



Arab American Mothers' HPV Vaccination Knowledge and Beliefs

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Abstract

Little is known of Arab Americans' human papilloma virus vaccination (HPVV) behaviors. We explored associations between US Arab immigrant mothers' beliefs regarding HPVV for their children with socioeconomic, medical, and religious/cultural factors. A cross-sectional survey was conducted in New York City (August 2019–April 2021) with 162 Arab American immigrant women who had at least one child aged 9 through 26 years. Among those reporting that their child/children had not received the HPVV (63.5%), reasons included not having heard of it (67.3%) and lack of provider recommendation (59.4%). HPVV awareness and uptake, respectively, were more likely among those with education ≥ 10 years ($p < .001$ and $p < .001$, respectively), with more years in the US ($p < .001$ and $p < .001$), and with higher household income ($p < .001$ and $p = .002$). Participants with limited English proficiency were less likely to have HPVV awareness and uptake ($p < .001$ and $p < .001$). Christian religious affiliation was positively associated with HPVV awareness and uptake ($p = .014$ and $p = .048$). A greater number of years in the US was significantly associated with willingness to vaccinate if recommended by the doctor ($p = .031$). In open-ended responses, mothers indicated that they did not receive strong provider HPVV recommendations, potentially because of their providers' perceptions of their cultural backgrounds. Mothers indicated a desire for HPVV educational materials in Arabic to help them with decision making. Potential opportunities to augment HPVV uptake among Arab immigrants' children include increasing population knowledge, increasing provider recommendation, and providing culturally/religiously responsive HPVV education in English and Arabic.

Keywords HPV (Human papillomavirus) · Arabs · Vaccinations · Prevention · Immigration

Background

Arab immigrants are a growing U.S. minority, representing 1.2 million of the estimated 3.5 million Americans of Arab descent [1, 2]. The U.S. Arab American population has doubled since 1980, and New York State has one of the largest Arab American populations at 195,000 [1]. Arabs are labeled by the U.S. government as Caucasian/White, rendering them a hidden minority [3], and little is known of their human papilloma virus vaccination (HPVV) behaviors [3].

Abboud et al. note that Arab Americans are subject to structural violence from social, economic, and political forces that perpetuate social exclusion, stigma, and discrimination, contributing to health disparities [3]. It is important to gain insights into Arab Americans' health status and behaviors, and then to act on this knowledge.

Cervical cancer and cancers of the vulva, vagina, penis, anus, and oropharynx and genital warts are caused by the sexually transmitted HPV [4]. Vaccines that confer protection against several HPV types have been approved for U.S. use since 2006 [5]. An estimated 92% of cancers caused by HPV could be preventable with HPVV [6].

Although three-fourths of U.S. adolescents (aged 13–17 years) receive at least one HPVV dose, rates lag behind those of other adolescent vaccines, such as Tdap (90.1%, typically administered at 13 years) [7]. Barriers to HPVV for parents include lack of provider recommendation, lack of knowledge, and safety and necessity concerns

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[8]. Concerns about HPVV encouraging premarital sex affect about 10% of U.S. parents [8].

There is little evidence on vaccine uptake in general in the Arab American population. A California study found that Arab Americans are significantly less likely than non-Hispanic Whites to receive influenza vaccinations, and there is evidence of Arab American COVID-19 vaccine hesitancy [9, 10]. A systematic review found no articles on Arab American HPVV attitudes and behaviors [11].

Middle East and North African (MENA) region HPVV attitudes and availability may inform Arab American immigrant attitudes. Cervical cancer is a top cause of women's cancer-related death in the MENA region [12, 13], but conservative values and Muslim and Christian religious beliefs may influence HPVV uptake [14–16]. HPVV is not widely available in MENA countries, and national HPVV programs are rare [13], although an Abu Dhabi HPVV campaign (2007–2011) had 60% to 80% uptake among girls aged ≥ 15 years [16]. A systematic review found that HPVV introduction in MENA countries has been slowed primarily by a lack of political will based on cultural and religious sensitivities, and by limited financial resources, competition from higher-priority vaccines, poor adolescent vaccine delivery infrastructure, and a lack of reliable HPV incidence and mortality data [13].

