

# Closing the Gap between Urban and Rural

## HPV Vaccination Rates – 9/18/18

**Kristine Sande:**

Hello, everyone. My name is Kristine Sande, and I'm the program director of the Rural Health Information Hub. I'd like to welcome you to today's webinar, Closing the Gap Between Urban and Rural HPV Vaccination Rates.

Before we get started, I will quickly run through a few housekeeping items. We do hope to have time for your questions at the end of the webinar. If you have questions for our presenters, we ask that you submit those using the Q and A section that will appear on the lower right-hand corner of your screen, and that will happen following the presentation. So if you'll hold your questions until then, that would be appreciated.

We've provided a PDF copy of the PowerPoint slides on the RHHub website, and those are accessible through the URL that's on your screen or we've also sent a link via the chat function. So you should be able to just click on that to access those slides.

If you do experience any technical difficulties during the presentation, we do ask that you call Webex support, and the number for that is 866-229-3239.

Now it is my pleasure to introduce our speakers for today's webinar. First we'll hear from Tanja Walker, who is an epidemiologist within the Immunization Services Division Assessment Branch for the National Center for Immunization and Respiratory Diseases within the CDC. She is the subject matter expert for adolescent vaccinations for the national immunizations survey team and works to advance ISD's research agenda using that NIS team data. Ms. Walker also works to improve human papillomavirus, or HPV, vaccination coverage, one of the CDC's priority public health initiative.

Our next speaker will be Robin C. Vanderpool. Dr. Vanderpool is an associate professor in the Department of Health, Behavior and Society at the University of Kentucky College of Public Health. Dr. Vanderpool also serves in two leadership roles for the National Cancer Institute-designated University of Kentucky Markey Cancer Center. She is the Director of the Community Outreach and Engagement and the Co-Director of the Behavior and Community-based Research shared resource facility.

Currently, Dr. Vanderpool serves as principal investigator of the Appalachian Center for Cancer Education, Screening and Support, a collaborating center of the CDC and NCI Federal Communications Commission Launch Demonstration Project in Appalachian Kentucky and the project lead on four NCI administration supplements awarded to MCC, focused on HPV vaccination, community health education in Appalachian Kentucky, catchment area population health assessment, and building rural cancer control research capacity. Dr. Vanderpool served as Chair of the NCI, accelerating rural cancer control research meeting in 2018.

Our final speaker will be Electra D. Paskett. Dr. Paskett became the Marion N. Rowley Professor of Cancer Research at The Ohio State University in 2002. She's the Director of the Division of Cancer Prevention and Control in the College of Medicine, a professor in the Division of Epidemiology in the College of Public Health, and is the Associate Director for Population Sciences and Program Leader of the Cancer Control Program in the Comprehensive Cancer Center of The Ohio State University.

She is also Director of the Center for Cancer Health Equity at the James Cancer Hospital. Dr. Paskett successfully competed for an NCI-funded P50 Center on Population Health and Health Disparities to examine why rates of cervical cancer are high in Appalachian Ohio and was a principal investigator of the Ohio Patient Navigator Research Program. She is the past President of the American Society of Preventative oncology, Deputy Editor of the Journal of Cancer Epidemiology Biomarkers and Prevention, and Section Editor of the journal Cancer.

She's Deputy Director of the Cancer Control Program and the Chair of the Health Disparities Committee of the Alliance for Cooperative Trials in Oncology. In 2016, she became a member of the National Cancer Institute's National Cancer Advisory Board and in 2018 became a member of the National Academies ad-hoc committee on a national strategy for cancer control.

And with that, I'll turn it over to Tanja Walker.

**Tanja Walker:**

Good afternoon. Today I will be presenting vaccination coverage among US adolescents, results from the 2017 National Immunization Survey Team. I will begin by reviewing the recommended immunizations for adolescents. Next I will provide an overview of the National Survey Team methods, then I will review the 2017 NIS team results as published in the August 24, 2018 MNWR, and then I will conclude.

This is the Advisory Committee on Immunization Practices and CDC-recommended immunization schedule for 2018 for children and adolescents. Outlined in blue are routinely recommended vaccines for adolescents. One dose of tetanus, diphtheria and a cellular pertussis vaccine, two or three doses of human papillomavirus vaccine, and the first dose of quadrivalent meningococcal vaccine are routinely recommended for adolescents age 11 to 12 years. ACIP recommends a booster dose of meningococcal vaccine at age 16 years. Coverage with these three vaccines will be the focus of my talk today.

Vaccination coverage estimate for catch-up childhood vaccines outlined in red include hepatitis-B, measles, mumps and rubella and varicella vaccine. Influenza vaccines, outlined in green, is recommended annually for everyone older than six months of age. And serogroup B meningococcal vaccines, outlined in black, is recommended for adolescents and young adults ages 16 through 23.

NIS Team objectives are to assist national, state, selected local area, and territorial vaccine 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, and monitor adherence to ACIP vaccine recommendations for adolescents.

NIST has been conducted annually since 2006. State and selected area estimates have been available since 2008. NIST is conducted among parents and guardians of eligible adolescents identified using a random digit dial sample of landline and cellular telephone numbers. The survey occurs in two phases, the household interview in which parents and guardians are interviewed for information on the sociodemographic characteristics of the adolescents and household and contact information for the child's vaccination provider is obtained. And the second phase, with parental and guardian consent, healthcare providers identified during the interview are mailed a questionnaire requesting the child's vaccination history. All vaccination coverage estimates are based on provider reported vaccination histories.

