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SHORT REPORT

A short report: parents HPV vaccine knowledge in rural South Florida

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ABSTRACT

An exploratory pilot descriptive research study was conducted in the rural counties of Hendry and Glades Florida exploring parental knowledge and hesitancy of HPV vaccination. Participants included parents/caregivers with children ages 9 to 13; using quantitative methods, we evaluated knowledge, feelings, and beliefs toward HPV vaccination including vaccination prevalence and correlates among participating parents/caregivers. Our measures included the Parental HPV Survey with a Cronbach's alpha of .96. Hesitancy-focused results revealed 26% of parents showed caution because of stigma around vaccination while attributing low levels of knowledge about HPV vaccination; 80% had a persistent belief HPV vaccination could leave their child sterile, perpetuating hesitancy. Participants with a high-school education or less (64%) and conservative religious affiliation, e.g., Baptist and Catholic (74%), did not decline HPV vaccination. Results are striking considering research indicating conservative religious views and lack of a college education leads to lower HPV vaccination rates. Numerous interventions to increase HPV vaccination have been studied including strong recommendations for increased provider communication but our data indicates increasing public education with community input and a focus on cultural norms in each specific rural community among parents and providers is needed to increase HPV vaccine knowledge and decrease HPV vaccine hesitancy.

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Currently, human papillomavirus (HPV) immunization data reflects a continued geographic disparity in immunization rates, with urban communities having higher rates than rural areas. This has led to reduced vaccination coverage in some countries and rural areas of the United States, especially those communities with anti-vaccine movements.[1,2] The HPV vaccine has been approved for over 10 years and, unfortunately, HPV vaccine series completion rates remain lower than expected, with national averages of 69.3% for girls and 57.8% for boys.[3] This lower than expected HPV vaccination coverage translates to over 79 million people currently infected with HPV and approximately 14 million new HPV infections annually in the United States.[4,5]

Even when the public believes vaccines are important for protection, many still have concerns about safety and this leads to vaccine hesitancy and lower HPV vaccine rates.[6,7] Studies conducted among parents with vaccine eligible children in the past 10 years have indicated that lack of a college education and conservative religious views lead to vaccine hesitancy.[8] It was noted in research as far back as 2007 that, among rural southern women in North Carolina, vaccine acceptability for their daughters was associated with their own beliefs about their own health care needs.[9] Five years later in a similar study conducted in rural Georgia, numerous vaccination barriers continued to impact HPV vaccine uptake in these communities, especially immigrant populations.[10] In 2016, The American Society of Clinical Oncology encouraged aggressive efforts to increase HPV vaccination to prevent cancer.[5] Since the HPV vaccine was approved in 2006, experts from the Centers for Disease Control and Prevention (CDC) report that HPV infection rates are increasing and as such, they support the expansion of HPV vaccination efforts.[11–13] Continuing to assess HPV vaccine acceptance and hesitancy in rural areas is crucial, as HPV infections are associated with 90%–93% of anal cancers, 12%–63% of oropharyngeal cancers, 36%–40% of penile cancers, 40%–64% of vaginal cancers, 96% of cervical cancers and 40%–51% of vulvar cancers.[14]

Rural Florida is characterized in particular by negative social determinants of health and both racial and economic disparities; as many as 26% of Black residents live below the Federal Poverty Level (FPL), while 17% of Hispanics and only 10% of white non-Hispanics live below the FPL. (2010).[15] White non-Hispanic households average an annual income of $84,000 while median annual family incomes for Blacks and Hispanics averages only $39,000 and $45,000, respectively. There are additional disparities in educational attainment, with 92% of non-Hispanic Whites possessing a high-school diploma or better, while only 73% of Hispanics and 72% of Blacks held a high-school diploma or better.

The rural south, including Florida, continues to have a disproportionately high rate of cervical cancer for women and Florida has the lowest HPV vaccine completion rate in the nation, 39.4%.[4,16] In rural Hendry and Glades counties, HPV vaccine series completion is almost nonexistent with providers often referring parents to department of health clinics for this vaccine series due to storage and vaccine cost issues.[17] These low HPV vaccine series completion rates are also attributed to provider recommendations as providers

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often omit or forget to recommend HPV vaccination to parents in rural areas.[18,19] Community leaders, healthcare providers and researchers noted HPV vaccination has been studied in rural Florida such as Hendry and Glades counties, also known as the "rural spine of the state," where the main industry is agriculture and historically there is a lack of resources and integration of healthcare services.[20,21]

The justification for this exploratory descriptive pilot study was based on data provided by the Florida Department of Health (DOH). According to Florida DOH reports, rural county HPV vaccine completion rates are very low, less than 20% in some counties, additionally, Florida has the lowest rate of HPV vaccine completion for either boys or girls in the nation.[19,22,23] The aim of this study was to assess the level of parental knowledge of HPV vaccination among parents in rural Florida. Results demonstrated a valuable understanding of knowledge and beliefs for HPV vaccination completion.

