Demographic and High-Risk Behaviors associated with HPV and HPV Vaccine Awareness among Persons Aged 15-74 Years in Puerto Rico

Juan Carlos Reyes, EdD, MS*; Carola T. Sánchez-Díaz, MS*;
Guillermo Tortolero-Luna, MD†, PhD; Hector M. Colón, PhD‡;
Ana Patricia Ortiz, PhD, MPH*†

Objective: Studies of human papillomavirus (HPV) awareness in Puerto Rico (PR) are limited and are of interest given low HPV vaccine uptake in this population. This cross-sectional study aimed to determine factors associated to HPV and HPV vaccine awareness among persons aged 15-74 years living in Puerto Rico.

Methods: We analysed data from a sub-sample of 1,476 men and women who participated in a 2008 population-based island-wide household survey and who completed an HPV module. Multivariate logistic regression models were used to examine factors associated with HPV and HPV vaccine awareness.

Results: Overall, 37.2% of participants had heard about HPV and 33.4% had heard of the vaccine. Multivariate logistic regression showed that women were more likely to have heard of HPV (OR adjusted: 4.54; 95% CI=3.45, 5.98) or of the HPV vaccine (OR adjusted: 6.15; 95% CI=4.50, 8.40) as compared to men. HPV awareness was also lower among older adults, persons with lower income and with lower educational attainment, those without children and smokers (p<0.05).

Conclusion: In 2008, two years after the introduction of the first HPV vaccine in PR and the US, public awareness about HPV infection and the HPV vaccine was lower in Hispanics in PR as compared to other populations. Identified high-risk populations should be targeted in preventive care strategies. Future efforts should increase HPV knowledge and vaccine use in this population in order to maximize the impact of vaccination programs. [*P R Health Sci J 2015;34:195-200*]

Key words: HPV, HPV vaccine, Awareness, Puerto Rico

Human Papillomavirus (HPV) is one of the most common sexually transmitted infections (STI) (1). In 2006, the Food and Drug Administration (FDA) approved Gardasil, the first HPV vaccine in the United States (US) recommended for women. Currently, three HPV vaccines are available to protect against the most common HPV types associated with cancer, genital warts and respiratory papillomatosis (2). Cervarix is recommended for the prevention of cervical cancer in women, while Gardasil and Gardasil 9 are recommended for the prevention of cervical, vulvar and vaginal cancer in women, and also for the prevention of anal cancer and genital warts in both men and women. Both vaccines are highly effective at preventing HPV infections and the diseases caused by the HPV types they target. Despite the effectiveness and advantage of the vaccines, and their importance and implications for public health, as well as cancer prevention and control efforts (2), knowledge of HPV infection, available vaccines and of vaccine uptake continues to be low in men and women (3). In the US, HPV awareness and uptake has been showed to be particularly low among Hispanic women and among men in general (3). A study showed that Hispanic (56-60%) and non-Hispanic Black women (80%) are less aware than non-Hispanic White women (90%) of HPV infection and vaccination and also less likely to report having been vaccinated (4). Data for men are much more limited (5, 6), with recent studies showing low awareness in the US 2010 National Health Interview Survey (6) and in the 2013 National Cancer Institute's 2013 Health Information National Trends Survey (7).

In Puerto Rico (PR), published information on HPV awareness in men and women during the initiation of HPV vaccination on the island is inexistent, with more recent studies being performed

*Department of Biostatistics and Epidemiology, Graduate School of Public Health, University of Puerto Rico, Medical Sciences Campus, San Juan, PR; †Cancer Control and Population Sciences Program, University of Puerto Rico Comprehensive Cancer Center, San Juan, PR; ‡PR Center for Sociomedical Research and Evaluation, Graduate School of Public Health, University of Puerto Rico, Medical Sciences Campus, San Juan, PR

The authors have no conflict of interests to disclose.

