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HPV Vaccine Coverage across Hispanic/Latinx Subgroups in the United States

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Abstract

Purpose.—Research on HPV vaccine coverage in the United States has typically aggregated Hispanic/Latinx individuals into a single group for analyses, an approach that has potentially masked variation between Hispanic/Latinx subgroups. To address this limitation, we examined HPV vaccine coverage across Hispanic/Latinx subgroups.

Methods.—We analyzed data on Hispanic/Latinx adolescents ages 13–17 (n=16,335) from the 2012–2016 National Immunization Survey-Teen. Each adolescent was categorized into a subgroup: Mexican, Cuban, Puerto Rican, Central American, South American, other Spanish origin, or multi-subgroup. We examined HPV vaccine initiation (receipt of one or more doses) and

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Author contributions:

P.L. Reiter conceived of the study, performed data analysis, and wrote the initial manuscript draft. M.L. Pennell performed data analysis and provided direction for manuscript writing. G.A. Martinez, R.B. Perkins, and M.L. Katz assisted with conceptualizing the project and writing the manuscript. All authors helped to conceptualize ideas, interpret findings, and review drafts of the manuscript.

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Availability of data and material: Data from the National Immunization Survey-Teen (NIS-Teen) are publicly available, minus the restricted data accessed for this study.

Code availability: Analyses were conducted using SAS Version 9.4 (SAS Inc., Cary, NC). Statistical code may be available upon request.

Ethics approval: Data collection for the NIS-Teen was approved by the National Center for Health Statistics (NCHS) Research Ethics Review Board. Analysis of de-identified data from the survey is exempt from the federal regulations for the protection of human research participants. Analysis of restricted data through the NCHS Research Data Center is also approved by the NCHS Research Ethics Review Board. The Institutional Review Board at The Ohio State University determined our secondary data analysis was exempt from review.

Informed consent: The NIS-Teen obtained informed consent from all participants.

completion (receipt of three doses) for males and females separately. Analyses used weighted logistic regression.

Results.—Vaccine coverage among males was highest among Central Americans (initiation: 57.5%; completion: 31.1%) and lowest among multi-subgroup males (initiation: 46.3%; completion: 19.9%). Among females, initiation ranged from 63.4% among Cubans to 71.2% among Puerto Ricans, and completion ranged from 33.6% among multi-subgroup females to 48.7% among South Americans. Hispanic/Latinx subgroups were similar on these outcomes in regression models. However, within several subgroups, vaccine coverage was higher among adolescents whose parents' preferred language was Spanish (*i.e.*, potentially less acculturated) compared to those whose parents' preferred language was English.

Conclusions.—Modest variation in HPV vaccine coverage exists across Hispanic/Latinx subgroups, with differences found by preferred language within several subgroups. Findings provide insight into HPV vaccine coverage among Hispanic/Latinx subgroups and can help guide future surveillance efforts and vaccination interventions.

Keywords

Human papillomavirus; HPV vaccine; Hispanic/Latinx; Adolescent

Introduction

The Hispanic/Latinx population is the largest racial/ethnic minority population in the United States (US), currently constituting about 17% of the total population [1]. This estimate is projected to increase to about 29% by 2060, making Hispanic/Latinx individuals one of the fastest-growing populations in the country [1]. The Hispanic Paradox is an epidemiological finding that Hispanic/Latinx individuals in the US often have health outcomes similar to or better than non-Hispanic/Latinx whites [2]. Contrary to this paradox, Hispanic/Latinx individuals experience several disparities related to human papillomavirus (HPV) infection and HPV-related disease (e.g., cervical cancer). Hispanic/Latinx individuals have among the highest HPV infection rates, with over 40% of Hispanic/Latinx women and men having a current genital HPV infection [3–6]. Hispanic/Latinx women have the highest cervical cancer incidence rate of any racial/ethnic group in the US, with an incidence rate that is 35% higher than that for non-Hispanic/Latinx white women [7]. A similar pattern is seen for cervical cancer mortality, with Hispanic/Latinx women having a mortality rate that is 24% higher than that for non-Hispanic/Latinx white women [7].

Given these HPV-related disparities, Hispanic/Latinx individuals can benefit greatly from HPV vaccination. The Advisory Committee on Immunization Practices (ACIP) currently recommends routine HPV vaccination for both male and female adolescents ages 11–12 with catch-up vaccination for persons through age 26 who are not already vaccinated [8]. A recent update also now recommends adults ages 27–45 make shared decisions with their doctors about getting HPV vaccine [8]. The recommended HPV vaccine series consists of two doses if the series is started before turning age 15 and three doses if it is started after turning age 15 [9]. Prior to late 2016, the ACIP recommended three doses regardless of age when the vaccine series was started. Despite recommendations, recent national data show

that more than half of adolescents in the US are still not up to date with the HPV vaccine series [10]. Past studies have varied greatly in estimates of HPV vaccine coverage among Hispanic/Latinx adolescents [11–16], though recent surveillance data from the National Immunization Survey-Teen (NIS-Teen) have shown that coverage among Hispanic/Latinx adolescents is among the highest of any racial/ethnic group in the US [10, 17, 18].