More research is needed on the HPVV-related knowledge, beliefs, and behaviors of Arab American immigrants to implement effective interventions to improve vaccination rates, which are likely warranted.

Methods

The Arab Health Initiative (AHI), at Memorial Sloan Kettering Cancer Center, works with the NYC Arab American community to assess and overcome cultural, linguistic, and socioeconomic barriers to healthcare access with the goal of improving health outcomes [17–19]. The AHI collaborates with Arab-serving faith-based and community-based organizations (CBOs) to link individuals to needed health resources.

Design

This cross-sectional mixed methods study recruited individuals visiting faith-based organizations and CBOs that are in the AHI network. The survey was translated into Arabic by a certified translator, according to standard methodology [20]. The project received Institutional Review Board exemption, and written consent was waived.

Participant Recruitment

From August 2019 through April 2021, Arab American mothers, who are frequently the primary caretakers in Arab American families [21], were recruited using a convenience sampling method at mosques, churches, and CBOs in the New York City boroughs of Manhattan, Brooklyn, the Bronx, and Queens. During the COVID-19 pandemic, eligible participants were also identified through an AHI database for breast cancer programming and were recruited by phone. This reduced in-person contact and was a COVID-19 exposure mitigation measure.

Participants

Eligibility criteria for participation included: (1) immigrant women aged 21 through 65, (2) with at least one child aged 9 through 26 years (following HPVV age guidelines at study initiation), (3) identifies as Arab, (4) NYC resident, and (5) self-reports proficiency in English/Arabic.

Study Procedures

Trained study staff members approached community members, either in-person or virtually, for eligibility screening. The data usage policy and patients' right to withdraw at any point were explained. Eligible and interested individuals were informed of the study purpose and verbal consent was obtained to begin the questionnaire in their preferred language (Arabic/English). Upon questionnaire completion, study staff provided each participant with a Centers for Disease Control and Prevention HPVV educational brochure in Arabic/English, or they were provided the information orally by phone [22].

Survey and Measures

The survey collected sociodemographic information, including language, country of origin, years in the U.S., age, years of education, employment history, household size and income, followed by questions on HPVV knowledge and beliefs, and on provider vaccine recommendation practices. The survey contained a mix of closed and open-ended items, and participants were encouraged to expand upon their answers in their own words. A subset of participants responded to the free-response questions as these items were added to the survey after study initiation.

Quantitative Analyses

Descriptive statistics were summarized for categorical (frequency, percent) and continuous (mean, standard deviation) variables. Sociodemographic variables were coded categorically to enable Chi-Square test analyses (household income based on 2021 Federal Poverty Guidelines by household size). To examine associations between survey responses and sociodemographic variables, Chi-Square tests and Fisher's exact tests were used as appropriate. To account for potentially inflated type-I error due to multiple comparisons, we applied the Benjamini–Hochberg procedure with a 5% false discovery rate [23]. All statistical analyses were completed using R version 3.6.2.

Qualitative Analyses

Qualitative data were extracted from the free responses and analyzed using a thematic text analysis approach to categorize themes and subthemes to further describe participants' HPVV experiences, knowledge, and beliefs [24]. Two investigators coded the data independently using a mix of a priori codes and inductive codes generated from an initial review of the data. Coders utilized a constant comparison approach to ensure reliability in coding throughout the analyses. After data coding, the team met to reach consensus on primary themes. Final themes and subthemes were then organized in a joint display, comparing barriers identified in the quantitative data side-by-side with relevant qualitative data.

Results

Of 219 Arab immigrant women screened for eligibility, 162 were eligible, consented, and included in the analyses. Twenty-four were ineligible because they had no children, children aged > 26 years, or their children did not reside in NYC. Thirty-three were eligible but decided not to participate because they lacked interest ($n = 14$) or time ($n = 19$).