Data were weighted to adjust for non-response and phone-less households. P-tests were used for statistical comparison of vaccination coverage between years and selected demographic subgroups. Weighted linear regression by survey year and year of birth was used to estimate

average percentage point changes in coverage annually, and by birth cohort. Differences reported are statistically significant at a p-value less than 0.5.

Here are sociographic characteristics covered in this presentation. Adolescents' race and ethnicity was reported by their parent or guardian. Adolescents identified in this report as White, Black, or Hispanic are presented here. Adolescents were classified as below poverty level if their total family income was less than the federal poverty level as defined by the US Census Bureau, specified for the applicable family size and number of children aged 18 years or less. All others were classified as at or above the poverty level.

Metropolitan statistical area status was determined based on household reported city and county of residence and was grouped into three categories: MSA principal city, MSA non-principal city, and non-MSA. Non-MSA would include urban areas that do not fall within the MSA principal city in rural areas.

Health insurance status consisted of four categories: adolescents with private insurance only, those with Medicaid, those with other insurance including Children's Health Insurance Program, or CHIP, military insurance, Indian Health Service insurance, and any other type of health insurance not mentioned elsewhere, and uninsured adolescents.

In 2017, the NIST national sample included data regarding 20,949 adolescents from 50 states and the District of Columbia. 17% of interviews were from landline sample and 83% were from cell phone sample. The three US territories, Guam, Puerto Rico, and the United States Virgin Islands, were sampled separately but not included in national estimates. The overall household CASRO response rate was 25.7% for the sample. For adolescents with completed interviews, 48.1% had adequate provider data.

This slide reviews coverage in 2016 compared with 2017. Percentage point differences **bolded** and in blue were statistically significant. Coverage with Tdap was 88.7% and similar to 2016. From 2016 to 2017, coverage with one or more dose of meningococcal vaccine increased by 2.9 percentage points to 85.1%. For two or more meningococcal vaccine doses among adolescents aged 17 years, coverage increased by 5.2 percentage points to 44.3%. HPV vaccination initiation, or receipt of one or more dose of HPV vaccine among females and males combined increase by 5.1 percentage points to 65.5. And in 2017, HPV up-to-date estimates increased by 5.2 percentage points to 48.6%.

For females only, vaccination coverage for one or more HPV vaccine dose increased by 3.5 percentage points, and HPV up-to-date estimates among females increased by 3.6 percentage points. Among males, vaccination coverage increased by 6.6 percentage points for one or more HPV vaccine dose, and by 6.8 percentage points for males up-to-date with the HPV vaccine series.

This figure shows the trends in vaccination coverage for routinely recommended vaccines among adolescents aged 13 to 17 years in the United States from 2006 to 2017. Please note that ACIP revised the recommended HPV vaccination schedule in late 2016. The recommendation changed from a three-dose to a two-dose series with appropriate space in between receipt of the first and second dose for immunocompetent adolescents, initiating the series before the 15th birthday. Three doses are still recommended for adolescents initiating the series between the ages of 15 and 26 years.

Because of the change of recommendation, the figure includes estimates for three or more dose of HPV vaccine from 2011 to 2015 and the HPV up-to-date estimate for 2016 and 2017. Because

HPV vaccination was recommended for boys in 2011, coverage for all adolescents was not measured before that year in the figure.

From 2006 to 2017, we've seen improvement in adolescents vaccination coverage among all routinely recommended vaccines. Coverage for HPV vaccination has still not reached a level of Tdap and meningococcal vaccinations. In 2017, coverage with one or more dose of HPV vaccine at 65% was 23.2 percentage points lower than coverage with one or more dose of Tdap at 88.7% and 19.6 percentage point lower than coverage with one or more dose of meningococcal vaccine at 85.1%.

Among adolescents surveyed during 2016 to 2017, HPC vaccination initiation by age 13 years increased an average of 5.9 percentage point for each birth year. Initiation by age 13 has increased from 19.6% among adolescents born in 1998 to 56.3% among adolescents born in 2004. On-time vaccination, or receipt of two or three doses of HPV vaccine by age 13 years, has increased an average of 3.6 percentage point for each consecutive birth year, from 7.7% among adolescents born in 1998 to 29.8% among those born in 2004.

This slide shows vaccination coverage by race and ethnicity. White non-Hispanics, the reference group, are in powder blue. Black non-Hispanics are in sky blue, and Hispanics are in navy blue. Coverage with one or more dose of Tdap was lower among Hispanic adolescents compared to White non-Hispanic adolescents. Coverage with one or more dose of meningococcal vaccine was similar among Hispanic adolescents, Black non-Hispanic adolescents, and White non-Hispanic adolescents. Coverage with one or more dose of HPV vaccine was higher among Black non-Hispanic and Hispanic adolescents compared to White non-Hispanic adolescents. And compared with White non-Hispanic adolescents, more Hispanic and Black non-Hispanic adolescents were up-to-date with the HPV vaccine series.

This figure shows coverage by poverty status. Below poverty is in powder blue and at or above poverty, the reference group, is in dark blue. There was no difference in Tdap or meningococcal vaccine coverage by poverty status. Vaccination coverage for HPV vaccine and HPV up-to-date estimates were higher among adolescents living below the federal poverty level than among those living at or above the poverty level. Overall, there was a 10 percentage point difference by poverty status for one or more dose of HPV vaccine, and a 7 percentage point difference by poverty status for HPV up-to-date.