A key and recurring limitation of past HPV vaccine research is that Hispanic/Latinx individuals have typically been aggregated and examined as a single, homogeneous group in analyses. Hispanic/Latinx individuals in the US are, in fact, a heterogeneous population that includes persons of Mexican, Cuban, Puerto Rican, Central American, South American, or other Spanish descent [19]. There are striking differences between these subgroups in terms of immigration histories, demographics, and health characteristics [19–23]. Cervical cancer incidence rates range from 10.8 cases per 100,000 women among Cubans up to 16.4 cases per 100,000 women among Mexicans [24]. Cancer screening behaviors, including cervical cancer screening, also vary across subgroups [20].

Hispanic/Latinx individuals have likely been aggregated in past HPV vaccine research due to lack of data on subgroup (which are often not collected) or small subgroup sample sizes. However, this aggregated approach has potentially masked important variation in HPV vaccine coverage between Hispanic/Latinx subgroups. In the current study, we analyzed data among a large, national sample of Hispanic/Latinx adolescents to examine potential differences in HPV vaccine coverage between Hispanic/Latinx subgroups.

Material and Methods

Study Design

We conducted a secondary analysis of data from the 2012–2016 NIS-Teen [18, 25–28]. The methodology of the NIS-Teen has been described in detail elsewhere [29] and briefly here. The NIS-Teen is an annual survey conducted by the Centers for Disease Control and Prevention (CDC) to monitor vaccination among 13–17 year-olds in the US. Data collection occurs in all 50 states, the District of Columbia, and selected territories. The CDC uses a complex stratified sampling strategy to obtain a national probability sample of adolescents ages 13–17 for the NIS-Teen. Recruitment involves a dual-frame approach with independent, random-digit-dialed (RDD) samples of landline and cellular telephones. For households containing more than one adolescent ages 13–17, one is randomly chosen as the index adolescent. Data collection has two steps: 1) a telephone survey with a parent of the index adolescent; and 2) a mailed survey to the adolescent's healthcare provider(s). Data from provider records are used to generate annual estimates of vaccine coverage among adolescents in the US [18, 25–28]. Data from the NIS-Teen are weighted to account for nonresponse in order to produce population-based estimates. The NIS-Teen obtained informed consent from all participants.

We analyzed data from the 2012–2016 NIS-Teen, which were the five most recent NIS-Teen data years available at the start of our study. We did not examine earlier data years since routine HPV vaccination was not recommended for males until late 2011 [30]. Household response rates for the 2012–2016 NIS-Teen ranged from 51% to 60% for landline

households and 24% to 31% for cellular households [18, 25–28]. Our analyses included data on 16,335 Hispanic/Latinx adolescents with provider-verified HPV vaccination data and information available on Hispanic/Latinx subgroup. We excluded non-Hispanic/Latinx adolescents from our analyses since our primary interest was to compare across Hispanic/Latinx subgroups and because recent reports of NIS-Teen data have consistently shown that Hispanic/Latinx adolescents, when aggregated, have among the highest HPV vaccine coverage of any racial/ethnic group in the US [10, 17, 18].

Data collection for the NIS-Teen was approved by the National Center for Health Statistics (NCHS) Research Ethics Review Board. Analysis of de-identified data from the survey is exempt from the federal regulations for the protection of human research participants. Analysis of restricted data through the NCHS Research Data Center is also approved by the NCHS Research Ethics Review Board. The Institutional Review Board at The Ohio State University determined our secondary data analysis was exempt from review.

Measures

HPV Vaccine Coverage.—We examined two dichotomous outcomes regarding HPV vaccine coverage (yes or no for each): 1) HPV vaccine initiation: receipt of at least one dose of HPV vaccine; and 2) HPV vaccine completion: receipt of three doses of HPV vaccine. We required three doses for HPV completion since the three-dose regimen was recommended during the data years included in our analyses (the two-dose regimen was not recommended until late 2016 [9]). All HPV vaccination outcomes were based on healthcare provider-verified vaccination records.