Address correspondence to: Ana Patricia Ortiz, PhD, University of Puerto Rico Comprehensive Cancer Center, PMB 711, 89 De Diego Ave. Suite 105, San Juan, PR, 00927-6346. Email: ana.ortiz7@upr.edu

in men from STI clinics and among a population-based sample of women (8, 9, 10). These studies are of interest, as this population still has a low HPV vaccine uptake (20% of women and 13% of men aged 11-18 years had completed vaccination regimen in 2014) despite the legal mandatory healthcare-coverage of the vaccine (Law #255-September 2012). Given the relevance of understanding HPV awareness for the development of necessary prevention and control efforts, we aimed to describe the HPV and HPV vaccine awareness and their correlates among a population-based sub-sample of men and women in PR. This is a public health priority as the most recent report of the President's Cancer Panel (2) established the need for accelerating HPV vaccine uptake in the US. Even though these vaccines could dramatically reduce the incidence of HPV-associated cancers and other conditions among both females and males, the vaccine uptake has fallen short of target levels.

Methods

The parent study, entitled Puerto Rico Substance Abuse Needs Assessment Program 2008 Household Survey (PRSANA), was a cross-sectional household survey aimed to assess rehabilitation and mental health services among non- institutionalized adolescents and adults aged 15 to 74 years old, living in Puerto Rico. The study was approved by the Institutional Review Board of the Universidad Central del Caribe School of Medicine and was carried on during 2008. Multi-stage stratified cluster sampling was used to select subjects by considering Puerto Rico, using 8 strata composed of the 8 health regions defined by the *Administración de Servicios de Salud de Puerto Rico* (ASES) in 2007. Sampling methods for this project have been thoroughly discussed elsewhere (11). Subjects recruited were given a personal interview to collect demographic and other non-sensitive information and a self-administered electronic questionnaire for drug use and abuse, treatment use, perception of use/abuse problem, and opinion of existing services.

The interview protocol consisted of two questionnaires and a toxicology saliva sample. Respondents were offered $25 for their time and effort. Both questionnaires were administered with a pocket palm pc. Data was collected using the Computer-Assisted face-to-face interview and the Self-Administered Computer-Assisted interview that was conducted using QDS (Questionnaire Design System, Nova Research Co., Bethesda, Maryland). The first questionnaire was self-administered by the respondent with the use of audio computer-assisted self-interviewing (ACASI) to ensure privacy. It consisted of sensitive nature questions pertaining to the use of illicit drugs and alcohol. Less sensitive questions were administered using computer-assisted personal interviewing (CAPI) which includes demographic, physical and mental health, communicable diseases and tobacco use items. The interview protocol lasted, on average, 25 minutes. Participants completed the self-administered questionnaires on average in 10 minutes. The toxicology salivary sample was used to detect possible use of marihuana, morphine, cocaine, PCP and amphetamines (OraSure Technologies, Inc.).

For the current sub-study, an additional short survey on HPV was administered to study participants. Data for the sub-study was collected between May-October, 2008 (HPV vaccines only recommended for females during this time period) with a response rate of 77.6%. From 3,424 eligible participants, 3,180 consented to participate in the parent study (92.9% response rate). From them, 1478 (46.5%) participated during the last six months of data collection and were administered the HPV module (100% response rate). The age distribution, gender, education, income and health insurance status of the study sub-sample was statistically comparable to the parent study distribution (data not shown).

Within the HPV module, HPV and HPV vaccine awareness were assessed using the following questions: 1) 'Have you ever heard of HPV infection?' 2) 'Have you ever heard about the HPV vaccine or vaccine against cervical cancer?' Information collected included demographic characteristics, history of STI's and substance use. Drug use was validated by the parent study through saliva tests to detect the presence of cocaine, amphetamines, opiates, phencyclidine (PCP), or tetrahydrocannabinol (THC). Diagnoses of alcohol abuse/dependence were based on the definitions and criteria of the American Psychiatric Association's DSM-IV operated with a modified version of the World Health Organization's Composite International Diagnostic Interview.