This slide shows coverage by health insurance status. Private insurance only, the reference group, is in powder blue. Those with Medicaid are in sky blue. Those with other insurance are in royal blue, and those who are uninsured are in dark blue. Coverage with one or more dose of Tdap was similar, regardless of the adolescent's health insurance status. Coverage with one or more dose of meningococcal vaccine was lower among uninsured adolescents compared with adolescents with private insurance only. Coverage with one or more dose of HPC vaccine was higher among adolescents with any Medicaid compared with adolescents with private insurance only. Compared with adolescents with private insurance, more adolescents with Medicaid were up-to-date with the HPV vaccine series, while less with uninsured adolescents.

This slide shows vaccination coverage by metropolitan statistical area. MSA principal city, the reference group, is in powder blue. MSA non-principal city is in sky blue, and non-MSA is in dark blue. Coverage with Tdap did not vary by MSA status. Coverage with one or more dose of meningococcal vaccine was 7 percentage points lower among adolescents living in non-MSA areas than among those living in MSA principal cities. For both HPV measures, coverage was lower for adolescents living in non-MSA and MSA non-principal cities compared with those living in MSA principal cities.

In taking a further look, we conducted additional analysis to determine if coverage with one or more dose of HPV vaccine differed with stratified by MSA status and select characteristics. Here we stratified by MSA status and sex and we found that among female adolescents, those living in MSA non-principal cities and non-MSAs had lower coverage with one or more dose of HPV vaccine than those living in MSA principal cities.

Coverage in MSA non-principal cities was also higher than coverage in non-MSA. While coverage overall was lower among males compared to females, coverage with one or more dose of HPV vaccine by MSA status follow a similar pattern for those living in non-MSAs compared to those living in MSA principal cities. For White non-Hispanic adolescents, those living in MSA non-principal cities and non-MSAs had lower coverage with one or more dose of HPV vaccine compared to those living in MSA principal cities. Coverage with one or more dose of HPV vaccine was similar among Black non-Hispanic adolescents, regardless of MSA status. For Hispanic adolescents, coverage with one or more dose of HPV vaccine was lower among those living in MSA non-principal cities and non-MSAs compared to those living in MSA principal cities.

When stratified by MSA status and poverty level, coverage for one or more dose of HPV vaccine was lower among adolescents living in MSA non-principal cities and non-MSAs compared to those living in MSA principal cities. For both adolescents living below the poverty level and among those living at or above the poverty level. Among adolescents below poverty level, coverage for one or more dose HPV vaccine was also higher among those living in MSA non-principal cities compared to those living in non-MSAs.

Stratifying by health differences, we observed that differences in coverage with one or more dose of HPV vaccine persist by MSA status. For adolescents with Medicaid, those living in MSA non-principal cities and non-MSAs have lower coverage than adolescents living in MSA principal cities. The same pattern is seen among adolescents with private insurance only. Coverage with one or more dose with HPV vaccine was similar by MSA status among adolescents with other insurances. And uninsured adolescents living in non-MSAs had lower coverage than those living in MSA principal cities.

Changing gears, here's a look at variation in vaccination coverage by state. For all slides, coverage is displayed by quartiles, where the lighter color equals lower coverage and the darker color equals higher coverage. For one or more dose of Tdap vaccine, coverage ranged from 78.9% in Alaska to 96.2% in Massachusetts. For one or more meningococcal vaccine dose, coverage ranged from 60.7% in Wyoming to 95.3% in Georgia. For one or more HPV vaccine dose, coverage ranged from 46.9% in Wyoming to 91.9% in the District of Columbia.

This slide presents data on the combined five-year average annual increase for coverage with one or more dose of HPV vaccine. Increases range from 2.2 to 8.5 percentage points. From 2013 to 2017, the national average annual percent increase in coverage for one or more dose of HPV vaccine was 5 percentage points. The largest increases were in Virginia with 8.5 percentage points, D.C, 7.5 percentage points, Montana, 7.4, and 7.3 percentage points in Arkansas, Iowa, Utah, and El Paso, Texas.

Limitation for these results included low survey response rates, bias that might remain after adjustment for household and provider non-response and phone-less households, and changes in non-response bias over time which could affect comparability of estimates between surveys.

In summary, HPV vaccine initiation and series completion continue to increase. We continue to see high national level Tdap and meningococcal vaccine coverage. Urban rural disparities in coverage with one or more dose of HPV and one or more dose of meningococcal vaccine continue to persist. And opportunities still exist to further increase HPV-associated cancer prevention.

Moving forward, we would like to continue to investigate the factors contributing to these lower vaccination rates in rural areas and to identify interventions to improve these rates. For example, we would like to look further into Tdap vaccination and where it's occurring in rural areas compared to where it's not occurring for HPV vaccine and determine what the barriers might be with having coverage rates similar in those sites that we see in Tdap vaccines.

I also wanted to highlight some resources that we have developed to assist clinicians in improving their HPV vaccine rates. At the bottom of this slide, you could find URL for a page that outlines the differences in vaccination rates among rural communities. This page also links to several resources designed to assist clinicians and communicating about HPV vaccine with parents and implementing strategies to improve vaccinations rates, increase vaccinations rates, in their office. I just wanted to highlight a few of the resources that are available on our website.

The first resource, which is the graphic on the left, is our Tips for Talking to Parents About HPV Vaccine fact sheet. This quick fact sheet includes brief answers that clinicians can use to answer the most common questions that parents have about HPV vaccine. The second resource I wanted to mention, which is shown in the middle of this slide, is our How I Recommend video series. This is a series of short videos which feature practicing clinicians talking about how they make effective vaccine recommendations and address common questions that parents have. Finally, I wanted to highlight our page on Five Ways to Boost Your HPV Vaccination Rate, which is shown on the right of the slide. This page includes a short article which uses shareable graphics to highlight five practical improvement tips that may help practices increase their HPV vaccination rate.