The methods and measures of this pilot exploratory study were subjected to appropriate Institutional Review Board (IRB) review and approval. After community engagement meetings and discussion with community leaders in 2016, a pilot study was proposed in these rural counties. Data collection took place during apparent event that focused on education and health services for elementary and middle school children.

The inclusion criteria consisted of parents/guardians at least 18 years of age, with children ages 9 to 13 that attended the local elementary or middle schools in Hendry and Glades County who spoke English or Spanish. Any parent or guardian not meeting the above criteria was excluded.

Participant recruitment for the research study was completed via recruitment letter presented to parents who met the inclusion criteria. The recruitment letter was provided in both English and Spanish. It explained the study's purpose, described the project, described the incentive (a $ 25 gift card to the local grocery store) and provided contact information as well as information about the IRB should parents have questions, comments or complaints. If parents/guardians were interested, they were invited to complete an anonymous survey in a private area with a trained research assistant available, who spoke both English and Spanish, to assist with question clarification or literacy issues as needed. All parents/guardians knew they could decline completion of the surveys at any time with no negative consequences. Once surveys were completed, a gift card was given to the parent/guardian. In addition, education on the HPV vaccine was shared with each parent along with locations of where the vaccine could be administered. This education was provided both orally and through a handout in both English and Spanish.

After the data collection was completed, each anonymous survey was reviewed to maintain data integrity, quality and clarity. A survey database was developed, utilizing SPSS statistical software with a confidential login on iPads.[24,25] These devices were password protected and kept in a locked cabinet accessible to the PI only.

This pilot exploratory descriptive study, which used demographic items, and the Parental HPV Vaccine Survey (PHPVS) were used in combination as the anonymous survey for the pilot study.[26] The PHPVS has been psychometrically validated with an overall Cronbach's alpha of 0.96 for all four subscales: perceived severity (six items), perceived vulnerability (five items), perceived benefits (eight items) and perceived barriers (six items).[26] This anonymous survey was used to gather data to describe correlates of HPV vaccination knowledge and acceptance versus hesitancy in rural Florida, specifically Hendry and Glades counties, which are part of the "rural spine of the state."

Vaccine acceptance/uptake was measured by one item, specifically whether or not the parent/guardian has vaccinated his or her child. This item was treated as the dependent variable in analysis. Other independent variables that were used in analysis were demographic items and items referring to perceived vulnerability, perceived susceptibility (knowledge, attitudes and beliefs), personal agency (self-efficacy), perceived barriers and perceived benefits (perceived norms). Cumulative higher summative scores on perceived vulnerability, perceived susceptibility (knowledge, attitudes, and beliefs), personal agency (self-efficacy), perceived barriers and perceived benefits (perceived norms) should indicate strong knowledge and perceived benefits of the HPV vaccine and subsequent vaccine uptake.[26]

All analysis were completed on the identified data using SPSS data software. A total of 123 completed surveys were collected and this included 133 completed PHPVS items without demographic information out of a sample of approximately 150 parents. All data was reviewed for missing values prior to analysis. Many parents are reluctant to complete demographic items in these rural isolated communities so while there is missing data on demographic items; all HPV survey item were completed. Nominal and ordinal level variables comprise the data set; therefore, chi-square analysis was used to describe between group differences.

Summary statistics were generated for each demographic variable for all participants by self -report that their child had been vaccinated (yes or no) (see Table 1). Comparisons of the "yes vaccinated" (YES) to "not vaccinated" (NO) group demographics were run using t-tests for parent's age and chi-square tests for categorical and ordinal data (parent's gender, race, religion, marital status, education level and income level – initial univariate comparisons) with parents with higher income and educational levels vaccinating their children at higher rates than other groups. In this data set, 89% of parents made less than 46,000 dollars annually, 36% were unemployed but 95% reported that their child saw a healthcare provider (physician or nurse practitioner) annually. Responses to the PHPVS demonstrated a general lack of knowledge about HPV vaccination (see Table 2). Demographic variables and response to question 16, "I understand exactly what the HPV Vaccine is for" were compared to evaluate HPV vaccine knowledge among demographic variables (see Table 3).

