HPV Vaccine, Unvaccinated Adolescents Aged 13-17 Years, NIS-Teen, United States, 2017

Parents of Girls		Parents of Boys	
	% (95% CI)		% (95% CI)
Safety concerns/ side effects	24.5 (21.6-27.8)	**Safety concerns/ side effects**	16.8 (14.5-19.4)
Not needed/necessary	14.5 (11.8-17.8)	**Not recommended**	15.2 (12.6-18.2)
Not recommended	7.6 (5.9-9.7)	**Not needed/necessary**	14.2 (12.0-16.7)
Lack of knowledge	7.5 (5.7-9.6)	**Lack of knowledge**	9.2 (7.3-11.5)
Not sexually active	7.3 (5.7-9.4)	**Not sexually active**	7.7 (5.7-10.2)

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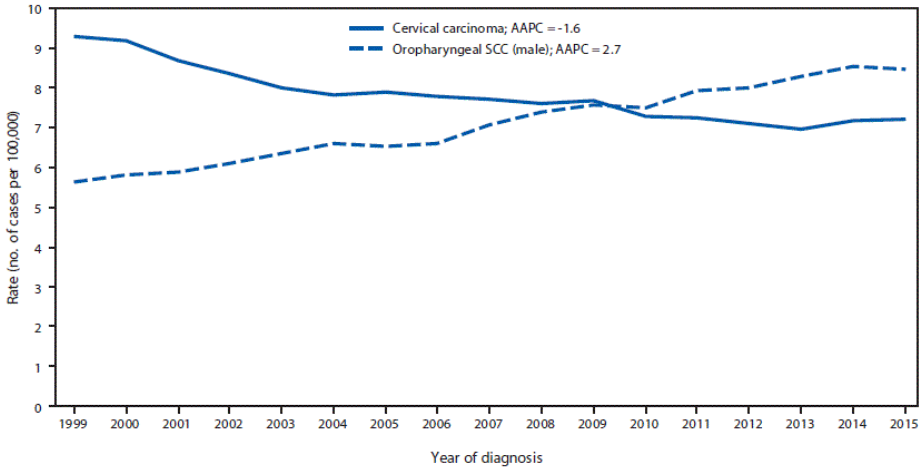
Closing the Gab between Urban and Rural HPV Vaccination Rates

Robin C. Vanderpool, DrPH
September 18, 2018
RHIhub Webinar

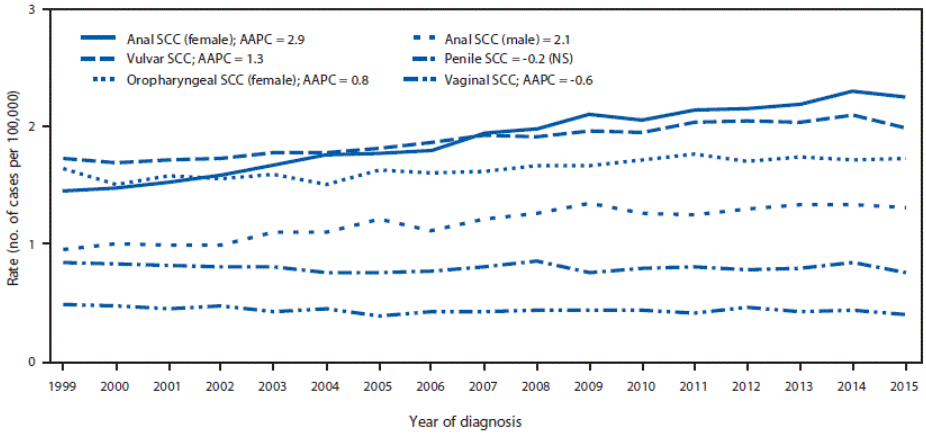
Presentation Outline

- Provide an overview of the burden of HPV-associated cancers in rural communities
- Discuss HPV and HPV vaccination knowledge/awareness differences between rural/urban populations
- Highlight the unique challenges and opportunities associated with rural HPV vaccination