I would just like to acknowledge all of the people that worked with me to get the article together and everything else moving forward, and that's it. I will pass it along to our next presenter, Dr. Vanderpool.

**Robin Vanderpool:**

All right. Thank you all very much for the opportunity to present on today's webinar. Working in rural communities is a passion of mine, both from a personal and professional perspective. I've noted in the introductions, much of my work is in Kentucky, and specifically eastern Kentucky. The state of Kentucky, just for reference, is about 41% rural and the 54 counties in the eastern part of the state that's designated as Appalachian are 82% rural.

For today's presentation, I wanted to focus in on three objectives. I want to just provide a high-level overview of the burden of HPV-associated cancers in rural communities. I want to discuss HPV and HPV vaccination knowledge and awareness differences that exist between urban and rural populations. And I want to highlight both the unique challenges and the opportunities associated with rural HPV vaccination.

Many of you all may have seen last month, again that the CDC published new data on HPV-associated cancer incidence rates in the US, and specifically the MMWR report provided a historical perspective, starting at 1999 and going all the way to 2015. And just as reference, in 1999, there were a total of 30,000 new cases of HPV-associated cancer in the US, and by 2015 that number climbed to over 43,000.

And as you can specifically see in this graph on your screen right now, in 1999, we had higher rates of cervical cancer among women compared to oropharyngeal squamous cell carcinoma among men. But as you can see, about 2009 the lines crossed. And across this time period, cervical cancer rates have actually decreased at almost 2% each year, whereas oropharyngeal squamous cell carcinoma rates have increased almost 3% per year among men and almost 1% per year among women. And so, by 2015 there's around 11,700 cases of cervical cancer and almost 19,000 cases of oropharyngeal cancer, and 82% of those cases occur among men.

The MMWR report also shows increases in other HPV-related cancers, and as you can see here on this screen, age-adjusted incidence rates for oropharyngeal cancer among females, anal cancer among men and women, and vulvar cancer among women have had increases over this time period of 1999 to 2015. Penile cancer and vaginal cancer rates have remained stable over this time.

I realize that this is not a specific rural-urban map, but examining the states with elevated rates of HPV-associated cancers, we can see a regionalization in the south, which is also recognized for many rural communities. And, unfortunately, my state of Kentucky has the honor of having the highest incidence of HPV-related cancers at 15.67 cases per 100,000.

Thanks to several analyses that have been conducted by Whitney Zahnd and colleagues, we do now have a better assessment of the HPV-related cancer disparities that are based on geography, and that does include a rural-urban comparison. And, as reference, I have included a slide at the end of my presentation with references where you can go back and look up these articles and the data that is within those articles, but as a summary of the research findings, we can see that across 1995 to 2013 that rural populations have experienced a statistically significant increase in HPV-related cancers. The increased incidence is higher in rural communities compared to urban populations. We see that rural females, in particular, have higher rates of cervical, vaginal, vulvar, oropharyngeal, and anal cancer compared to their urban peers and rural males have higher rates of penile cancer.

We can also see that rural populations have higher rates of HPV-associated cancers that are diagnosed both at the local and distance stages, and when looking at cervical cancer mortality rates, we also know that rural women experience higher rates compared to their metro counterparts.

I wanted to just show you an example of what this looks like. For example, here in Kentucky, we're able to use our Kentucky cancer registry data. We are a SEER registry for the National Cancer Institute, and we also participate in the CDC cancer registry program. But here, we're able to map five-year incidence and mortality rates based on rural-urban status of the county. And as you can see here, both incidence and mortality in Kentucky cervical cancer, it's significantly different and significantly higher in our rural communities compared to our urban communities.

And I also pulled the data for oral and pharynx cancer in Kentucky men, and you can see the same trend, although the difference is not statistically significant between rural and urban, we do have higher incidence and mortality rates among our rural residents for those cancer sites.

In addition to understanding the actual cancer rates, it's important to have an assessment of any rural and urban differences regarding the knowledge of HPV and HPV vaccination, as this does ultimately inform HPV vaccination behavior. A recent paper analyzing data from the National Cancer Institute's Health Information National Trend Survey shows that rural residents were significantly less likely to have heard of HPV and the vaccine and know that HPV can cause cervical cancer. And I think that this data is particularly striking given that the vaccine has been approved for over 12 years and we still see these lower rates of knowledge and awareness about HPV and its repercussions.

I wanted to, also, give you a local example where in last summer, 2017, here in Kentucky, we surveyed a representative sample of Appalachian Kentucky residents about a variety of health topics, including HPV vaccination. And this work actually serves, and I would hope, an encouragement to all of us to think about rurality across a continuum where we could look at

different communities and look at rurality across, not just urban and rural or metro and non-metro, but look at the differences across the different categorizations of rurality.

In this figure, strata one is what we consider urban, or rural-urban continuum codes one through three. And then, strata four in the yellow is actually what you would consider eight and nine on that continuum. And, as you can see looking at the first set of bars around HPV awareness, our most rural communities, again in the eight, nine continuum had the lowest awareness, around 54%, compared to over 70% in our other counties. And then, if you look at HPV vaccination awareness, it was actually interesting to see similarities between our more urban communities and our more rural communities in eastern Kentucky where the awareness was around 63%, but then our counties there in the gray that fall in the six, seven rural-urban continuum codes had the highest awareness at 80%.

And so, again, I just wanted to use this example showing the need for granularity in our data and to work very closely with our communities.

