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Short communication

## Disparities in parental human papillomavirus (HPV) vaccine awareness and uptake among adolescents

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## ABSTRACT

Trends in HPV vaccine awareness among parents of adolescent girls and boys (ages 13–17) and HPV vaccine uptake ( $\geq 1$  dose) among girls (ages 13–17) were evaluated in Los Angeles County, California. Between 2007 and 2011, parental HPV vaccine awareness increased from 72% to 77% overall, with significant increases among mothers, Latinos, and respondents with daughters and Medi-Cal insured children. In 2011, parents who were male, older, less educated, Asian/Pacific Islander, and had sons remained significantly less likely to be aware. HPV vaccine initiation among daughters nearly doubled from 25% in 2007 to 48% in 2011, and girls who were older, uninsured, and had access-related barriers showed the largest improvements. In 2011, daughters who were younger and who had older and African American parents were at risk for low uptake. Thus, initiatives targeting male and younger adolescents, culturally-relevant information, and access to vaccination may help to reduce identified disparities.

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## 1. Introduction

The quadrivalent human papillomavirus (HPV) vaccine was licensed in the U.S. in 2006, and the bivalent and 9-valent formulations were approved in 2009 and 2014, respectively. These vaccines protect against 66–81% of cervical cancers and the majority of other HPV-associated cancers [1]. Mitigating disparities in incidence of HPV-associated cancers remains critical [2,3], particularly by ensuring equitable coverage among adolescents prior to HPV exposure. The Advisory Committee for Immunization Practices (ACIP) has recommended routine HPV vaccination at ages 11–12 for girls since 2006 and for boys since 2011, with catch-up vaccinations through age 26 for females and age 21 for males. In 2015, however, coverage rates for teenage girls and boys only reached 63% and 50%, respectively, in the U.S. and 67% and 59%, respectively, in California [4].

Prior studies have identified facilitators to adolescent HPV vaccination, including parent and adolescent race/ethnicity, parental awareness and knowledge, child age, health insurance status, health care utilization, and physician recommendation [5–7]. Many, however, included limited ethnic subpopulations or non-random samples, and few assessed correlates over time. To address this gap, we analyzed two cycles of a large, ethnically-diverse population survey in Los Angeles (LA) County, California, the most populous county in the U.S., with high rates of cervical cancer incidence and mortality [8]. In this article, we compared (1) HPV vaccine awareness among parents of adolescent girls and boys (ages 13–17) between 2007 and 2011 and (2) HPV vaccine uptake ( $\geq 1$  dose) among girls (ages 13–17) over this same period.

## 2. Materials and methods

## 2.1. Data source and study population

This study is nested in the Los Angeles County Health Survey (LACHS), a periodic, population-based telephone survey and focuses on the 2007 and 2011 child surveys. Methodology details are described elsewhere [9]. Briefly, a sample of LA County households was random digit dialed, and surveys were completed with the parent or primary caregiver (parent for brevity) of a selected

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child ages 0–17 in that household. Computer-assisted telephone interviews were conducted in six languages between April and December 2007 for the 2007 survey and between June 2010 and June 2011 for the 2011 survey. Overall sample sizes for 2007 and 2011 child surveys were 5728 and 6013, and response rates were 15% and 20%, respectively. We restricted analyses to parents with children ages 13–17, comparable to the National Immunization Survey – Teen, resulting in 1783 and 1864 respondents from 2007 and 2011, respectively.

## 2.2. Data measures

Primary outcomes included parental HPV vaccine awareness and adolescent HPV vaccine uptake. A statement about HPV and the cervical cancer vaccine or HPV shot (or Gardasil in the 2007 survey) for girls (and boys in the 2011 survey) introduced HPV survey questions. Awareness was measured with a question asking parents whether they had ever heard of a vaccine to prevent HPV and cervical cancer; awareness was defined as having heard of the vaccine. Aware parents with children ages 9–17 were then asked whether their children had received any HPV shots and how many. For unaware parents, we assumed their children received no shots. HPV vaccine uptake was defined as having received at least one shot. Other measures, informed by literature and prior work [10–12], included parental and child demographics and child's access to health care.

## 2.3. Statistical analysis

All statistical analyses employed weighted data to account for design effects. For unadjusted analyses, we examined 95% confidence intervals [CI] between years, and non-overlapping CIs were considered statistically significant ( $p < 0.05$ ). For adjusted analyses, we employed logistic regression, calculated adjusted odds ratios [aOR] and 95% CIs, and stratified analyses by parent gender. Because the vaccine was not approved for boys in 2007, vaccine uptake was modeled only among girls ( $n = 888$  in 2007 and  $n = 891$  in 2011). We evaluated statistical significance using the Wald test, and  $p$ -values were two-sided. All analyses were performed in SAS 9.3 (SAS Institute, Cary, NC).