Hispanic/Latinx Subgroups.—The NIS-Teen established Hispanic/Latinx ethnicity by first asking parents whether or not adolescents were “Hispanic or Latino.” For parents who indicated their adolescents were “Hispanic or Latino,” the NIS-Teen then collected information about Hispanic/Latinx subgroup. Parents could indicate more than one subgroup, if applicable. Hispanic/Latinx adolescents were then categorized as Mexican, Cuban, Puerto Rican, Central American, South American, other Spanish descent, or multi-subgroup (*i.e.*, at least two of the other subgroups were indicated). These subgroups are similar to those included in recent reports of Hispanic/Latinx health [19, 20]. Data on Hispanic/Latinx subgroup were not available in the public use NIS-Teen datasets, so these restricted data were accessed through the NCHS Research Data Center.

Additional Variables.—The NIS-Teen collected data on several demographic and health-related characteristics of the adolescent, parent, and household (Table 1). If someone other than the adolescent’s mother completed the telephone survey, the person was asked to provide data on the mother’s age, education level, and marital status. We examined whether parents completed the NIS-Teen telephone survey in English or Spanish (*i.e.*, preferred language). Language preference is a commonly used proxy for acculturation that correlates with more sophisticated acculturation scales or is often a domain within such scales [31].

Data Analysis

Analyses applied NIS-Teen weights and accounted for its complex design, though frequencies are not weighted [32]. We first examined demographic and health-related characteristics across Hispanic/Latinx subgroups. We then used logistic regression to compare Hispanic/Latinx subgroups on HPV vaccine initiation and completion. Since HPV vaccine coverage is higher among female adolescents compared to male adolescents [18, 25–28], regression analyses were stratified by sex. For each outcome separately, we first constructed an unadjusted model that included only Hispanic/Latinx subgroup. We then constructed an adjusted model that controlled for year of data collection and demographic and health-related characteristics (*i.e.*, those variables included in Table 1). Logistic regression models produced odds ratios (ORs) and 95% confidence intervals (CIs).

Lastly, given the importance of acculturation to Hispanic/Latinx health behaviors and health outcomes [33], we used logistic regression models to examine the effect of preferred language on HPV vaccine coverage within each subgroup and if this effect differed across subgroups (*i.e.*, an interaction between preferred language and Hispanic/Latinx subgroup). In examining this interaction, we first constructed unadjusted models and then adjusted models that controlled for year of data collection and demographic and health-related characteristics. We performed analyses using SAS Version 9.4 (SAS Inc., Cary, NC), and all statistical tests were two-tailed.

Results

Participant Characteristics

About half of Hispanic/Latinx adolescents were male (51.0%) (Table 1). Most Hispanic/Latinx adolescents were ages 13–15 (62.7%), identified as white for their race (82.8%), and had some form of healthcare coverage (87.4%). In terms of Hispanic/Latinx subgroups, 63.8% of adolescents were Mexican ($n=10,337$), 1.8% were Cuban ($n=219$), 7.7% were Puerto Rican ($n=1,326$), 6.3% were Central American ($n=1,066$), 5.5% were South American ($n=823$), 11.1% were of other Spanish descent ($n=1,989$), and 3.7% were multi-subgroup ($n=575$). Most mothers of Hispanic/Latinx adolescents were at least 35 years old (86.6%), did not have a college degree (82.2%), and were married (60.0%). Almost half (46.3%) of parents completed the NIS-Teen telephone survey in Spanish. Table 1 shows these demographic and health-related characteristics across Hispanic/Latinx subgroups.

HPV Vaccine Coverage among Males

Just over half (52.6%) of Hispanic/Latinx adolescent males had initiated the HPV vaccine series, with 26.7% having completed the series. Among Hispanic/Latinx subgroups, vaccine initiation ranged from 46.3% among multi-subgroup males up to 57.5% among Central American males (Table 2). A similar pattern was seen for vaccine completion, with estimates ranging from 19.9% among multi-subgroup males up to 31.1% among Central American males. Vaccine initiation or completion were similar across Hispanic/Latinx subgroups in unadjusted and adjusted logistic regression models.

There was an interaction between Hispanic/Latinx subgroup and preferred language in adjusted models for both HPV vaccine initiation (interaction $p=0.004$) and completion (interaction $p=0.005$). In adjusted models, HPV vaccine initiation was higher among males whose parents completed the NIS-Teen telephone survey in Spanish compared to those whose parents completed the survey in English within the following subgroups (Table 3): Mexican (58.6% vs. 44.7%; OR=1.71, 95% CI: 1.26–2.30); Puerto Rican (75.2% vs. 47.6%; OR=4.37, 95% CI: 1.31–14.58); Central American (72.3% vs. 35.0%; OR=5.25, 95% CI: 2.16–12.77); other Spanish descent (72.6% vs. 42.8%; OR=3.85, 95% CI: 2.21–6.70); and multi-subgroup (66.3% vs. 39.9%; OR=4.29, 95% CI: 1.66–11.05). HPV vaccine completion was higher in adjusted models among males whose parents completed the NIS-Teen telephone survey in Spanish for the subgroups of Central American (43.6% vs. 12.2%; OR=5.66, 95% CI: 2.34–13.71) and other Spanish descent (41.9% vs. 18.9%; OR=2.91, 95% CI: 1.54–5.51).