As we saw earlier, both the epidemiology of HPV-related cancers, understanding knowledge and awareness of the virus itself as well as the vaccine, all of this translates into vaccinations behaviors. And, as Ms. Walker just shared, we do know that rural adolescents are less likely to be up-to-date with HPV vaccinations as compared to their urban counterparts, a difference of almost 12 percentage points. And then, for dose one, we just saw that these disparities across rural-urban status hold for females and males separately, adolescents of different ethnic groups, poverty levels, and insurance status.

And in reviewing this map, you can, again, if you take the map that I showed earlier with the high rates of HPV-related cancers and overlay this even on top of this HPV vaccinations map, many of the same states there in the south do carry high HPV-related cancer burden, but also have the lowest up-to-date HPV vaccination rates.

And so what I want to do in the next few slides ... and again, in the sake of time, I'm giving a very high-level overview of challenges to HPV vaccinations that have been documented in the literature and among practitioners for rural communities. I think some of them, you will see are probably prevalent and evident across any population that you work with no matter where they live, but many of these can be magnified in our rural communities. And so, this first slide speaks to the barriers encountered by parents and families in particular and the notion of still do we understand the link between HPV infection and cancer, and it's more than just cervical cancer.

There are still concerns among the public about the safety of the vaccine. There's still concerns that HPV vaccination leads to sexual promiscuity. Even confusion all the way up and to our President of understanding the difference between HIV and HPV. And I've even had a parent discuss that with us at a school project that we did. I'm thinking that we gave their child HIV shot versus an HPV vaccine. So really, having an understanding of disease and infection and human anatomy and how this all plays out.

We know that the vaccine is expensive, so understanding how we can cover that through insurance and the Vaccine For Children's program. Particularly in our rural communities, we do have concerns about transportation and distance from healthcare. Limited parental and peer support. There may be cultural views or maybe even fatalistic beliefs. We've done some work in eastern Kentucky that shows individuals that higher fatalistic beliefs were less likely to finish the vaccine series, and again, even after 12 years of the vaccine being available, because it's not always mandated for school entry ... Right now, it's only in three states, Virginia, D.C., and Rhode Island. It's just not viewed the same way. And often, as we'll talk about on the next slide, providers may not give that strong and consistent recommendation.

And, in fact, we know that rural parents have reported that they're less likely to have collaborative communications with their child's provider about HPV vaccination. We know that many of our rural areas particularly are family medicine providers, have already a full plate, and many responsibilities and urgent care and acute care needs that need to be taken care of and may not have time for vaccination conversations. Again, the vaccine isn't mandated or viewed like others, even in the provider community, and it's just not discussed the same way.

We know, from the data that Ms. Walker just presented, that we have the opportunity to reach 80, 90% if HPV vaccination could be given with the other adolescent platform vaccines. And so, a study in Utah even showed that rurality was significantly associated with these missed opportunities. Often, clinics may not stock the vaccine due to perceived cost and again having that hard, uncomfortable perhaps, conversation with parents about a child's sexual health and talking with someone about the prevention of an STD that is, again, linked to cancer, so the importance of the cancer message is real here.

So, again, quickly in the sake of time, I just wanted to promote some different ways and opportunities so that I think we can improve HPV vaccination in rural communities. Certainly, I would encourage all of us to consider multilevel approaches, which start at the parents and the patient and the family level, work their way up through healthcare providers and clinics, setting community norms, and policies, particularly at the state level related to, and in this instance, possible school entry mandate for the HPV vaccine.

I know Electra is going to talk about, in her presentation, the notion of doing multilevel approaches because I feel like we have to come at this from all angles. We certainly need strategic education and health communication messaging, for both providers and parents in communities. We want our health providers to deliver a brief yet strong and consistent recommendation about the importance of HPV vaccination and inclusion with the other vaccines. You can see here at the bottom, really we have that opportunity to increase our HPV vaccination rates equivalent to Tdap and meningococcal moving up to the 80, 90% goal.

And then, again, as another example of working with our community, we had a project years ago called 1-2-3 PAP, which actually focused on young adult women in eastern Kentucky. And we used women to help guide our messaging, test our messages. We actually had young women and healthcare providers from eastern Kentucky star in our health education video and use their voices to talk about cues to action and how to overcome barriers. And this was specifically focused on helping those women actually adhere to the full three-dose series because it's one thing to get folks started on the vaccine series, but we do have to finish the full series, whether it's two doses or three doses.

As you can see here, some other opportunities exist in exploring alternatives outside of the traditional medical home. Looking at schools, for example. We did a school project a few years ago down in south central eastern Kentucky, and in this case ... I'll cut to the punchline. For those students that started the vaccine schedule in the fall, by the spring, 88% of them had completed the full, at the time, three-dose series. So it just shows, again, the power of working with our schools.

Working with your local pharmacies ... We had funding a couple of years ago from the American Cancer Society's National HPV Roundtable to work with local pharmacies. So we partnered in this case with Total Care Pharmacy which was a local chain of pharmacies in eastern Kentucky to promote and provide HPV vaccination. Think about dental practices, community health workers, patient navigators, peer educators, and even mobile vaccinations clinics. I think this is an opportunity for all of us to partner with our federally qualified health centers and rural health clinics and our local health department and to think outside the box around community and

clinical linkages, or maybe you have a community cancer coalition or even an immunization coalition that could help promote and educate about a vaccine and then connect them to one of the clinical sites to get the actual vaccine.