With this final data size (n = 123), chi-square tests were also used to compare the percentages of subjects relative to whether they said "yes" or "no" that they vaccinated their child. With respect to considering demographics and PHPVS items for inclusion in a final logistic regression model, items were identified if they yielded univariate significance tests with $p < .10$. Using logistic regression with variable selection, predictors of vaccination were noted to

Table 1. Demographic variables compared with child vaccination with HPV vaccine.

	All participants summary	Child vaccinated		
	n	Yes	No	Unsure
Parent gender				
Male	23	35%	26%	39%
Female	100	38%	36%	26%
Race				
Black/African American	12	50%	42%	8%
Hispanic	98	36%	37%	27%
White Non-Hispanic	11	36%	9%	55%
Other	2	50%	0%	50%
Religion				
Baptist	17	30%	35%	35%
Catholic	74	35%	35%	30%
Christian scientists	5	60%	0%	40%
Church of latter day saints	1	100%	0%	0%
Jewish	1	100%	0%	0%
Methodists	1	0%	100%	0%
Other	15	40%	33%	27%
Pentecostal	9	44%	44%	12%
Education				
Some high school	30	20%	53%	27%
High-school degree	49	48%	26%	26%
Some college	32	28%	31%	41%
Bachelor's degree	9	56%	33%	11%
Master's degree	3	100%	0%	0%
Income				
$15,000 or less	66	43%	33%	24%
$16,000 – $45,000	44	12	17	15
$46,000 – $60,000	8	50%	25%	25%
$61,000 – $80,000	1	0%	100%	0%
More than $80,000	4	50%	0%	50%
Health insurance				
Medicaid	38	37%	37%	26%
Medicare	3	67%	33%	0%
Private	38	34%	29%	37%
Unemployed	44	39%	36%	25%
Marital status				
Divorced	4	25%	50%	25%
Long-term relationship	25	60%	24%	16%
Married	61	36%	33%	31%
Single	33	24%	43%	33%

**Based on PHPVS Item 29. "I have vaccinated my child with the HPV Vaccine."*

be items associated with knowledge of HPV and positive attitudes and beliefs of vaccination (HPV vaccine acceptance). This model yielded an R value of .689 and an R Square of only .475 with an Adjusted R square of .332. These results were not statistically significant. But items focused on HPV vaccine knowledge and the initiation of HPV vaccination were not surprising. Unfortunately, less than 45% of parents/caregivers had vaccinated their child with the HPV vaccine and 80% of the participants had low or no knowledge of HPV vaccination. This data provided a foundation for discussion with health care providers, clinic staff and local health care leaders. The identified intervention points, increasing HPV vaccine knowledge for parents and providing access to the HPV vaccine, has led to renewed efforts on the part of all parties who participated in the study.

The overall methods were efficient and have been duplicated with success in other studies completed by the principal investigator across rural areas of the southeastern United States. The methods are cost effective when community engagement is done prior to study implementation. When data collection occurs it often requires less labour, facilitates analysis and yields timely results. Timely results can speed intervention development and a subsequent pilot

Table 2. Parental human papillomavirus survey responses.

Item	Response	*F*	%
1. Children should only get vaccinated for serious diseases			
	0	64	48.1
	1	11	8.3
	2	3	2.3
	3	10	7.5
	4	45	33.8
2. I am more likely to trust vaccinations that have been around awhile.			
	0	17	12.8
	1	10	7.5
	2	20	15
	3	16	12
	4	70	52.6
3. Vaccinations are getting better all the time because of research.			
	0	6	4.5
	1	1	0.8
	2	16	12
	3	25	18.8
	4	85	63.9
4. Healthy children do not need vaccinations.			
	0	82	61.7
	1	18	13.5
	2	8	6
	3	6	4.5
	4	19	14.3
5. HPV is a sexually transmitted disease.			
	0	24	18
	1	7	5.3
	2	25	18.5
	3	14	10.5
	4	62	46.6
6. Using condoms can prevent HPV.			
	0	23	17.3
	1	6	4.5
	2	39	29.3
	3	13	9.8
	4	52	39.1
7. Genital warts are caused by HPV.			
	0	22	16.5
	1	5	3.8
	2	52	39.1
	3	12	9.0
	4	42	31.6
8. People with HPV might not have symptoms.			
	0	14	10.5
	1	8	6.0
	2	54	40.6
	3	13	9.8
	4	44	33.1
9. HPV makes you unable to have children.			
	0	32	24.1
	1	14	10.5
	2	48	36.1
	3	13	9.8
	4	26	19.5
10. I worry that my child may get HPV.			
	0	22	16.5
	1	14	10.5
	2	24	18
	3	19	14.3
	4	54	40.6
11. HPV can cause cervical cancer.			
	0	11	8.3
	1	7	5.3
	2	37	27.8
	3	18	13.5
	4	59	44.4
12. Treatment for HPV is painful.			
	0	16	12
	1	7	5.3
	2	72	54.1
	3	7	5.3
	4	31	23.3
13. I am opposed to vaccination requirements because they go against freedom of choice.			
	0	61	45.9