Participants' mean age was 46.1 years ($SD = 8.1$) (Table 1). Most (85.2%; $n = 138$) were married, and 33.8% ($n = 52$) had one child, 30.5% ($n = 47$) two, and 35.7% \geq three. Participants came from nine countries (Yemen [25.0%], Egypt [23.8%], Lebanon [9.4%], Morocco [9.4%], Syria [8.1%], Palestine [7.5%], Jordan [6.3%]). They were Muslim (64.2%; 17.2 years [$SD = 0.97$] average U.S. residence) and Christian (35.8%; 1.6 years [$SD = 9.5$] average U.S. residence). Half (49.4%; $n = 80$) were limited English Proficient (LEP): they reported speaking English less than "very well" [25]. Two-thirds (66.0%) preferred Arabic for healthcare (Muslims 70.2%, Christians 58.6%).

Years of education ranged from < 5 years (16.7%) to 5 to 9 years (16.7%), 10 to 15 years (37.7%), and \geq 16 years

(29%). Over half (56.3%) were never employed in the U.S. Household income was below 200% of the Federal Poverty Level for 41.6%. Nearly all (93.8%) reported having health insurance for themselves (11 insurance types, including Medicaid [19.1%; $n = 31$], Private [17.9%; $n = 29$], Health-first [15.4%; $n = 25$], Fidelis [12.3%; $n = 20$]); 22 (13.6%) did not know insurance type).

HPV and HPVV Awareness

Sixty-eight participants (43.0%) did not know the HPVV's purpose (Table 2). Most (63.5%) reported that their children had not received the HPVV; 5.7% did not know. Non-vaccination reasons included not having heard of the vaccine (67.3%), no provider recommendation (59.4%), believing the vaccine unnecessary (24.8%), and religion (18.8%) and culture (12.9%). After being told that HPV can cause cervical, anal, and penile cancer, and that the HPVV can prevent these cancers, 57.1% of participants agreed/strongly agreed that they did not have enough information to decide whether to vaccinate their children. Most (66%) said that they would vaccinate their children if recommended by their doctor. This was associated with years in the U.S. (100.0% of those with 2–5 years; 6–10 years, 88.9%; 11–20 years, 95.5%; > 20 years, 65.9%; $p < 0.031$) (Table 3).

HPVV awareness among mothers was associated with higher educational attainment (17.7% of those with < 10 years; \geq 10 years, 68.6%; $p < 0.001$), years in the U.S. (16.7% of those with 2–5 years; 6–10 years, 20.0%; 11–20 years, 52.4%; > 20 years, 72.1%; $p < 0.001$), higher household income (34.4% of those with < 200% of the federal poverty level [FPL]; 200%–399% FPL, 83.3%; > 400% FPL, 88.5%; $p < 0.0001$), LEP (74.0% of those without LEP, 30.4% with LEP; $p < 0.001$), and religious affiliation (66.7% of Christians, 43.4% of Muslims; $p = 0.014$).

Likelihood of HPVV uptake for their children was associated with mothers' years of education (8.7% of those with < 10 years, \geq 10 years, 43.3%; $p < 0.001$), time in the U.S. (12.5% of those with 2–5 years; 6–10 years, 9.5%; 11–20 years, 33.3%; > 20 years, 45.3%; $p < 0.001$), household income (15.6% of those with < 200% FPL; 200–399% FPL, 57.9%; > 400% FPL, 60.0%; $p < 0.0002$), LEP status (51.9% of those without LEP, 12.3% with LEP; $p < 0.001$), and religious affiliation (43.9% of Christians, 25.8% of Muslims; $p = 0.048$).

Qualitative Results

Themes

A cohort of 100 participants responded to the free-response questions. Qualitative analysis results are summarized and compared to quantitative results in a joint display (Table 4).