## 3. Results

### 3.1. Study sample

Respondent characteristics in 2007 and 2011 were comparable (Table 1). The majority were ethnic minorities, foreign-born, and lower-income. Due to changes in respondent selection, proportionally more men were included in 2011. In both years, about half of respondents' children were female, half privately insured, and ages were equally distributed.

### 3.2. Parental HPV vaccine awareness

Overall, parental HPV vaccine awareness moderately increased from 72% in 2007 to 77% in 2011 (Table 2). Significant increases were observed among mothers, Latinos, and respondents with daughters or Medi-Cal insured children. Among mothers only, additional subgroups revealed increases, including those who were younger, less-educated, foreign-born, lower-income, mostly spoke Spanish, and whose children had greater health care access (data not shown).

In adjusted analyses, many subgroup differences were attenuated, including for lower household income, Latino and African American race/ethnicity, and other primary language (Table 2).

**Table 1**  
Sample characteristics ( $n = 3647$ ).

	2007	2011
	$n^a$ (Weighted % <sup>b</sup> )	$n^a$ (Weighted % <sup>b</sup> )
<b>Overall</b>	1783 (100)	1864 (100)
<b>Parent characteristics</b>		
<i>Gender</i>		
Female	1711 (96.3)	1363 (74.4)
Male	72 (3.7)	501 (25.6)
<i>Age group (years)</i>		
18–39	442 (26.0)	347 (29.7)
40–49	877 (50.1)	899 (47.4)
50 or over	452 (23.9)	609 (22.9)
<i>Race/ethnicity<sup>c</sup></i>		
White	503 (24.6)	598 (23.9)
Latino	924 (54.9)	896 (55.7)
African American	130 (11.0)	159 (10.4)
Asian/Pacific Islander	206 (9.6)	181 (10.1)
<i>Education</i>		
Less than high school	542 (32.2)	486 (29.8)
High school	299 (18.3)	308 (20.3)
Some college or trade school	410 (23.3)	388 (20.5)
College or post graduate	512 (26.2)	662 (29.3)
<i>Household income (% FPL)<sup>d</sup></i>		
0–99% FPL	619 (36.6)	435 (31.0)
100–199% FPL	394 (23.7)	424 (25.5)
200–299% FPL	205 (10.6)	218 (12.1)
300% or above FPL	565 (29.1)	787 (31.4)
<i>Primary language</i>		
English	1007 (56.6)	1130 (56.3)
Spanish	613 (37.7)	583 (37.4)
Other	118 (5.7)	124 (6.4)
<i>Country of birth</i>		
Foreign born	989 (56.9)	947 (55.7)
US born	784 (43.1)	906 (44.3)
<b>Child characteristics</b>		
<i>Gender</i>		
Female	888 (49.6)	891 (48.2)
Male	895 (50.4)	973 (51.8)
<i>Age (years)</i>		
13	315 (20.6)	295 (18.3)
14	352 (22.3)	338 (20.6)
15	356 (18.1)	366 (18.5)
16	407 (20.4)	429 (21.7)
17	353 (18.7)	436 (21.0)
<i>Insurance<sup>e</sup></i>		
Healthy Families/Healthy Kids	238 (13.1)	267 (16.2)
Medi-Cal	432 (26.2)	380 (28.1)
Private	932 (50.0)	1086 (48.4)
No insurance	166 (10.8)	113 (7.3)
<i>Difficulty accessing medical care</i>		
Yes	262 (16.6)	211 (14.1)
No	1471 (83.4)	1625 (85.9)
<i>Have regular source of care</i>		
Yes	1618 (90.5)	1770 (94.8)
No	161 (9.5)	90 (5.2)

Abbreviations: FPL, federal poverty level.

<sup>a</sup> Unweighted frequency; numbers might not add up to 1783 (2007) or 1864 (2011) due to missing data.

<sup>b</sup> Percentages were adjusted for sampling weights.

<sup>c</sup> Only Whites, Latinos, African Americans, and Asians/Pacific Islanders were included in the analysis.

<sup>d</sup> Based on U.S. Census Federal Poverty Level thresholds at the time of interview.

<sup>e</sup> Healthy Families/Healthy Kids are state/county children's health insurance programs. Medi-Cal is California's Medicaid program.

Lower awareness, however, remained associated with Asian/Pacific Islander and less-educated parents. Fathers also remained significantly less likely than mothers to report awareness, albeit to a lesser magnitude, while the disparity between parents with sons compared with daughters widened. Additionally, in 2011, younger versus older parents were more likely aware of the vaccine.

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