HPV Vaccine Coverage among Females

Overall, 67.4% of Hispanic/Latinx adolescent females had initiated the HPV vaccine series and 43.9% had completed the series. Among Hispanic/Latinx subgroups, vaccine initiation ranged from 63.4% among Cuban females up to 71.2% among Puerto Rican females (Table 2). Vaccine completion ranged from 33.6% among multi-subgroup females up to 48.7% among South American females. Vaccine initiation or completion were similar across Hispanic/Latinx subgroups in unadjusted and adjusted logistic regression models.

There was an interaction between Hispanic/Latinx subgroup and preferred language in adjusted models for both HPV vaccine initiation (interaction $p=0.001$) and completion (interaction $p=0.03$). Both HPV vaccine initiation (77.2% vs. 57.0%; OR=2.91, 95% CI: 2.04–4.15) and completion (50.6% vs. 37.3%; OR=2.07, 95% CI: 1.52–2.81) were higher among Mexican females whose parents completed the NIS-Teen telephone survey in Spanish compared to those whose parents completed the survey in English in adjusted models (Table 4). A similar pattern was seen among females of other Spanish descent for both initiation (77.9% vs. 61.8%; OR=2.24, 95% CI: 1.27–3.96) and completion (54.2% vs. 37.4%; OR=2.22, 95% CI: 1.28–3.85).

Discussion

Past research examining HPV vaccine coverage has typically aggregated Hispanic/Latinx individuals into a single, homogeneous group for analyses [11–16]. As the Hispanic/Latinx population in the US continues to grow [1] so does the importance of examining potential differences in health behaviors and outcomes across Hispanic/Latinx subgroups. Results of our study suggest there is modest variation in HPV vaccine coverage across subgroups, with estimates ranging by about 10% for the outcomes examined. To our knowledge, these results provide the most comprehensive insight into HPV vaccine coverage across Hispanic/Latinx subgroups to date. We believe the lack of larger differences across subgroups is actually quite encouraging from a public health standpoint, as it suggests that no subgroups have fallen drastically behind in vaccine coverage since HPV vaccine first became available about

15 years ago. This includes the Hispanic/Latinx subgroups that have among the highest cervical cancer incidence rates in the US (e.g., Mexican and Puerto Rican women [24]).

We believe it is worth noting that the variation in HPV vaccine coverage across subgroups is similar to what has been found for other health behaviors across Hispanic/Latinx subgroups, including cancer screening behaviors (colorectal, cervical, and breast), smoking, alcohol consumption, and leisure-time physical activity [19, 20]. Interestingly, there were no discernable patterns in HPV vaccine coverage across subgroups (*i.e.*, the same subgroups consistently having among the highest or lowest vaccine coverage estimates). This contrasts with what has been found for cancer screening behaviors among Hispanic/Latinx women, where screening for several types of cancer is typically more common among Cuban and Puerto Rican women and less common among Mexican and Central/South American women [20].

For several subgroups, particularly among males, HPV vaccine coverage was higher among adolescents whose parents' preferred language was Spanish compared to those whose parents' preferred language was English. Evidence concerning acculturation and vaccination has been mixed, though multiple past studies have also found that less acculturation is associated with higher vaccine coverage and intent to vaccinate [13, 14, 34]. To the extent that a preference for Spanish is indicative of acculturation, our results confirmed these findings. We think this pattern may be attributable to a few factors. First, Spanish-speaking parents may be more likely to have children who are eligible for the Vaccines for Children (VFC) program [35]. The VFC program is a federal program that provides vaccines free of charge to children who might not otherwise be vaccinated because of an inability to pay [35]. Although we were not able to examine VFC eligibility directly, low socioeconomic status and a lack of health insurance are more common among Spanish-speaking Hispanic/Latinx individuals than those whose preferred language is English [36]. Both characteristics (*i.e.*, low socioeconomic status and lack of health insurance) would increase the likelihood that their children would be eligible for the VFC program. Second, Hispanic/Latinx parents whose preferred language is Spanish may be more likely to adhere to a healthcare provider recommendation to vaccinate their children against HPV. Indeed, past research has shown that adherence to healthcare provider recommendation for preventive care services (e.g., colorectal cancer screening) is greater among Hispanic/Latinx individuals with less acculturation [37].