Statistical analysis was performed using the frequency distributions that were used to describe the study sample. Bivariate analyses using chi-square tests of independence and multivariate logistic regression models were used to examine factors associated with HPV and HPV vaccine awareness. In the bivariate analysis, trend analysis was performed using the Mantel-Haenszel linear-by-linear association chi-square test. Factors significantly associated ($p<0.05$) to HPV and HPV vaccine awareness in bivariate analyses, were included in the respective multivariate logistic regression models. Interaction terms were evaluated within the models by including the product of the independent variable and the moderator as an additional predictor in the model. The logistic regression coefficients were estimated using maximum likelihood with the Newton–Raphson method. All the statistical analyses were performed using SPSS for Windows version 15 (SPSS Inc., Chicago, IL, USA).

Results

Overall 61.2% of participants were females, while almost half were aged ≤ 44 years. Meanwhile, 25.5% had < 12 years of education, 62.5% had an income <$20,000 and 8.3% lacked health insurance. Regarding HPV awareness, 37.2% of participants had ever heard of HPV infection and 33.4% had ever heard of the HPV vaccine (Table 1).

Among persons who were aware of HPV, 86.0% knew that HPV causes cervical cancer, 73.0% that it is sexually transmitted, 45.4% that it is not an uncommon infection, 84.2% that having multiple sexual partners increases the risk of infection and 55.4% that genital warts are caused by HPV (Figure 1); knowledge of these items did not vary between men and women (chi-square p-values>0.05, data not shown). Among the 147 female participants aged 15-26 years, 4 (2.7%) had been vaccinated against HPV; only one with the 3 doses. Among participants, 22.7% had daughters aged 9-26 years; of those, 10.8% had received at least one vaccine dose. Overall, 79.7% of women said that they would vaccinate if doctor recommended it, 61.4% said that they would definitely (38.8%)/probably (22.6%) vaccinate in the future and 89.0% of parents with daughters aged 9-26 years said that they would vaccinate them if their doctor recommended it (data not shown).

Table 1. Characteristics of study participants: PRSANA Study (2008) (n=1, 476)

	Frequency (n)	Percent (%)
Sex		
Male	573	38.8
Female	903	61.2
Age (years)		
15-24	215	14.6
25-44	535	36.2
45-64	509	34.5
65-74	217	14.7
Education (years)		
<12	376	25.5
12	533	36.1
>12	567	38.4
Annual household income (n=1364)		
<$20,000	915	62.5
$20,000-$40,000	433	29.6
≥$40,000	116	7.9
Health care coverage		
None	123	8.3
Private/Public	1353	91.7
Ever heard of HPV		
Yes	549	37.2
No	927	62.8
Ever heard of HPV vaccine		
Yes	493	33.4
No	983	66.6

In bivariate analyses, HPV and HPV vaccine awareness were higher among women, among younger cohorts, those with higher education and higher household income, non-smokers, persons who do not abuse/depend on alcohol and among persons with children(p<0.001) (Table 2). Moreover, significant trends were observed (p<0.0001), were HPV and HPV vaccine awareness decreased with increasing age, while awareness increased with higher educational attainment and higher household income. Meanwhile, multivariate logistic regression models showed that women were 4 to 6 times more likely to have heard of HPV infection (OR adjusted: 4.54, 95% CI=3.45-5.98) or about the HPV vaccine (OR adjusted: 6.15, 95% CI=4.50-8.40) as compared to men. Persons raising children were also more likely to have heard of HPV (OR adjusted: 1.31, 95% CI=0.99-1.73) and of the vaccine (OR adjusted: 1.44, 95% CI=1.08-1.92). Meanwhile, smokers (OR adjusted: 0.62, 95% CI=0.48-0.80) and persons with alcohol use/dependence (OR adjusted: 0.42, 95% CI=0.19-0.95) were less likely to have heard of the vaccine.