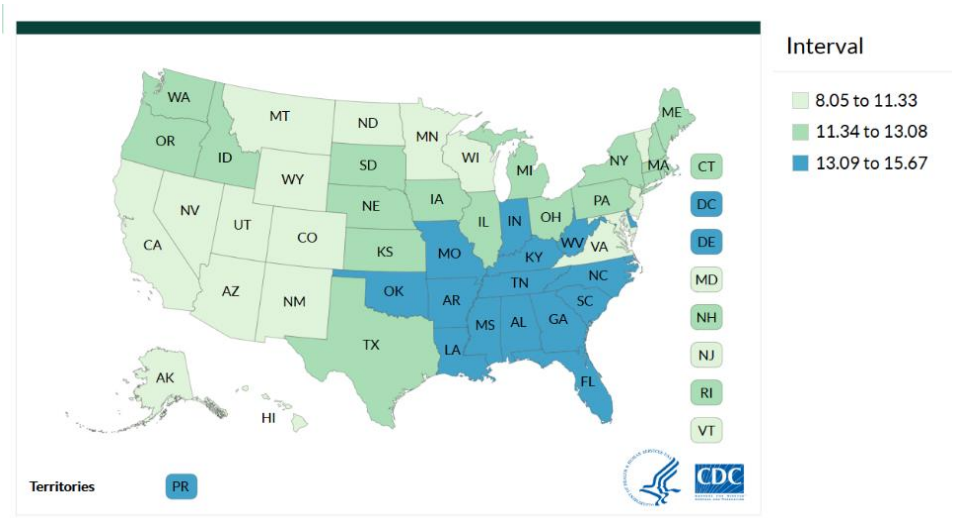
Trends in age-adjusted incidence of cervical carcinoma among females and oropharyngeal SCC among men, — U.S., 1999–2015



Trends in age-adjusted HPV-associated cancer incidence, by cancer type and sex — U.S., 1999–2015



HPV-Associated Cancer Rates by State, 20011-2015

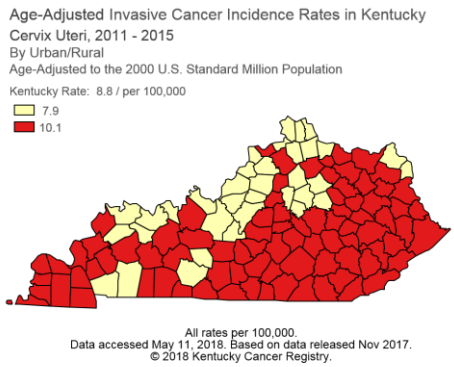


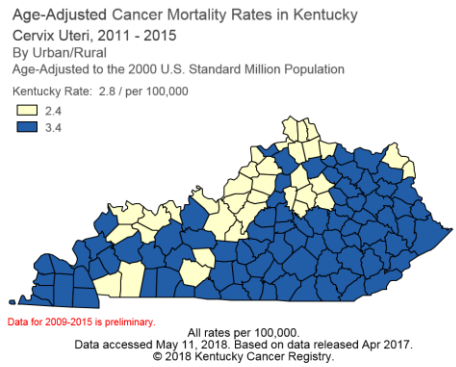
Rates are per 100,000 and age-adjusted to the 2000 U.S. Standard Population

Geography-Based HPV-Related Cancer Disparities

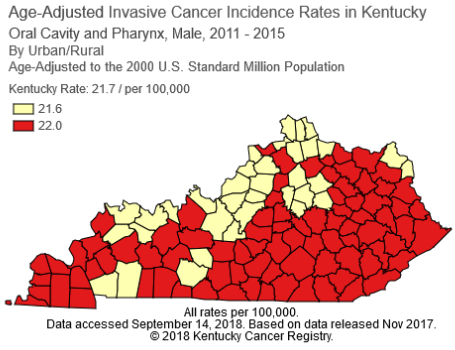
- Rural populations have an increased incidence of HPV-associated cancers compared to urban populations.
- Rural females had significantly higher rates of cervical, vaginal, vulvar, oropharyngeal, and anal cancer compared to their urban peers, while rural males had higher rates of penile cancer.
- Rural populations have experienced a statistically significant increase in HPV-related cancers between 1995-2013.
- Rural populations have higher rates of HPV-associated cancers diagnosed at both the local and distant stages.
- Rural women experience higher cervical cancer mortality rates compared to their metropolitan counterparts.