(*Continued*)

Table 2. (Continued).

Item	Response	*F*	%
	1	20	15
	2	23	17.3
	3	9	6.8
	4	20	15
14. I am opposed to vaccination requirements because parents know what's best.			
	0	52	39.1
	1	16	12
	2	16	12
	3	10	7.5
	4	39	29.3
15. Required vaccinations protect children from getting disease from unvaccinated children.			
	0	14	10.5
	1	8	6.0
	2	19	14.3
	3	16	12
	4	76	57.1
16. I understand exactly what the HPV vaccine is for.			
	0	13	9.8
	1	5	3.8
	2	45	33.8
	3	19	14.3
	4	51	38.3
17. A vaccine against HPV could prevent future problems for my child.			
	0	8	6.0
	1	6	4.5
	2	39	29.3
	3	17	12.8
	4	63	47.4
18. Giving my child a new vaccine is like performing an experiment on them.			
	0	44	33.1
	1	16	12
	2	33	24.8
	3	12	9.0
	4	27	20.3
19. Most people I know think vaccinating children with the HPV vaccine before they are teenagers is a good idea.			
	0	20	15
	1	6	4.5
	2	34	25.6
	3	21	15.8
	4	52	39.1
20. A teenager should be able to get the HPV vaccination without a parent's consent.			
	0	51	38.3
	1	17	12.8
	2	19	14.3
	3	13	9.8
	4	33	24.8
21. Having genital warts makes it very difficult to find a sexual partner.			
	0	31	23.3
	1	11	8.3
	2	41	30.8
	3	15	11.3
	4	35	26.3
22. If this new HPV vaccine was available when my child was an infant, they would be vaccinated against HPV infection.			
	0	24	18
	1	5	3.8
	2	29	21.8
	3	17	12.8
	4	58	43.6
23. Shots are very painful for my child so I would rather not vaccinate him/her.			
	0	82	61.7
	1	21	15.8
	2	13	9.8
	3	6	4.5
	4	11	8.3
24. If the new HPV vaccine is not required, I will not vaccinate my child.			
	0	57	42.9
	1	17	12.8
	2	22	16.5
	3	11	8.3
	4	25	18.8
25. I understand that the HPV vaccine is very expensive so I will not vaccinate my child.			
	0	62	46.6
	1	17	12.8
	2	33	24.8
	3	5	3.8
	4	15	11.3
26. I would vaccinate my child if it were free or at a very low cost.			
	0	30	22.6
	1	10	7.5
	2	12	9.0
	3	13	9.8
	4	67	50.4
27. My child does not need this vaccine because he/she will not have sex, I will not vaccinate him/her.			
	0	76	57.1
	1	16	12
	2	20	15
	3	5	3.8
	4	16	12
28. Generally I do what my doctor recommends, so I will vaccinate my child.			
	0	14	10.5
	1	6	4.5
	2	8	6.0
	3	23	17.3
	4	81	60.9
29. I have vaccinated my child with the HPV vaccine.			
	0	41	30.3
	1	5	3.8
	2	35	26.8
	3	7	5.3
	4	45	33.8
30. My closest friends are vaccinating their daughters with the HPV vaccine.			
	0	23	17.3
	1	6	4.5
	2	60	45.1
	3	12	9.0
	4	31	23.3
31. When I make a decision to vaccinate my child my mind is made up.			
	0	14	10.5
	1	10	7.5
	2	25	18.5
	3	15	11.3
	4	68	51.1

0 = totally disagree; 1 = slightly disagree; 2 = unsure; 3 = slightly agree; 4 = agree; F = frequencies; % = percent.

of the interventions to increase HPV vaccination in rural areas. As this pilot study sample size is small, the research methods and study should be replicated to a larger sample.