Discussion

This study describes for the first time HPV awareness in a Hispanic population in PR during 2008, 2 years after the introduction of the first HPV vaccine in females in this population. Overall, HPV awareness (overall: 37.2%; women:

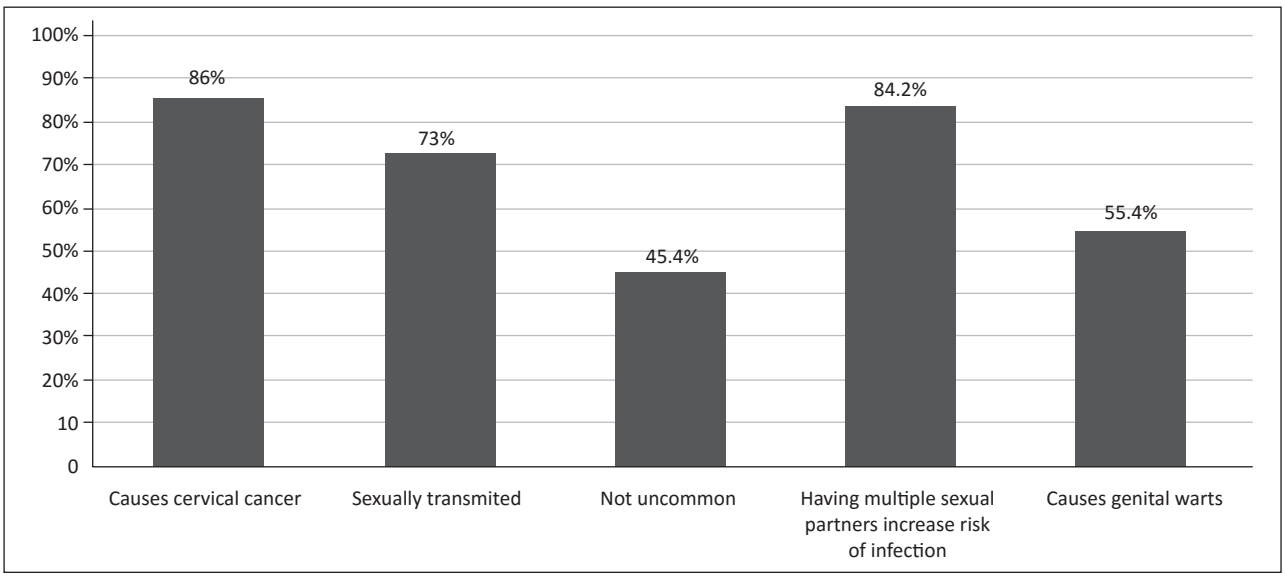

Figure 1. HPV knowledge among those aware of HPV (n=549)

Table 2. Factors associated to HPV and HPV vaccine awareness among persons aged 15-74 years: PRSANA Study (2008)

	Heard about HPV infection (n=1476*)			Heard of HPV vaccine (n=1474**)		
	n	(%)	p-value	n	(%)	p-value
Socio-demographics						
Gender			<0.0001			<0.0001
Males	101	17.6		77	13.5	
Females	448	49.6		416	46.1	
*Age (years)****			<0.0001			<0.0001
15-24 years	71	33.0		62	29.1	
25-44 years	257	48.0		236	44.0	
45-64 years	170	33.4		157	30.8	
65-74 years	51	23.5		38	17.6	
Marital status			0.99			0.15
Never married	118	37.0		94	29.6	
Married	284	37.1		271	35.5	
Divorced/separated/widowed	146	37.3		127	32.5	
*Education (years)****						
<12	92	24.5		68	18.1	
12	163	30.6		155	29.2	
>12	293	51.8	<0.001	269	47.5	<0.001
*Annual family income****			<0.0001			<0.0001
<$20,000	305	33.3		254	27.8	
$20,000-$40,000	172	39.7		158	36.5	
≥$40,000	68	58.6		76	65.0	
Children			<0.0001			<0.0001
No	306	31.8		266	27.7	
Yes	243	47.4		227	44.3	
Tobacco use (last year)						
No	361	45.4		328	41.2	
Yes	188	27.6	<0.0001	165	24.3	<0.0001
Alcohol abuse or dependence (last year)						
No	536	38.1	0.001	485	34.6	<0.0001
Yes	13	18.3		8	11.3	
Drug use (saliva test)						
Negative	519	37.4		471	34.0	
Positive	30	33.7	0.483	22	24.7	0.072
Health related characteristics						
History of STDs (self-reported)						
No	521	36.8		467	33.1	
Yes	28	45.2	0.185	26	41.9	0.148
Health care coverage						
None/public	41	33.3		33	26.8	
Private	508	37.5	0.355	460	34.0	0.104