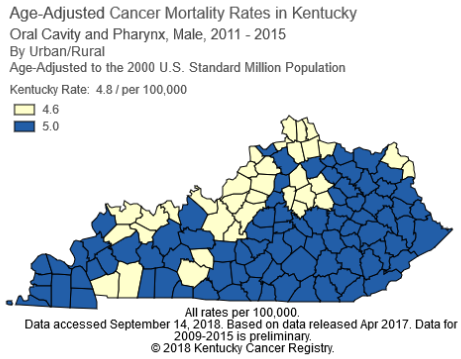
Cervical Cancer among Kentucky Females





Oral Cavity & Pharynx Cancer in among Kentucky Men

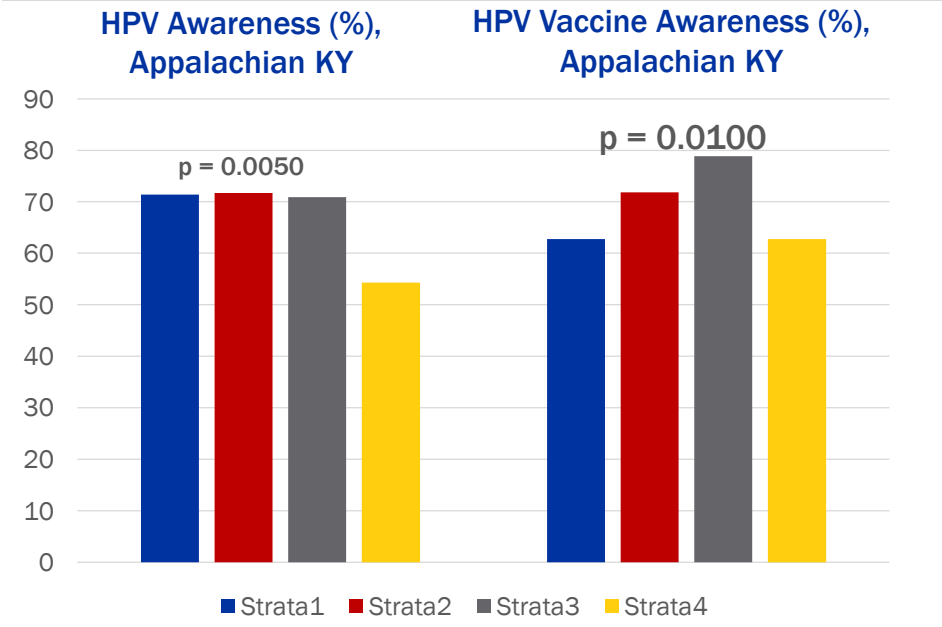




Rural HPV Vaccination Disparities

Mohammed et al. (2018) found that rural residents were less likely to have heard of HPV and the HPV vaccine compared to urban residents.

	Rural	Urban
	Prevalence & 95% CI	
Heard of HPV	55.8 (53.1-59.2)	67.2 (67.0-69.2)
Heard of HPV Vaccine	58.6 (56.3-61.5)	65.8 (64.2-67.1)
HPV can cause cervical cancer	64.4 (59.8-67.7)	75.4 (72.5-77.3)