Table 1 Characteristics of the sample

Sample Characteristics	Overall, No. (%) (<i>N</i> = 162)	Christians, No. (%) (<i>N</i> = 58)	Muslims, No. (%) (<i>N</i> = 104)
Age, mean (SD)	46.1 (8.1)	47.3 (7.8)	45.4 (8.3)
Years of residence in U.S, mean (SD)	18.8 (9.9)	21.6 (9.5)	17.2 (9.7)
Years of education	N (%)	N (%)	N (%)
Less than 5	27 (16.7)	0 (0)	27 (26.0)
5 to 9	27 (16.7)	11 (19.0)	16 (15.4)
10 to 15	61 (37.7)	32 (55.2)	29 (27.9)
16 or more	47 (29.0)	15 (25.9)	32 (30.8)
Marital status			
Married	138 (85.2)	49 (84.5)	89 (85.6)
Divorced	14 (8.6)	5 (8.6)	9 (8.7)
Separated	2 (1.2)	1 (1.7)	1 (1.0)
Widowed	8 (4.9)	3 (5.2)	5 (4.8)
Number of children 9–27 years, (<i>n</i> = 154) ^a			
1	52 (33.8)	16 (28.6)	36 (36.7)
2	47 (30.5)	22 (39.3)	25 (25.5)
3	31 (20.1)	15 (26.8)	16 (16.3)
4+	24 (15.6)	3 (5.4)	21 (21.4)
Annual household income (<i>n</i> = 77) ^a			
< 200% FPL	32 (41.6)	13 (31.7)	19 (52.8)
200–399% FPL	19 (24.7)	11 (26.8)	8 (22.2)
≥ 400% FPL	26 (33.8)	17 (41.5)	9 (25.0)
Health insurance status			
Insured	152 (93.8)	52 (89.7)	100 (96.2)
Uninsured	10 (6.2)	6 (10.3)	4 (3.8)
Country of origin (<i>n</i> = 160) ^a			
Algeria	4 (2.5)	0 (0)	4 (3.9)
Egypt	38 (23.8)	19 (33.3)	19 (18.5)
Iraq	9 (5.6)	6 (10.5)	3 (2.9)
Jordan	10 (6.3)	6 (10.5)	4 (3.9)
Lebanon	15 (9.4)	11 (19.3)	4 (3.9)
Morocco	15 (9.4)	2 (3.5)	13 (12.6)
Palestine	12 (7.5)	3 (5.3)	9 (8.7)
Yemen	40 (25.0)	0 (0)	40 (38.8)
Syria	13 (8.1)	9 (15.8)	4 (3.9)
Other	4 (2.5)	1 (1.8)	3 (2.9)
Preferred language for healthcare			
Arabic	107 (66.0)	34 (58.6)	73 (70.2)
English	55 (34.0)	24 (41.4)	31 (29.8)
Limited English proficiency	80 (49.4)	30 (51.7)	50 (48.1)
Occupation (<i>n</i> = 160) ^a			
Personal care and service occupations	10 (6.3)	4 (6.9)	6 (5.9)
Sales and related occupations	10 (6.3)	6 (10.3)	4 (3.9)
Healthcare occupations	5 (3.1)	2 (3.5)	3 (2.9)
Educational instruction occupations	15 (9.4)	5 (8.6)	10 (9.8)
Other occupations	30 (18.5)	3 (5.2)	17 (16.7)
Never worked in the U.S	90 (56.3)	32 (55.2)	58 (56.9)

^aNumber of respondents for items containing missing data. *FPL* federal poverty line, *SD* standard deviation

Table 2 HPV vaccine awareness, uptake, and acceptability by religious affiliation