P-values were obtained using chi-square test of independence. *Two persons excluded because they answered "don't know/refuse". ** Four persons excluded because they answered "don't know". *** P-value for trend <0.001.

49.6%, men: 17.9%) and of the vaccine (overall: 33.4%; women: 46.1%, men: 13.5%) was low among participants during this time period. Despite lower awareness among men, specific knowledge of HPV infection did not vary between men and women already aware of HPV. Meanwhile, vaccine uptake was extremely low among female participants aged 15-26 years of age (2.7%) and among daughters of participants within this age group (10.8%). High intent for vaccination was reported upon physician recommendation, highlighting the importance of physician involvement in patient education efforts. Thus, future studies are needed to evaluate the knowledge, attitudes and beliefs of health professionals with respect to HPV vaccination of girls and boys. This information is essential given that some studies have reported that participants prefer that providers take the lead in the health decision process (12). In addition, future studies are needed to determine the barriers for HPV vaccination among underserved populations.

Consistent with results for Latino US immigrants (13), limited knowledge existed in our population, particularly regarding the frequency of infection, its sexual transmission and its association to genital warts. When compared to studies performed in other populations during similar time periods, we can observe that HPV awareness in our study was lower than in another study among 1,334 Latino immigrants ≥ 21 years attending safety-net clinics (2007-2008) (48% aware of HPV) (3), lower to that reported among 534 Latina immigrants from Alabama (2007-2009) (where 47% were aware of HPV and 39% of the vaccine HPV) (14), than those for Hispanic women in the Health Interview National Trends Survey (69.5%) (2007), and lower than among callers to the National Cancer Institute's Cancer Information Service (2007) (63.8% aware of HPV) (15). Studies during this time period were limited in men, and to our knowledge none had been done in the US. In Denmark, a 2006-2007 population-based study showed that only 10% of males had heard of HPV (16), while 38.3% of men who had heard of HPV in an Australian 2007-2008 study (17). Consistent to ours and other studies (1, 13), both of these studies also showed lower awareness in men than women. It is important to highlight that these comparisons need to be made with caution, as differences in methodologies and target populations exist between ours and the previous studies described.

When comparing our results with more recent studies performed in PR, we see some evidence of improved HPV awareness, although optimal awareness has not yet been achieved in this population. A study done from 2009-2010 among men attending an STI clinic in San Juan, PR found that 53% of men attending this STI clinic had heard about HPV, although only 29% had adequate knowledge about it. Meanwhile, only 28% of these men knew about the HPV vaccine (8). In this study, men who had sex with men were more likely to have adequate knowledge about HPV. Meanwhile, comparison of our results for women with those of a recent population-based study also suggest some increases in HPV awareness, were from 2010-2013, 65% of women aged 16-64 years living in the San Juan metropolitan

Table 3. Adjusted magnitude of the association between HPV and HPV vaccine awareness among persons aged 15-74 years: PRSANA Study (2008)