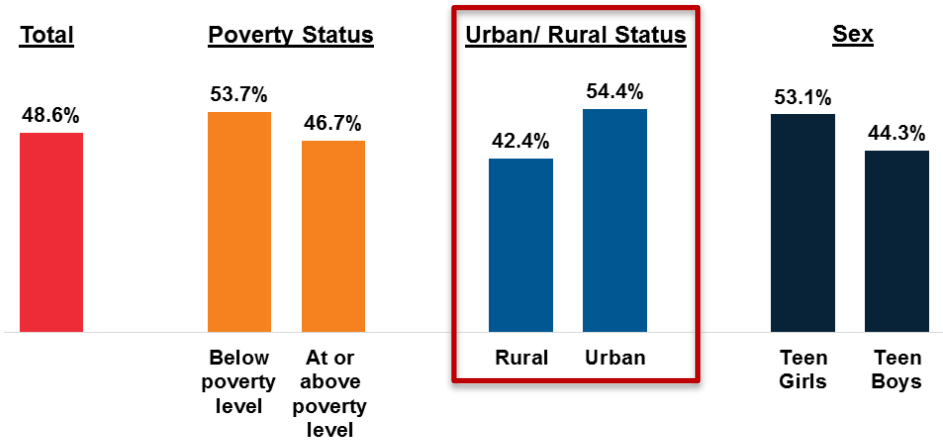


Vanderpool et al., 2017 unpublished data,

Figure 3

Estimated HPV Vaccination Coverage Among Adolescents in the US

Share that are HPV Up-to-Date (UTD), 2017



NOTE: Among adolescents ages 13-17. HPV UTD includes those with ≥3 doses, and those with 2 doses when the first HPV Vaccine dose was initiated before age 15 years and time between the first and the second dose was at least 5 months minus 4 days.
SOURCE: CDC. (2018). National, Regional, State, Selected Local Area Vaccination Coverage Among Adolescents Aged 13-17 Years—United States, 2017. *MMRW* 67(33).

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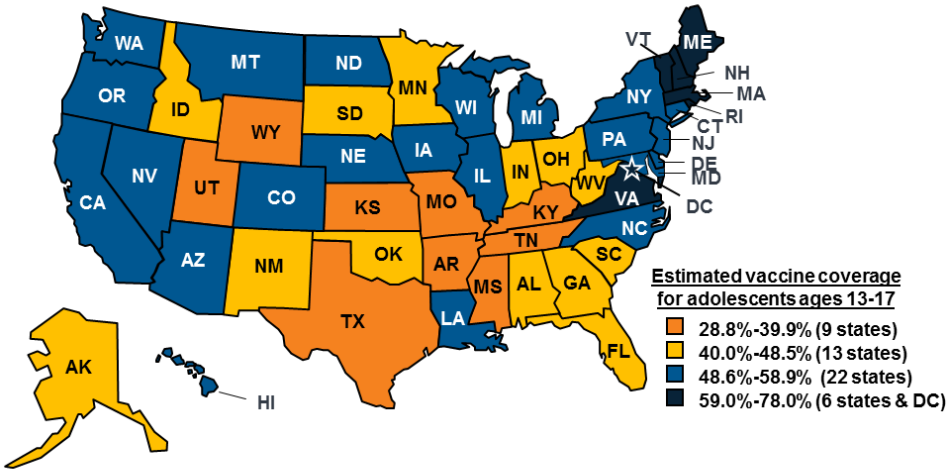
Figure 4

HPV Vaccination Rates of Adolescents, by State

Adolescents ages 13-17 with HPV Up-To-Date (UTD) Vaccination Series, 2017

2017 US Average = 48.6%



NOTES: HPV UTD includes those with ≥3 doses, and those with 2 doses when the first HPV Vaccine dose was initiated before age 15 years and time between the first and the second dose was at least 5 months minus 4 days.
SOURCE: CDC. (2018). National, Regional, State, Selected Local Area Vaccination Coverage Among Adolescents Aged 13-17 Years—United States, 2017. *MMRW* 67(33).