Survey items	Overall, No. (%) (<i>N</i> = 162)	Christians, No. (%) (<i>N</i> = 58)	Muslims, No. (%) (<i>N</i> = 104)
Have you heard of the HPV vaccine? (<i>n</i> = 160) ^a			
Yes	81 (50.6)	38 (65.5)	43 (42.2)
No	75 (46.9)	19 (32.8)	56 (54.9)
Don't know	4 (2.5)	1 (1.7)	3 (2.9)
What is the purpose of the HPV vaccine? (<i>n</i> = 158) ^a			
Prevents cervical cancer	45 (28.5)	12 (20.1)	33 (32.7)
Prevents genital warts	1 (0.6)	0 (0)	1 (1.0)
Prevents HPV	23 (14.6)	15 (26.3)	8 (7.9)
None of the above	2 (1.3)	1 (1.8)	1 (1.0)
All of the above	19 (12.0)	11 (19.3)	8 (7.9)
Don't know	68 (43.0)	18 (31.6)	50 (49.5)
Have your children been vaccinated? (<i>n</i> = 159) ^a			
Don't know	9 (5.7)	1 (1.7)	8 (7.9)
Yes	49 (30.8)	25 (43.1)	24 (23.8)
No	101 (63.5)	32 (55.2)	69 (68.3)
If not, why? ^a			
Have not heard of vaccine	68 (67.3)	18 (56.3)	50 (72.5)
Provider has not recommended the vaccine	60 (59.4)	21 (65.6)	39 (56.5)
Unnecessary for my child(ren)	25 (24.8)	12 (37.5)	13 (18.8)
Religious reasons	19 (18.8)	12 (37.5)	7 (10.2)
Cultural reasons	13 (12.9)	7 (21.9)	6 (8.7)
Difficulty accessing the vaccine	10 (9.9)	6 (18.8)	4 (5.8)
No time to complete the vaccine series	6 (5.9)	4 (12.5)	2 (2.9)
Do you think it is important for your children to receive the HPV vaccine? (<i>n</i> = 160) ^a			
Yes	73 (45.7)	22 (37.9)	51 (50.0)
No	30 (18.8)	17 (29.3)	13 (12.7)
Don't know	57 (35.6)	19 (32.8)	38 (37.3)
Perceived barriers to HPV vaccination, ^a (<i>n</i> = 160) ^a			
Amount of money it would take to get the vaccination	7 (4.3)	6 (10.3)	1 (1.0)
Amount of time it would take to get the vaccination	10 (6.3)	7 (12.1)	3 (2.9)
Feasibility of reaching the clinic	6 (3.7)	5 (8.6)	1 (1.0)
Vaccination would be uncomfortable for my child	72 (45.0)	32 (55.2)	40 (39.2)
Vaccination would make me anxious	69 (43.1)	33 (56.9)	36 (35.3)
Not have enough information to make a decision regarding vaccination	101 (63.1)	34 (58.6)	67 (65.7)
Other perceived barrier	11 (6.9)	7 (12.1)	4 (3.9)
If recommended by your doctor, would you vaccinate your children? (<i>n</i> = 100) ^b			
Yes	66 (66.0)	36 (66.7)	30 (65.2)
No	16 (16.0)	11 (20.4)	5 (10.9)
Don't know	18 (18.0)	7 (13.0)	11 (23.9)

^aCategories for this item are not mutually exclusive, participants were prompted to check all that apply, thus percentages may sum to over 100

^bRepresents a survey item collected from a subset of *n* = 100 participants. HPV Human Papilloma Virus

Knowledge and Awareness

Mothers with unvaccinated children reported lacking HPV knowledge (number of shots, vaccine purpose, eligibility). Some reported misinformation, most commonly that the HPV is only for girls (“the vaccine is only for

girls because HPV only affects girls”). Some attributed their lack of HPV awareness to its unavailability in Arab countries.

Table 3 HPV vaccine outcomes by education, years in U.S., household income, limited English proficiency, and religion