Similar study results in rural areas with smaller sample sizes (n = 78) identified that in Hispanic communities both parents should be educated about the HPV vaccine.[27] Our pilot study included both parents and supports this finding, as fathers had lower HPV vaccine knowledge. In rural Appalachian Kentucky, in a sample of 495 of young women ages 18–26, peer support, endorsement by their father and provider recommendations were noted as predictors of HPV

Table 3. Demographic variables and parental knowledge on HPV vaccination responses.

	All participants summary	HPV vaccine knowledge		
	n	Yes	No	Unsure
Parent gender				
Male	23	57%	13%	30%
Female	100	50%	13%	37%
Race				
Black/African American	12	58%	8%	34%
Hispanic	98	51%	13%	36%
White Non-Hispanic	11	46%	18%	36%
Other	2	50%	0%	50%
Religion				
Baptist	17	53%	18%	29%
Catholic	74	54%	11%	35%
Christian scientists	5	80%	0%	20%
Church of latter day saints	1	100%	0%	0%
Jewish	1	0%	0%	100%
Methodists	1	0%	0%	100%
Other	15	27%	33%	40%
Pentecostal	9	56%	0%	44%
Education				
Some high school	30	43%	27%	30%
High-school degree	49	57%	10%	33%
Some college	32	50%	3%	47%
Bachelor's degree	9	45%	22%	33%
Master's degree	3	67%	0%	33%
Income				
$15,000 or Less	66	59%	15%	26%
$16,000 – $45,000	44	41%	14%	45%
$46,000 – $60,000	8	37%	0%	63%
$61,000 – $80,000	1	100%	0%	0%
More than $80,000	4	50%	0%	50%
Health insurance				
Medicaid	38	58%	8%	34%
Medicare	3	67%	0%	33%
Private	38	45%	5%	50%
Unemployed	44	50%	25%	25%
Marital status				
Divorced	4	50%	25%	25%
Long-term relationship	25	72%	12%	16%
Married	61	46%	11%	43%
Single	33	45%	15%	40%

**Based on PHPVS Item 16. "I understand exactly what the HPV vaccine is for."*

vaccine acceptance but there were interaction effects among clinic sites and not all of the participants were parents.[28] Adolescents in rural Appalachian Ohio were surveyed regarding HPV vaccination awareness, uptake and parent/provider communication; the results indicated that, despite a strong link between parent/provider, communication levels of HPV education remain low and the need for public health education programs targeting providers, parents and adolescents are needed.[29]

The findings from this small exploratory pilot descriptive study provides data that is consistent with other studies in rural areas as noted previously. In addition to this exploratory pilot study, low rates of HPV vaccine knowledge were identified in rural south Florida in these communities. In rural areas across the United States, HPV vaccination interventions must be refined based on pilot test data and then tested for efficacy and comparative effectiveness with rural populations. Inclusion of community leaders, healthcare providers and parents can assist with wider dissemination of the interventions and future adaptation in rural underserved areas.

This rural community-based study provides insight into levels of knowledge about the HPV vaccine and how many parents are vaccinating their children with the HPV vaccine. Community and healthcare leaders agreed that these factors must be contributing to HPV vaccine hesitation in these rural counties. The community has begun to address these low levels of knowledge and addressing these factors that contribute to hesitation should increase HPV vaccination and thereby decrease the enormous disease burden of HPV-related cancers for future rural populations where access to care is often limited and poverty persists.

Increasing HPV vaccination rates by using culturally specific public health education programs with input from parents and community leaders in rural areas could generate substantive changes in healthcare provider practice and health policy. In these rural areas, increasing levels of knowledge about HPV knowledge including transmission and understanding of how the HPV infection causes cancer is essential. These data from this pilot exploratory descriptive study support that these unique community focused approaches might indeed reduce the geographic disparities in HPV vaccination. Intervention development and implementation with community input into educational programs in Hendry and Glades counties has been welcomed. In the future, the methods used in this pilot could be easily be adapted to other research projects focused on childhood vaccination in rural areas and generate other culturally appropriate approaches based on data analysis and input from the local rural community. Understanding that each rural community has its own unique culture and a one-size fits all solution may not be appropriate in every community can lead to a better understanding of why HPV vaccine knowledge persists at low rates in these communities.

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No potential conflicts of interest were disclosed.

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