	Heard about HPV $OR_{adjusted}$ (95% CI)*	Heard of vaccine $OR_{adjusted}$ (95% CI)*
Gender		
Women vs. Men	4.54 (3.45-5.98)*	6.15 (4.50-8.40)*
Age		
25-44 years vs. 15-24 years	1.24 (0.85-1.82)	1.16 (0.78-1.74)
45-64 years vs. 15-24 years	0.95 (0.65-1.37)	1.00 (0.67-1.48)
≥65 years vs. 15-24 years	0.63 (0.40-1.01)	0.55 (0.33-0.92)*
Education		
High school vs. less than high school	1.25 (0.90-1.73)	1.65 (1.16-2.35)*
More than high school vs. less than high school	2.65 (1.87-3.76)*	2.85 (1.96-4.15)*
Annual family income		
$20,000-$39,000 vs. <$20,000	1.01 (0.76-1.35)	1.18 (0.88-1.59)
≥$40,000 vs. <$20,000	2.22 (1.38-3.56)*	4.83 (2.91-8.00)*
Tobacco use (last year)		
Smokers vs. Non-smokers	0.60 (0.47-0.77)*	0.62 (0.48-0.80)*
Alcohol abuse/dependence (last year)		
Yes vs. No	0.67 (0.34-1.31)	0.42 (0.19-0.95)*
Currently raising children		
Yes vs. No	1.31 (0.99-1.73)	1.44 (1.08-1.92)*

OR=Odds ratio; CI=Confidence interval

area were aware of the HPV vaccine (10). As in our 2008 study, vaccine uptake was also extremely low in this population-based study (10), with only 4.7% of women within recommended vaccination ages (16-26) having been vaccinated, and only one (1.2%) having received the three doses.

Our study also found an association between increasing age and reduced HPV awareness, although higher knowledge was observed among adults aged 25-44 years, as compared to persons aged 15-24 years old. By contrast, other studies have found that HPV awareness is lowest in those < 25 years, who are the most likely to acquire HPV infection (18). Similar to previous reports (15), our data also showed lower awareness among those with lower education and annual household income, a result that highlights a health disparity. Our study also found persons raising children were more aware about HPV and the HPV vaccine than their counterparts; this is accordance with a Turkish study which found that women who have children were more aware about the virus and the vaccine, and close to two-thirds would accept the vaccines for their children (19). Because parental knowledge is an important predictor of HPV vaccination, educational efforts should be made to increase HPV and HPV vaccine knowledge and to promote programs that provide vaccines for children and adolescents, such as the Centers for Disease Control and Prevention Vaccines for Children Programs.

Consistent with a study among women (20), tobacco users were also less likely to know about HPV infection. We found similar results for HPV vaccine awareness. These results are of importance as tobacco use and smoking intensity are independent risk factor for HPV infection and smokers are more likely to develop HPV-related cancers (18). Lower HPV knowledge among smokers could be explained by the fact that they are less likely to seek health information (21). Finally, in our study, people who abuse of alcohol were also less aware of the HPV vaccine. This finding has important preventive implications because alcohol abuse is associated with increased risk for oral and pharyngeal cancer (1). Meanwhile, the lack of statistical association between history of STIs and HPV awareness in our study, which have been observed in other studies (22, 23), could be related to the fact that STIs were self-reported, and the possibility of information bias may be present for this variable.

Among study limitations, this study did not collect information on sexual practices or on HPV infection status, limiting our ability to correlate these variables with the outcomes of interest. In addition, being a cross-sectional study, it does not permit us to assess changes in HPV awareness and knowledge across time. Despite these limitations, we conclude that in 2008, two years after the introduction of the first HPV vaccine in PR and the US, public awareness about HPV infection and the HPV vaccine was lower in Hispanics in PR as compared to other populations. Awareness was particularly lower among men, older adults, persons with lower income and educational attainment, those without children and smokers. Our results provide insights into high-risk populations that should be targeted in educational and other preventive care strategies in PR and potentially other Hispanic populations. Meanwhile, comparisons of our results with more recent data for PR confirm the need for continued education efforts in this population. Further research is needed to evaluate the effectiveness of interventions to promote HPV awareness and complete vaccine uptake for Hispanics. Educational interventions should be evaluated and culturally adapted for PR, as public knowledge about HPV infection requires improvement. The Department of Health, schools, the media and health professionals are important communication channels that should be involved in these efforts.