Think about faith-based organizations. And of course our local American Cancer Society representatives are all great resources. Again, I wanted to mention a few resources for you all, as well, and thinking about your work. The National Cancer Institute has the Research-Tested Intervention Programs. These are HPV vaccination interventions that have been research-tested or evidence-based and can be adapted for use in your community. We have, again, the National HPV Vaccination Roundtable, which has a repository of resources that can be used in your areas; for example, even survivor testimonies from those who have survived HPV-related cancers and use them as an advocate for vaccination.

Ms. Walker mentioned the resources from CDC about rural health and the website is included there, as well. The American Academy of Pediatrics has some initiatives, specifically for providers in HPV vaccination. I know some colleagues out in the inner mountain west have used the hub and spoke model in promoting HPV vaccination. And of course AHEC is another partner that you might consider, particularly in our rural areas, as they have also received funding and partnerships to focus on HPV vaccination and using physicians to consider themselves champions for HPV vaccination and cancer prevention.

And noted earlier, I wanted to include references that you all can go back and look up some of this work and just want to thank you again for this opportunity to present this afternoon. And, with that, I will turn it over to Dr. Paskett.

**Electra Paskett:**

My pleasure to present to you a little bit about what we've been doing in terms of trying to change the picture that you've just seen by Ms. Walker and Dr. Vanderpool in terms of the low uptake of HPV vaccination in, specifically, Appalachia.

So I'm going to give you a little background and talk about a full randomized control trial we did, and then our pilot study, which is now pending review at the NCI for a full study, all I Vaccinate.

So when I arrived in Ohio in 2002, this was the picture of cervical cancer death rates in White women that the National Cancer Institute presented. And, as you can see, the red areas are, in the majority, the Appalachian portion of Ohio, Kentucky and West Virginia. And those were the highest death rates among White women in the United States at that time.

So, for background, as you just saw visually, the Appalachian region have higher than average incidences and mortality rates for HPV-related cancers. Through our research and also what you just heard, completion rates for the vaccine series are low for females and very low for males. We've heard a little bit about the reasons for the low uptake. Mainly, it's lack of physician recommendation, which is what we have found in our research, and the awareness of the need to be vaccinated, confusion about guidelines, cost, negative attitudes, not only about the HPV vaccine but about HPV-related cancers and vaccines in general.

Therefore, we felt that underserved populations, specifically in Appalachia, could benefit from a multilevel approach to improve HPV vaccination uptake. And Dr. Vanderpool has nicely explained to you the basics of multilevel interventions. And so, what we did in our Center for Population Health and Health Disparities was we developed and then evaluated a multilevel intervention focused on improving HPV vaccine uptake among young girls and adolescents females age 9 to 17 living in Ohio Appalachia. At the time we were funded for this study, the approval to vaccinate boys had not happened, so that's why we only focused on girls.

So, the levels include the parents of these female adolescents who live in Ohio Appalachia, healthcare providers who practiced at the healthcare institutions that we worked with, and then the actual health department and provider offices in the counties that we worked with. We tested the intervention in six Ohio Appalachian counties, those were intervention counties. And compared to six usual care Ohio Appalachian counties. Those were the controls. And the control counties received the exact type of the interventions, which I'm going to talk to you about on the next slide; however, the content focused on the flu and the flu vaccine. So our ultimate goal was to test this intervention, and we called our project The Parent Project.

So the multilevel intervention components are shown here, and at the system level, we developed waiting room and exam room posters and brochures, table top tent cards for the waiting rooms, a quarterly newsletter, helped the clinics develop a vaccine tracking system, and then developed invitation to be vaccinated letter from their provider that was sent to parents.

At the provider level, we developed a fact sheet, and that is on the middle on the right. A resource list, an article on cervical cancer in Ohio Appalachian, and we did a face-to-face CME session that explained cervical cancer, HPV, HPV vaccine, and gave some strategies to the providers to get their patients vaccinated.

And then, at the patient level, we developed a culture-tailored HPV and cervical cancer educational DVD. The bottom picture on your right shows the family. These were paid actors, but they resembled an Appalachian family, and the storyline was the older daughter, who is the middle on the right of the picture, she had cervical cancer and the parents and the older were worried about the younger daughter, who is on the left. And they didn't want her to be in the same situation, and they said, "Hey, I heard there's this vaccine."

And automatically they brought up the issues we found in focus groups about, "Well, I don't want that to be a green light for her to have sex. If it's safe, we'll go to the doctor and talk to the doctor." And then, it followed them to the doctor, and the girl got the shot and then immediately texted her friends and said, "Oh, it didn't hurt." And then, the culturally tailored education brochures had this family on it continue the same theme, the same colors, and actually addressed a lot of the barriers that we had heard from focus groups we did with parents.

Question and answer fact sheet, a resource list, and then a magnetic appointment reminder card, which is at the top on the right for the second and the third shot. So the good news and the bad news, as my statistician said ... So who got a shot within the first three months? And so, you can see we had 8% in the HPV arm versus 3% in the control arm. It was statistically significant difference. And if you look at "Got the first shot within six months," which we counted as ever, it was 7% in the control arm and 13% in the HPV arm.

So we did have an effect, but it wasn't a lot of people who got the shot. And we wanted to know what did we do wrong? What failed? So we working to be awarded a supplement to our center to modify the components of this multilevel intervention to focus more on implementation science study. And we implemented it in two Appalachian Ohio clinics as the I Vaccinate program. The issue was mainly for the first study, The Parent Project, the clinics didn't like the fact that we wanted to get names and consent individual patients and their parents. They wanted to do it more themselves.

And so, this redesigned program, the I Vaccinate program, allowed the clinics to run the entire intervention. We helped them assess baseline HPV vaccinations rates. We trained the staff on how to use the components of the I Vaccinate program, and what we wanted to do was then

examine the effect of the program by just comparing pre- versus post-implementation rates over time.