Moving forward, we think our results have a few important implications. Data on Hispanic/Latinx subgroups are rarely collected and/or included in analyses and reports, and we believe it is critical that future research and surveillance efforts, including those for HPV vaccination, begin to collect and report such data. This will allow for future monitoring of vaccine coverage among Hispanic/Latinx subgroups and the identification of any emerging differences between them. A few of the subgroups in our analyses had modest sample sizes, and given the range of estimates found in the current study, it is possible that larger differences could emerge when additional data provide larger subgroup sample sizes. Further, given our findings concerning preferred language, future efforts should also begin to incorporate more sophisticated measures of acculturation. Although preferred language is a common proxy for acculturation, more complex acculturation scales exist (and often include

preferred language as a component [31]) and can likely better determine how this construct may be affecting HPV vaccine coverage. Such information could help inform the planning and development of HPV vaccination interventions for the Hispanic/Latinx population.

Our study had several key strengths, including a large sample of Hispanic/Latinx adolescents from throughout the US, HPV vaccination data that were based on healthcare provider-verified vaccination records, and the inclusion of data on Hispanic/Latinx subgroups. Study limitations included modest household response rates for the NIS-Teen data years included in analyses, though the weights generated for NIS-Teen data are adjusted for nonresponse. All data on adolescents' ethnicity and Hispanic/Latinx subgroup were based on parent-reported information. We were also not able to examine the other Spanish descent subgroup and multi-subgroup at a more granular level. This is due to the large number of response categories included in each subgroup (e.g., the large number of combinations of multiple subgroups indicated) and small sample size of each individual category. Future efforts with larger sample sizes are needed to better disentangle the heterogeneity within each of these subgroups. We also could not include additional factors (e.g., parents' health beliefs, rurality) that may be correlates of HPV vaccine coverage in our statistical models due to lack of data on these factors in the NIS-Teen datasets. Despite these limitations, we believe our study represents an important step forward in understanding HPV vaccine coverage among Hispanic/Latinx adolescents.

Current variation in HPV vaccine coverage among Hispanic/Latinx subgroups is modest for both males and females. Within several, but not all, of the subgroups, HPV vaccine coverage is actually higher among adolescents, particularly males, whose parents' preferred language is Spanish (*i.e.*, potentially less acculturated). Findings from this study provide early and important insight into HPV vaccine coverage among Hispanic/Latinx subgroups and have implications for future surveillance efforts and vaccination interventions.

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Table 1.

Characteristics of Hispanic/Latinx adolescents and their parents by Hispanic/Latinx subgroup