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An Overview of the Challenges to HPV Vaccination in Rural Communities

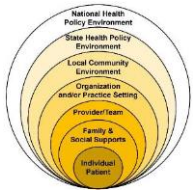
- Lack of knowledge regarding HPV and its link to cancer
  - Safety concerns
  - Sexual promiscuity
  - Confusion between HIV and HPV
  - Limited understanding of human anatomy
- High monetary cost
- Lack of transportation / distance
- Limited parental/peer support
- Cultural views, fatalistic beliefs
- The vaccine isn't mandated and/or viewed like other vaccines

An Overview of the Challenges to HPV Vaccination in Rural Communities

- Lack of and/or varying provider recommendations
  - Rural parents were least likely to report collaborative communications with their provider about HPV vaccination.
- Providers do not have enough time
  - Rural areas are served by family medicine providers who already have too much to keep up with, not enough time during visits
- The vaccine isn't mandated and/or viewed like other vaccines; it's discussed differently with parents
  - Utah: rurality significantly associated with "missed opportunities"
- Not stocking the vaccine due to perceived costs
- Uncomfortable talking with parents

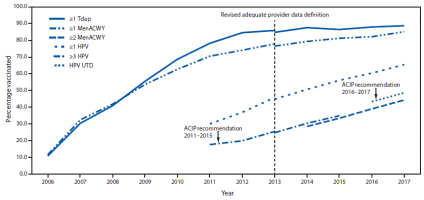
An Overview of Opportunities to Improve HPV Vaccination in Rural Communities

- Multilevel approaches are needed that consider resources, cultural values, geographic location, and economic status, among other considerations
  - Patients / parents / families
  - Health care providers and clinics
  - Communities
  - Policies (e.g., school entry)



- Education / training / skills development / messaging

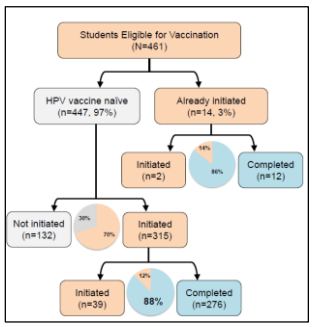
- Decrease missed HPV vaccination opportunities



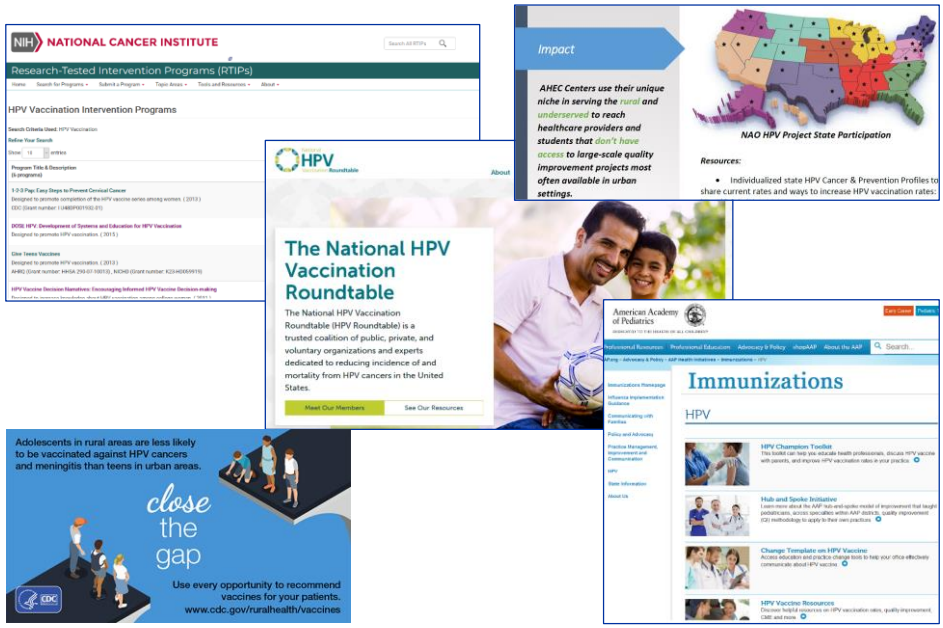
Taplin et al. *JNCI Monogr*, 2012

An Overview of Opportunities to Improve HPV Vaccination in Rural Communities

- Alternatives to the medical home:
  - Schools
  - Pharmacies
  - Dental practices
  - Community health workers
  - Patient navigators
  - Peer educators
  - Mobile vaccination clinics
- Federally qualified health centers, rural health clinics, health departments
- Community-clinical linkages
  - Cancer and immunization coalitions
  - Faith-based organizations
  - Local American Cancer Society



HPV Vaccination Resources



Select References

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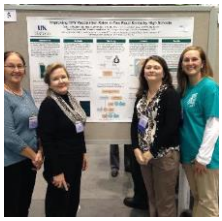

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Thank you!