So we did this in one county, Meigs County. It's a federally-designated distress county in Appalachian Ohio. We used the Hopewell Health Center and the Meigs County Health Department, both in Pomeroy, Ohio. That was the level one. Level two were the providers at the participating clinics, physicians, nurses, and office staff. And level three were the patients, the girls and boys - this time we added boys because boys were approved by this time - aged 11 to 17, and their legal guardians.

And I wanted to just show you, billboards are very big in this county, so on the left at the top is the Hopewell Clinic and the bottom is the Meigs County Health Department. This is the same location. It's an electric billboard, so it revolves. So what we did was we developed personalized educational material, and we featured a local provider who was the clinic champion from Hopewell and her family. And we used the materials from the parent study, but we got input from the clinic's staff on how to change it, how to customize it and personalize it.

We delivered the education training with a booster session offered at six months, and we assessed provider HPV knowledge at pre- and post-education session, and then we obtained HPV vaccination rates at baseline and 12 months using the electronic medical record. So overall, we distributed and/or displayed over 700 brochures, 75 table tents, and 30 posters in the clinic waiting room, exam rooms, school districts, and community areas because the Health Department was very, very interested in getting this out to the community. And they are the ones that put this poster that we had developed on the billboard. So this is the same electronic billboard, and they added the I Vaccinate project on there.

We educated 23 providers across the two clinics, and the other picture is of the poster that was in the clinic. So the outcome in Hopewell Clinic, the rates increased in 13-year-old females from 44% at baseline to 58% at 12 months. However, among 18-year-old females, the vaccination rates increased from 0 at baseline to 54% at 12 months. Remember, we were focusing on 11 to 17, so the 18-year-olds were 17 when we started the study. Changes in the electronic health system in the second clinic, the health Department prevented collection of follow-up data. So we're still trying to bridge that gap. And as I mentioned, this clinic really, really focused on community outreach strategy.

So our challenges were there were varying electronic health record systems that not even all of the clinics knew how to work with them. There was a significant staff workload to implement the study. They both have static client populations. They already had established clinic processes and procedures that might be resistant to change. And also, the economic challenges of the county spilled over into healthcare. So there a lot of other pressing needs in clinics.

The rewards were that we were able to strengthen collaborations with our existing partners. There was great enthusiasm from community clinics, staff, and community members, and we learned a lot with regard to assessment planning and implementation. What we learned was factored into our grants that are now under review that, hopefully, will provide success.

So thank you for your attention. I appreciate being invited to join this esteemed panel.

**Kristine Sande:**

Thank you so much to our presenters. Those were fabulous presentations with some really great information. At this time, we'll open up for some questions, and you should see a Q and A box open up in the bottom right-hand corner of your screen. And if you're not seeing that on the controls on the bottom of the screen, there should be a blue button that has a box with a question mark in it that would allow you to toggle that panel on and off.

So at this point, we will have a few questions, and I do have a few here to start with. Regarding raising awareness and stressing the cancer angle, has there been any collaborative work with oral health providers of another rural patient or parent touch point to recommend vaccinations, such as pharmacists and others mentioned, and if so, what were the results? If not, what are barriers or reservations to incorporating oral health providers?

Dr. Vanderpool or Dr. Paskett, would either of you like to take that on?

**Robin Vanderpool:** This is Robin. I'll start and, hopefully, maybe Electra has more to add, too. We specifically here, or at least I, have not worked directly with oral health care providers, but that being said, one of the resources I mentioned to you all was the HPV Vaccination Roundtable, and there is a focus among the resources that are provided there about partnering with oral health providers and dental providers. Certainly, the issue of working ... Well, you can use dental providers to, obviously, promote and educate about the vaccine. Now, delivering the vaccine, that may be where the challenge comes from, but often, for example, I know that many primary care clinics may be even linked with a dental clinic as part of like a federally qualified health center. So then you literally have the promotion and the encouragement from the dental provider, and you have them walk over to the clinic and get the vaccine.

Electra may have some other thoughts about that, as well.

**Electra Paskett:** No, I think you did just swell. I think it's swell.

**Kristine Sande:** All right. Another question ... Can you talk more about the cost barrier? Doesn't BFC cover the cost of vaccine and do you know anything about how clinics bill of the vaccine? Is it an office visit or a nurse injection fee?

**Electra Paskett:** So I'll start, and Robin, you can tip in, too, about the second part. So the cost of the vaccine should be covered. If people are insured under the Affordable Care Act, it's a preventive service, so those are covered. Yes, the vaccines for children does cover it, and in a lot of places, I have seen that the company, pharmaceutical company, is willing to also help cover the cost if their need to be cost. Robin, do you know if it's a nurse injection visit or office visit?

**Robin Vanderpool:** Well, oh, that's a great question. I do not know off the top of my head, but I certainly know that many clinics can certainly implement standing orders so that it is just a nurse visit. And then, if you expand out to these other outside of the medical home, per se, that's where you do need to do a little bit of homework about whether different insurance companies will pay for, for example, HPV vaccination in the pharmacy setting or in the dental setting. And just making sure those are covered because often there may be still an administration fee even if the vaccine is covered itself. But I think those are things that if you're going to implement any type of these programs, just to do the homework behind that.

**Kristine Sande:** Great. Thank you. Next question is what is the best way to reach parents in the rural area? Do they have internet access and do they access social media, or do you need to rely more on distribution of materials at community venues?