	All <i>n</i> =16,335 <i>n</i> (weighted %)	Mexican <i>n</i> =10,337 <i>n</i> (weighted %)	Cuban <i>n</i> =219 <i>n</i> (weighted %)	Puerto Rican <i>n</i> =1,326 <i>n</i> (weighted %)	Central American <i>n</i> =1,066 <i>n</i> (weighted %)	South American <i>n</i> =823 <i>n</i> (weighted %)	Other Spanish descent <i>n</i> =1,989 <i>n</i> (weighted %)	Multi- subgroup <i>n</i> =575 <i>n</i> (weighted %)
<i>Year</i>								
2012	2546 (19.4)	1589 (19.5)	46 (22.6)	212(17.3)	168 (17.7)	150 (18.6)	296 (19.2)	85 (25.5)
2013	2735 (19.7)	1677 (19.7)	36 (17.1)	260 (21.5)	187 (20.5)	167 (24.0)	304(17.8)	104(15.5)
2014	3251 (20.0)	2095 (20.5)	32(19.5)	263 (20.9)	215 (22.6)	164(17.2)	372(17.5)	110 (17.1)
2015	4599 (20.3)	3082 (20.4)	47(19.0)	297 (19.4)	274 (21.9)	180 (17.1)	562 (22.4)	147(17.3)
2016	3204 (20.6)	1894 (19.9)	58 (21.8)	294(21.0)	212(17.3)	162 (23.1)	455 (23.1)	129 (24.6)
<i>Adolescent characteristics</i>								
<i>Sex</i>								
Male	8492 (51.0)	5378 (51.1)	117(52.6)	712(52.5)	551 (52.3)	442 (47.9)	996 (53.0)	296 (42.7)
Female	7843 (49.0)	4959 (48.9)	102 (47.4)	614(47.5)	515 (47.7)	381 (52.1)	993 (47.0)	279 (57.3)
<i>Age</i>								
13 years	3627 (20.4)	2354(21.1)	47(15.2)	267(19.0)	248 (22.8)	163 (17.0)	431 (20.4)	117(16.4)
14 years	3500 (21.5)	2208 (21.8)	36 (17.9)	281 (18.2)	218 (25.1)	162(18.6)	454(21.3)	141 (23.1)
15 years	3231 (20.8)	2062(21.1)	47 (20.6)	245 (19.5)	212(21.9)	167 (21.6)	391 (19.9)	107(19.4)
16 years	3207 (19.8)	1980 (18.9)	53 (26.5)	274 (25.2)	214(17.1)	191 (23.7)	379 (17.2)	116 (26.6)
17 years	2770 (17.5)	1733 (17.2)	36 (19.8)	259(18.0)	174(13.0)	140 (19.1)	334(21.2)	94(14.5)
<i>Race</i>								
White	13688 (82.8)	9152(86.1)	183 (93.6)	870 (71.6)	848 (82.5)	688 (82.7)	1503 (72.6)	444 (74.5)
Black	946 (6.5)	329 (4.4)	20 (4.5)	224 (16.2)	76 (6.1)	49 (7.1)	187(11.2)	61 (11.2)
Other	1701 (10.7)	856 (9.5)	16 (1.9)	232 (12.2)	142(11.4)	86 (10.1)	299 (16.2)	70 (14.2)
<i>Visited healthcare provider in last year</i>								
No	3055 (21.8)	2093 (23.9)	15 (7.0)	181 (16.3)	218 (22.0)	124(15.3)	342 (21.5)	82(16.2)
Yes	13051 (78.2)	8092(76.1)	202 (93.0)	1128 (83.7)	831 (78.0)	697 (84.7)	1611 (78.5)	490 (83.8)
<i>Healthcare coverage</i>								
Through parent employer or union	6509 (36.4)	3672 (32.6)	130 (52.4)	654 (47.0)	436 (33.8)	484(52.1)	847 (39.8)	286 (41.8)
Other health insurance	7670 (51.0)	5076 (52.8)	78 (43.0)	618 (48.4)	436 (50.6)	246 (35.4)	969(51.9)	247(51.1)
No health insurance	1997(12.6)	1501 (14.6)	8 (4.7)	44 (4.6)	181 (15.6)	85 (12.5)	146 (8.3)	32 (7.1)
<i>Parent characteristics</i>								
<i>Mother's age</i>								
<35 years	2219 (13.4)	1490 (14.4)	19(11.4)	215 (13.7)	150 (14.1)	47 (9.6)	222 (10.2)	76 (12.3)
35–44 years	8151 (52.8)	5419(55.7)	78 (37.8)	637 (51.5)	490 (48.0)	313 (38.5)	946 (49.8)	268 (49.4)

	All <i>n</i> =16,335 <i>n</i> (weighted %)	Mexican <i>n</i> =10,337 <i>n</i> (weighted %)	Cuban <i>n</i> =219 <i>n</i> (weighted %)	Puerto Rican <i>n</i> =1,326 <i>n</i> (weighted %)	Central American <i>n</i> =1,066 <i>n</i> (weighted %)	South American <i>n</i> =823 <i>n</i> (weighted %)	Other Spanish descent <i>n</i> =1,989 <i>n</i> (weighted %)	Multi- subgroup <i>n</i> =575 <i>n</i> (weighted %)
45+ years	5965 (33.8)	3428 (29.9)	122(50.8)	474 (34.8)	426 (37.9)	463 (51.9)	821 (40.0)	231 (38.4)
Mother's education								
Less than high school	5599 (36.6)	4112(43.4)	24 (9.8)	209(14.0)	452 (40.7)	95 (13.6)	579 (31.1)	128 (25.6)
High school	3472 (26.2)	2343 (26.5)	34 (23.2)	296 (29.6)	160 (22.4)	148 (25.0)	382 (25.8)	109 (25.8)
Some college	3577 (19.3)	2113 (17.9)	39(16.5)	411 (26.2)	158 (13.1)	174 (22.5)	501 (21.7)	181 (29.7)
College graduate	3687 (17.8)	1769 (12.2)	122(50.4)	410 (30.3)	296 (23.8)	406 (39.0)	527 (21.4)	157(18.9)
Mother's marital status								
Not married	6045 (40.0)	3671 (38.0)	64 (37.4)	657(52.2)	397 (40.7)	206 (28.0)	817(47.1)	233 (44.0)
Married	10290 (60.0)	6666 (62.0)	155 (62.6)	669 (47.8)	669 (59.3)	617(72.0)	1172 (52.9)	342 (56.0)
Language of NIS-Teen interview								
English	9573 (53.7)	5419 (47.4)	177 (73.5)	1174 (86.2)	500 (42.6)	602 (66.4)	1253 (56.8)	448 (73.9)
Spanish	6762 (46.3)	4918 (52.6)	42 (26.5)	152(13.8)	566 (57.4)	221 (33.6)	736 (43.2)	127(26.1)
Provider recommendation to get child HPV vaccine								
No	6865 (45.7)	4509 (47.3)	80 (42.0)	466 (37.6)	477 (49.7)	317(41.0)	796 (42.6)	220 (46.4)
Yes	9144 (54.3)	5611 (52.7)	137 (58.0)	831 (62.4)	570 (50.3)	496 (59.0)	1152(57.4)	347 (53.6)
<i>Household characteristics</i>								
Poverty status								
Below or unknown poverty	7241 (48.6)	4988 (52.9)	51 (32.8)	479 (36.0)	488 (54.1)	181 (28.0)	857 (46.3)	197(38.5)
Above poverty	9094 (51.4)	5349(47.1)	168 (67.2)	847 (64.0)	578 (45.9)	642 (72.0)	1132(53.7)	378 (61.5)
Region of residence								
Northeast	2201 (12.6)	285 (2.7)	43 (9.5)	687 (47.4)	235 (22.3)	284 (30.0)	544 (29.4)	123 (18.2)
Midwest	2021 (9.9)	1434(11.1)	13 (2.2)	127 (9.6)	129 (9.4)	98 (8.0)	130 (5.3)	90 (11.6)
South	7431 (35.6)	5241 (34.8)	118 (75.8)	334 (32.3)	524 (38.9)	309 (39.5)	704 (33.1)	201 (31.8)
West	4682 (41.9)	3377 (51.3)	45 (12.5)	178 (10.7)	178 (29.5)	132 (22.6)	611 (32.2)	161 (38.5)