Implementing "I Vaccinate" in Appalachia: A Pilot Study

Electra D. Paskett, PhD

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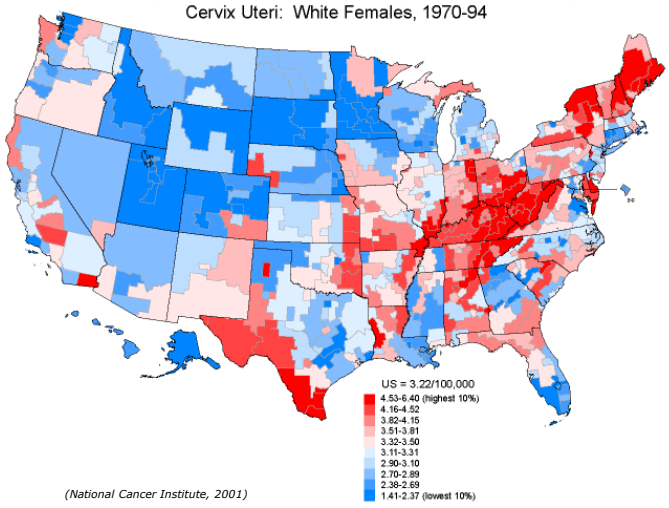
I Vaccinate

Supported by NCI Grant Number P50 CA105632

Cancer Mortality Rates by State Economic Area (Age-adjusted 1970 US Population)
Cervix Uteri: White Females, 1970-94



(National Cancer Institute, 2001)

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Background

- Appalachian region has higher than average incidence and mortality rates for HPV-related cancers
- Completion rates for vaccine series are low for females and very low for males
- Reasons for low uptake are many:
  - lack of physician recommendation and awareness of need to be vaccinated; confusion about guidelines; cost; negative attitudes and beliefs about HPV vaccination, HPV-related cancer and vaccines in general (parent and provider)
- Underserved populations could benefit from a multilevel approach to improve HPV vaccine uptake

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Primary Aims: P50 CPHHD, Project 4

- To develop and evaluate a multi-level HPV vaccine intervention to increase HPV vaccination rates among young girls and adolescent females (9-17) living in Ohio Appalachia
- Levels:
  - Parents of female adolescents who live in Ohio Appalachia (Level 1)
  - Health care providers who practice at health departments and provider offices (Level 2)
  - Health departments and provider offices in Ohio Appalachia (Level 3)
- Intervention tested in 6 Ohio Appalachia counties (intervention) vs 6 usual care Ohio Appalachia counties (control)
  - Control counties receive education on the flu and the flu vaccine

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Multi-Level Intervention

- Goal: To develop and evaluate a multi-level HPV vaccine intervention to increase HPV vaccination rates among young girls and adolescent females (9-17) living in Ohio Appalachia

PARENT PROJECT
Parents in Appalachia Receive Education Needed for Teens

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Multi-Level Intervention Components

- System-level:
  - Waiting room and examination room posters and brochures
  - Tabletop tent cards for the waiting rooms
  - Quarterly newsletter
  - Vaccine tracking system
  - Invitation to be vaccinated' letter to parents from their provider
- Provider-level:
  - Fact sheet
  - Resource list
  - Article on Cervical Cancer in Ohio Appalachia
  - CME Session
- Patient-level:
  - Culturally tailored HPV and cervical cancer educational DVD
  - Culturally tailored educational brochures
  - Question & Answer (Q & A) fact sheet
  - Resource list
  - Magnetic appointment reminder card for the 2nd and 3rd shot

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HPV Vaccine Uptake: Group Randomized Trial

Months

First Shot within Three

Received Shot	Control Arm	HPV Arm	p-value
Yes	**4 (3%)**	**10 (8%)**	**0.045**
No	120 (97%)	120 (92%)	