**Electra Paskett:** So, it really depends on the area. I can tell you in our area of Appalachia, the internet coverage is spotty and phone coverage is spotty, although a lot of people will have cell phones. People still have dial ups, and that does pose a lot of problems. It's interesting. There are a lot of people on social media, and that is one way, also, but our community partners tell us ... I mean, they are the ones that focus on the billboards and a lot of the written distribution materials, just because of the deficit of internet.

And I know Robin's institution is participating in a really neat initiative with the NCI and the Federal Communications Committee. Is that where it is?

**Robin Vanderpool:** Yeah. The FCC.

**Electra Paskett:** To try to expand broadband use because people think, "Oh, there's no problem," but we can tell you there's a problem with that.

**Robin Vanderpool:** And I would say all of the above. I think any touch point where we can reach our rural parents and families. I think schools are a venue where a lot of social gathering, events, and healthcare can be provided, so that is another one, but based on the work we've done, having I guess community champions might be the right phrase. Having research nurses and community health workers that are from the community to deliver the messages and deliver the vaccine I think are good strategies, as well.

**Kristine Sande:** Great. In terms of community champions, there's a question about school nurses and whether that's an effective approach for outreach.

**Electra Paskett:** So I can tell you that our Health Department, the Meigs County Health Department, they worked with the school nurses and provided them information, posters, and things like that to be able to be a resource. And, yes, I think that educating the school nurses about this is a huge resource. And some schools might have school-based clinics, so there's a lot of opportunities with school nurses and school-based clinics.

**Kristine Sande:** Great. Thank you. And a question for Ms. Walker ... For the NIS Team 2017 data, how do the categories related to geographic location align with other ways of measuring and assessing rural rates of HPV vaccination uptake? And then-

**Tanja Walker:** Oh, sorry.

**Kristine Sande:** Oh, there was, also, a related question about how you determine the MSA category, whether participants are asked to report that or whether the household address is mapped and used that way.

**Tanja Walker:** Okay, so currently, the way that we use it, we're using the USOMB's metropolitan statistical area designations. And so, they have a three-level designation. It's in an MSA principal city, in an MSA but not in a principal city, and not in the MSA. And that, essentially, is based off of city and county. So it's not very granular compared to, let's say, NCHS, which I think has a six-level way of looking at things where they, essentially, take some of those categories and break them up further based off of closeness to metropolitan area ... commuting and some other ... and population density.

And then, also, of course, USDA has, I think, like a nine-level category that is even more granular than that. We currently don't use anything except for, like I said, the city and county information. We are currently talking and trying to figure out if we can look at this more granular, simply because we know that in an MSA principal city area, depending upon how big that MSA is, you could have an area that operates more like a rural area than an urban area because it's kind of on the outskirts.

So we are currently looking at trying to find a way to map it using RUCA code information, population density, and commuting. It's a process that we just started talking about, as we realized we need to take a more granular look at this. So does that answer the question?

**Kristine Sande:** I believe it does. Thanks. So there are a couple of questions related to male versus female issues, one about whether you can speak to the higher incidences of oropharyngeal cancer, why that's higher in males. And also, questions related to whether we're breaking the data down by sex. So, that's really two questions.

**Tanja Walker:** I don't think I can speak well to the whole idea of the incidences for oropharyngeal cancer. In terms of the breaking the data down by sex, in terms of the vaccination, we're actually going to start moving away from that. And the reason for that is because we've seen that, since 2011, there's been a very steep increase in vaccination coverage among males. And so, say in 2012, so one year after the recommendation for HPV vaccinations for males, it was a difference between the two of 33%. This year, that has dwindled down to six percentage point difference, in terms of what the coverage is.

And so, the coverage for both sexes appear to be converging. And so, we feel like we're getting to a point ... or we're at the point, really, where we can start reporting that as one measure.

**Electra Paskett:** Thank you. Certainly, HPV is transmitted to the mouth by oral sex, and so that ... and you can see ... and even about 10% of men and 3.6% of women ... I'm actually on the CDC website right now...and an oral HPV infection is actually more common with older age. And so, again, it is linked to sexual activity and how it's transmitted that way.

**Kristine Sande:** Thank you very much. And I think this might be the last question that we'll take at this point. Sorry to anyone who didn't get your question answered. We will try to get those questions to our presenters and allow them to get back to you. But this question is, "What's been successful in working with faith-based organizations in the HPV discussion?"

**Electra Paskett:** So I can just tell you that we bring them into the discussion when we've done our focus groups. It includes parents and community leaders, especially those of the faith-based community. So we hear what their issues are and, in return, those leaders are also educated about the issue.

Robin, I don't know if you've had any experience.

**Robin Vanderpool:** Well, actually, I know some of my colleagues in Iowa actually have had ... They've worked with, actually, the Catholic community and faith-based community, particularly in working with Hispanic populations. So, that's one reason why I wanted to bring that up in conversation. I know there are successful models out there, but as Electra said, always bringing our faith community partners to the table from the beginning, and then deciding what's the appropriate role for them and what they're comfortable with.

**Kristine Sande:** Great. Thank you so much, and, at this point, I think we'll wrap up. We are 10 minutes over our allotted time. So thanks to our presenters for staying on, and thanks so much to everyone who participated today, as well. When you close this window, a survey will automatically open, and we do ask and encourage you to complete the survey to provide us with your feedback, and we can use that to host future webinars. And we really appreciate any feedback you are willing to give us.

The slides used in today's webinar are currently available at the link listed on this slide. In addition, a recording and a transcript of today's webinar will be sent to you by email in the near future so that you can listen again and share the presentation with your colleagues.

Thank you again for joining us today, and we hope you have a great day.