Note. Totals may not sum to stated sample size due to missing data. Percents may not sum to 100% due to rounding. Frequencies were not weighted. NIS-Teen = National Immunization Survey-Teen; HPV = human papillomavirus.

Table 2.

HPV vaccine coverage across Hispanic/Latinx subgroups

		HPV Vaccine Initiation		HPV Vaccine Completion		
	Weighted %	Unadjusted OR (95% CI)	Adjusted OR (95% CI)	Weighted %	Unadjusted OR (95% CI)	Adjusted OR (95% CI)
<i>Hispanic/Latinx Males</i>						
Mexican	52.1	ref.	ref.	26.8	ref.	ref.
Cuban	52.0	1.00 (0.55–1.82)	1.48 (0.75–2.93)	23.0	0.82 (0.38–1.73)	0.98 (0.45–2.13)
Puerto Rican	51.5	0.98 (0.73–1.31)	1.30 (0.89–1.89)	22.8	0.80 (0.55–1.18)	0.94 (0.57–1.55)
Central American	57.5	1.24 (0.86–1.79)	1.17 (0.75–1.83)	31.1	1.23 (0.83–1.83)	1.12 (0.71–1.77)
South American	50.6	0.94 (0.67–1.32)	1.22 (0.79–1.89)	25.3	0.93 (0.65–1.32)	1.00 (0.65–1.54)
Other Spanish descent	56.1	1.17 (0.88–1.57)	1.14 (0.83–1.55)	29.1	1.12 (0.83–1.52)	1.09 (0.76–1.57)
Multi-subgroup	46.3	0.79 (0.51–1.23)	0.93 (0.61–1.44)	19.9	0.68 (0.43–1.06)	0.73 (0.44–1.22)
<i>Hispanic/Latinx Females</i>						
Mexican	67.4	ref.	ref.	44.2	ref.	ref.
Cuban	63.4	0.84 (0.44–1.60)	1.03 (0.52–2.04)	42.8	0.95 (0.51–1.75)	1.13 (0.62–2.06)
Puerto Rican	71.2	1.19 (0.86–1.66)	1.18 (0.74–1.88)	45.2	1.05 (0.78–1.39)	0.91 (0.64–1.30)
Central American	66.2	0.95 (0.63–1.43)	1.00 (0.61–1.63)	42.5	0.94 (0.65–1.34)	1.00 (0.66–1.53)
South American	64.7	0.88 (0.58–1.35)	0.91 (0.57–1.45)	48.7	1.20 (0.79–1.82)	1.07 (0.69–1.65)
Other Spanish descent	68.5	1.05 (0.79–1.40)	1.11 (0.80–1.53)	44.4	1.01 (0.77–1.32)	0.95 (0.70–1.29)
Multi-subgroup	65.0	0.90 (0.50–1.59)	0.93 (0.54–1.62)	33.6	0.64 (0.39–1.05)	0.68 (0.41–1.12)

Note. Adjusted models controlled for year of data collection and all demographic and health characteristics reported in Table 1. ref.=referent group; HPV=human papillomavirus; OR=odds ratio; CI=confidence interval.

Table 3.