First Shot within Six Months (Ever)

Received Shot	Control Arm	HPV Arm	p-value
Yes	**8 (7%)**	**17 (13%)**	**0.003**
No	116 (94%)	113 (87%)	

Paskett E, et al., CEBP 2016

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Supplement Specific Aims

- Modify components of previously developed and tested multilevel intervention (MLI) for implementation in two Appalachian Ohio clinics as the “I Vaccinate” program;
- Assess baseline HPV vaccination rate in each clinic and train staff on how to use the components of the “I Vaccinate” program; and
- Examine the effect of the “I Vaccinate” program by comparing pre- vs. post-implementation rates of HPV vaccination over time.

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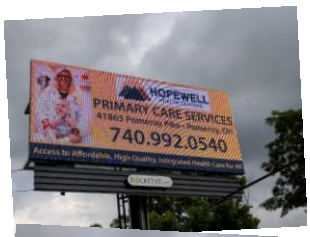
“I Vaccinate” Intervention Levels



- Level 1: Health clinic (Hopewell Health Center and Meigs County Health Department in Pomeroy, OH)
- Level 2: Providers at participating clinics (physicians, nurses, office staff)
- Level 3: Patients (girls and boys age 11 – 17 years and their legal guardians)

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Supplement Activities

- Developed personalized HPV education materials (posters, brochures, table tents, billboards) featuring a local provider (clinic champion) and her family
  - Based on materials from previous study with input from clinic staff
- Delivered HPV education training to clinic staff, with a booster session offered 6 months post-baseline
  - Assessed provider HPV knowledge at pre- and post-education session
- Obtained HPV vaccination rates at baseline and 12 months post-baseline
  - Utilizing HER at clinics

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Supplement Outcomes

- Distributed and/or displayed more than 700 brochures, 75 table tents and 30 posters in clinic waiting areas, exam rooms, school districts and community areas
- Educated 23 providers across two clinics between October 2016 and September 2017

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Supplement Outcomes (cont.)

- HPV vaccination rates in one clinic increased in 13-year old females from 44% at baseline to 58% at 12 months
  - Among 18-year old females: HPV vaccination rates increased from 0% at baseline to 54% at 12 months
- Changes to EHR system in 2nd clinic prevented collection of follow-up data
  - Efforts to bridge that gap are ongoing
  - This clinic, however, engaged in community outreach strategies

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Challenges

- Varying EHR systems
- Staff workload to implement
- Static client population
- Established clinic processes and procedures that may be resistant to change
- Economic challenges of the county that spill over to health care

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Rewards

- Strengthened collaborations with existing partners
- Great enthusiasm from committed clinic staff and community members
- Lessons learned with regard to assessment, planning and implementation are being factored into future grants to improve program success

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Thank You

To learn more about Ohio State's cancer program, please visit **cancer.osu.edu** or follow us in social media:

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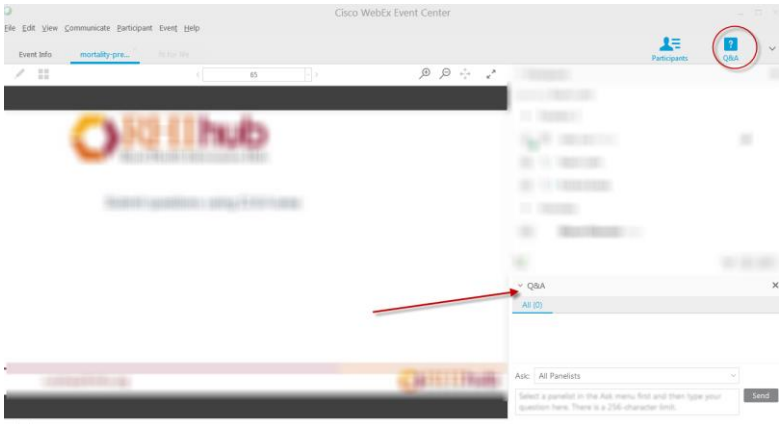
Questions?



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