Resumen

Objetivo: Estudios sobre conocimiento del virus del papiloma humano (VPH) son limitados en Puerto Rico (PR), y son de interés dada la baja cobertura de la vacuna contra el VPH en esta población. Este estudio transversal tuvo como objetivo determinar los factores asociados al conocimiento sobre el VPH y sobre la vacuna contra el VPH en personas de 15 a 74 años en PR. Métodos: Se analizaron los datos de una sub-muestra de 1,476 hombres y mujeres que participaron en una encuesta poblacional realizada en PR en el 2008. Modelos de regresión logística multivariados fueron usados para examinar factores asociados al conocimiento sobre el VPH y sobre la vacuna contra el VPH. Resultados: En total, el 37.2% de los

participantes había escuchado sobre el VPH y el 33.4% había escuchado sobre la vacuna. El análisis de regresión logística multivariado mostró que las mujeres tenían más probabilidad de haber escuchado del VPH (OR ajustado: 4.54; IC 95%= 3.45, 5.98) y de la vacuna contra el VPH (OR ajustado: 6.15, IC 95%= 4.50, 8.40), en comparación con los hombres. El conocimiento sobre VPH también fue menor entre los adultos mayores, las personas con ingresos más bajos y con menor nivel educativo, los que no tienen hijos y los fumadores ($p < 0.05$). Conclusión: En el 2008, dos años después de la introducción de la primera vacuna contra el VPH en PR, el conocimiento sobre el VPH y sobre su vacuna era menor en los Hispanos viviendo en PR en comparación a otras poblaciones. Los esfuerzos de intervención deben estar dirigidos a aumentar el conocimiento de VPH y la cobertura de la vacuna en esta población, con el fin de maximizar su impacto.

Acknowledgments

The Mental Health and Anti Addiction Services Administration (ASSMCA) supported this study.