HPV vaccine coverage among males by parents' preferred language across Hispanic/Latinx subgroups

		HPV Vaccine Initiation		HPV Vaccine Completion		
	Weighted %	Unadjusted OR (95% CI)	Adjusted OR (95% CI)	Weighted %	Unadjusted OR (95% CI)	Adjusted OR (95% CI)
<i>Mexican</i>						
English	44.7	ref.	ref.	21.2	ref.	ref.
Spanish	58.6	1.75 (1.39–2.19)	1.71 (1.26–2.30)	31.7	1.73 (1.31–2.27)	1.49(1.06–2.11)
<i>Cuban</i>						
English	43.6	ref.	ref.	20.5	ref.	ref.
Spanish	80.9	5.48 (0.95–31.67)	4.18 (0.46–38.04)	31.5	1.78 (0.31–10.27)	1.46 (0.26–8.07)
<i>Puerto Rican</i>						
English	47.6	ref.	ref.	23.9	ref.	ref.
Spanish	75.2	3.34(1.52–7.35)	4.37(1.31–14.58)	16.0	0.61 (0.26–1.42)	0.59(0.21–1.64)
<i>Central American</i>						
English	35.0	ref.	ref.	12.2	ref.	ref.
Spanish	72.3	4.84 (2.46–9.55)	5.25 (2.16–12.77)	43.6	5.58(2.76–11.29)	5.66 (2.34–13.71)
<i>South American</i>						
English	49.5	ref.	ref.	26.7	ref.	ref.
Spanish	52.6	1.13(0.59–2.17)	1.00 (0.47–2.15)	22.8	0.81 (0.41–1.61)	0.86 (0.39–1.92)
<i>Other Spanish descent</i>						
English	42.8	ref.	ref.	18.9	ref.	ref.
Spanish	72.6	3.55 (2.11–5.97)	3.85 (2.21–6.70)	41.9	3.11 (1.82–5.30)	2.91 (1.54–5.51)
<i>Multi-subgroup</i>						
English	39.9	ref.	ref.	18.2	ref.	ref.
Spanish	66.3	2.96(1.15–7.60)	4.29 (1.66–11.05)	25.3	1.52 (0.61–3.81)	1.61 (0.50–5.24)

Note. Adjusted models controlled for year of data collection and all demographic and health characteristics reported in Table 1. ref.=referent group; HPV=human papillomavirus; OR=odds ratio; CI=confidence interval.

Table 4.

HPV vaccine coverage among females by parents' preferred language across Hispanic/Latinx subgroups

		HPV Vaccine Initiation		HPV Vaccine Completion		
	Weighted %	Unadjusted OR (95% CI)	Adjusted OR (95% CI)	Weighted %	Unadjusted OR (95% CI)	Adjusted OR (95% CI)
<i>Mexican</i>						
English	57.0	ref.	ref.	37.3	ref.	ref.
Spanish	77.2	2.56(1.97–3.32)	2.91 (2.04–4.15)	50.6	1.72 (1.34–2.22)	2.07(1.52–2.81)
<i>Cuban</i>						
English	60.0	ref.	ref.	41.3	ref.	ref.
Spanish	70.9	1.62 (0.31–8.47)	1.25 (0.25–6.46)	46.1	1.22 (0.28–5.37)	2.08 (0.49–8.82)
<i>Puerto Rican</i>						
English	71.2	ref.	ref.	45.0	ref.	ref.
Spanish	70.9	0.98 (0.29–3.37)	0.76 (0.19–3.05)	46.9	1.08 (0.45–2.57)	1.16 (0.49–2.75)
<i>Central American</i>						
English	60.8	ref.	ref.	43.0	ref.	ref.
Spanish	70.8	1.57 (0.72–3.40)	2.15 (0.86–5.40)	42.1	0.97 (0.49–1.89)	1.50 (0.68–3.32)
<i>South American</i>						
English	69.5	ref.	ref.	53.5	ref.	ref.
Spanish	54.7	0.53 (0.22–1.25)	0.49 (0.22–1.08)	38.6	0.55 (0.22–1.33)	0.54 (0.25–1.18)
<i>Other Spanish descent</i>						
English	61.8	ref.	ref.	37.4	ref.	ref.
Spanish	77.9	2.18 (1.29–3.68)	2.24(1.27–3.96)	54.2	1.98 (1.24–3.16)	2.22 (1.28–3.85)
<i>Multi-subgroup</i>						
English	62.5	ref.	ref.	35.1	ref.	ref.
Spanish	71.3	1.49 (0.45–4.92)	0.90 (0.32–2.53)	29.7	0.78 (0.28–2.16)	0.95 (0.33–2.69)

Note. Adjusted models controlled for year of data collection and all demographic and health characteristics reported in Table 1. ref.=referent group; HPV=human papillomavirus; OR=odds ratio; CI=confidence interval.