References

1. Colón-López V, Ortiz AP, Palefsky J. Burden of human papilloma virus infection and related comorbidities in men: implications for research, disease prevention and health promotion among Hispanic men. P R Health Sci J 2010;29:232-240.
2. Accelerating HPV Vaccine Uptake: Urgency for Action to Prevent Cancer. A Report to the President of the United States from the President's Cancer Panel. Bethesda (MD): National Cancer Institute (US); 2014 Feb. 78p.
3. Mueller NT, Noone AM, Luta G, Wallington Sf, Huerta EE, Mandelblatt JS. Information channels associated with awareness of human papillomavirus infections and vaccination among Latino immigrants from safety net clinics. J Immigr Minor Health 2012;14:183-188. doi: 10.1007/s10903-011-9501-6.
4. Ford JL. Racial and ethnic disparities in human papillomavirus awareness and vaccination among young adult women. Public Health Nurs. 2011; 28:485-493. doi: 10.1111/j.1525-1446.2011.00958.x.
5. Gerend MA, Magloire ZF. Awareness knowledge and beliefs about human papillomavirus in a racially diverse sample of young adults. J Adolesc Health 2008;42:237-242. doi: 10.1016/j.jadohealth.2007.08.022.
6. Lu PJ, Williams WW, Li J et al. Human papillomavirus vaccine initiation and awareness: U.S. Young men in the 2010 National Health Interview Survey. Am J of Prev Med 2013;44:330-338. doi: 10.1016/j.amepre.2012.11.027.
7. Blake KD, Ottencache, AJ, Finney-Rutten LJ, Kobrin SC, Jacobson RM & Hesse BW. Predictors of human papillomavirus awareness and knowledge in 2013:gaps and opportunities for targeted communication strategies. AM J Prev Med 2015:48:402-410. Doi:10.1016/h.amepre.2014.10.024
8. Colón-López V, Del Toro-Mejias LM, Ortiz AP, Clatts MC, Tortolero-Luna G, Palefsky J. Awareness and willingness to HPV vaccination among high risk men of Hispanic origin attending a Sexually Transmitted Infection (STI) clinic. P R Health Sci J 2012;3:227-231.
9. Colón-López V, Ortiz AP, Del Toro-Mejias LM, García H, Clatts MC, Palefsky J. Awareness and knowledge of human papillomavirus (HPV) infection among high-risk men of Hispanic origin attending a sexually transmitted infection (STI) clinic. BMC Infect Dis 2012;12:346. doi: 10.1186/1471-2334-12-346.
10. Romaguera J, Caballero-Varona D, Marrero E, Pérez C, Palefsky JB, Ortiz AP. Factors associated with human papillomavirus vaccine awareness in a population-based sample of women in Puerto Rico. Obstet Gynecol. 2014;123:22S. doi: 10.1097/01.AOG.0000447281.57336.3b.
11. Administración de Servicios de Salud Mental y Contra la Adicción. (2009) Puerto Rico Substance Abuse Needs Assessment Program: 2008 Household Survey, Final Report. Hato Rey, Puerto Rico.
12. Thavarajah N, Chow E, Arocha J. Factors influencing parental decision making for the human papillomavirus (HPV) vaccine: A literature review. Int J Child Adoles Health 2015;8: 265-276.
13. Seal PS, Garcés-Palacio IC, Halanych JH, Scarinci IC. Sexual health knowledge of male and female Latino immigrants. J Immigr Minor Health 2012;14:673-681. doi: 10.1007/s10903-012-9576-8.
14. Drewry J, Garcés-Palacio IC, Scarinci I. Awareness and knowledge about human papillomavirus among Latina immigrants. Ethn Dis. 2010;20:327-333.
15. Kobetz E, Kornfeld J, Vanderpool RC et al. Knowledge of HPV among United States Hispanic women: opportunities and challenges for cancer prevention. J Health Commun 2010;15: 22-29.
16. Nielsen A, Munk C, Liaw KL, Kjaer SK. Awareness of human papillomavirus in 23000 Danish men from general male population. Eur J Cancer Prev 2009;18:236-239. doi: 10.1097/CEJ.0b013e3283240607.
17. Pitt MK, Heywood W, Ryall R et al.. Knowledge of human papillomavirus (HPV) and the HPV vaccine in a national sample of Australian men and women. Sex Health 2010;7:299-303. doi: 10.1071/SH09150.
18. IARC Monographs on the Evaluation of Carcinogenic Risks to Humans. Volume 100 B. A Review of Human Carcinogens: Biological Agents [Internet]. Lyon, France: International Agency for Research on Cancer; 2012 [cited 2014 Oct 10]. Available from IARC Monographs: http://monographs.iarc.fr/ENG/Monographs/vol100B/index.php
19. Dursun P, Altuntas B, Kuscu E, Ayhan A. Women's knowledge about human papillomavirus and their acceptance of HPV vaccine. Aust N Z J Obstet Gynaecol 2009;49:202-206. doi: 10.1111/j.1479-828-X.2009.00947.x.
20. Manhart LE, Burgess-Hull AJ, Fleming CB, Bailey JA, Haggerty KP, Catalano, RF. HPV vaccination among a community sample of young adult women. Vaccine 2011;29:5238-5244. doi: 10.1016/j.vaccine.2011.05.024.
21. Beaudoin CE, Hong T. Health information seeking, diet and physical activity: an empirical assessment by medium and critical demographics. Int J Med Inform 2011;80:586-595. doi: 10.1016/j.ijmedinf.2011.04.003..
22. Ghosh I, Ghosh P, Bharti AC, Mandal R, Biswas J, Basu P. Prevalence of Human Papillomavirus and Co-Existent Sexually Transmitted Infections among Female Sex Workers, Men having Sex with Men and Injectable Drug abusers from Eastern India. Asian Pac J of Cancer Prev 2012;13: 799-802. doi: 10.7314/APJCP.2012.13.3.799
23. Ahken S, Fleming N, Dumont, T, Black A. HPV Awareness in high risk young women: The need for a targeted catch-up Vaccination program. J Obstet Gynaecol Can 2015;37:122-128.