Demographic variables	Awareness of the HPV vaccine, No. (%)			Uptake of the HPV vaccine, No. (%)			Willingness to vaccinate if recommended by doctor ^a , No. (%)		
	Yes	No	<i>p</i>	Yes	No	<i>p</i>	Yes	No	<i>p</i>
Years of education (<i>n</i> = 156) ^a			<.001			<.001			.203
< 10 years	9 (17.7)	42 (82.3)		4 (8.7)	42 (91.3)		15 (93.8)	1 (6.2)	
≥ 10 years	72 (68.6)	33 (31.4)		45 (43.3)	59 (56.7)		51 (77.3)	15 (22.7)	
Years in the U.S. ^b			<.001			<.001			.031
2–5 years	3 (16.7)	15 (83.3)		2 (12.5)	14 (87.5)		5 (100)	0 (0)	
6–10 years	4 (20.0)	16 (80.0)		2 (9.5)	19 (90.5)		8 (88.9)	1 (11.1)	
11–20 years	22 (52.4)	20 (47.6)		14 (33.3)	28 (66.7)		21 (95.5)	1 (4.5)	
> 20 years	49 (72.1)	19 (27.9)		29 (45.3)	35 (54.7)		27 (65.9)	14 (34.1)	
Household income			<.001			.002			.194
< 200% FPL	11 (34.4)	21 (65.6)		5 (15.6)	27 (84.4)		16 (84.2)	3 (15.8)	
200–399% FPL	15 (83.3)	3 (16.7)		11 (57.9)	8 (42.1)		16 (94.1)	1 (5.9)	
≥ 400% FPL	23 (88.5)	3 (11.5)		15 (60.0)	10 (40.0)		17 (70.9)	7 (29.1)	
Limited English proficiency			<.001			<.001			.544
No	57 (74.0)	20 (26.0)		40 (51.9)	37 (48.1)		37 (84.1)	7 (15.9)	
Yes	24 (30.4)	55 (69.6)		9 (12.3)	64 (87.7)		29 (76.3)	9 (23.7)	
Religious affiliation			.014			.048			.486
Christianity	38 (66.7)	19 (33.3)		25 (43.9)	32 (56.1)		36 (76.6)	11 (23.4)	
Islam	43 (43.4)	56 (56.6)		24 (25.8)	69 (74.2)		30 (85.7)	5 (14.3)	

All missing data and responses of “don’t know” were excluded from analyses. A chi-square test or Fisher’s exact test was used to test each association, as appropriate. All *p* values have been adjusted for potentially inflated type I error due to multiple testing using the Benjamini–Hochberg procedure with a false discovery rate of 5%. Boldface indicates statistical significance (*p* < .05)

FPL federal poverty line, HPV Human Papilloma Virus

^aRepresents a survey item collected from a subset of *n* = 100 participants

^bNo respondents reported residing in the U.S. for < 2 years

Provider Recommendation

Participants commonly cited their child’s provider as the main influence on vaccination decisions and awareness. Many reported that their child was unvaccinated and/or they had never heard of the HPVV because their provider did not recommend it or weakly recommended it. One mother stated, “I didn’t get the impression from [provider] that it was important,” and said that her provider “didn’t push for it since she knows [my daughter is] not sexually active and understands our culture.” Some were not told that boys can receive the HPVV (“The doctor explained to me that it’s a vaccine to prevent cervical cancer, so I assumed it’s just for girls.”) Participants expressed significant concerns about the lack of HPV/HPVV education they received from providers, including modes and causes of HPV transmission, with one mother saying that, “The doctor never told me its purpose. I didn’t find out until later that it was to prevent sexually transmitted diseases. The doctor should have explained it better.”

Cultural and Religious Beliefs

Mothers who felt that the vaccine was unnecessary for their child largely cited religious and cultural reasons, such as “our religion doesn’t allow sex before marriage; therefore, I didn’t think it’s necessary” and “A lot of friends and people in the Arab Muslim community didn’t vaccinate their daughters. In our religion, you only have sex with your partner/husband; you don’t have a high chance of getting cervical cancer.” Culture also influenced several mothers’ HPVV decision making, with one explaining, “When [provider] told me that it prevents HPV, which comes from having sex, I thought it wasn’t appropriate or necessary for my kids given that they are not sexually active before marriage.” One participant mentioned HPVV uptake in her home country: “no one gets the HPVV there since sex before marriage is not something that is encouraged in our culture.”

Several participants suggested being influenced by other Arab mothers who disagree with HPVV receipt. One stated, “I found out from friends in our community that it is not

Table 4 Joint display of quantitative and qualitative results

HPV Barrier	Quantitative investigation	Qualitative investigation
Knowledge & Awareness	46.3% of participants had never heard of the HPVV, 42.0% did not know its purpose. 42.0% said their child did not receive the HPVV because they had not heard of the vaccine. Mothers with higher educational attainment (> 10 years) were more likely to express awareness of the HPVV (66.7% vs. 16.7%; $p < .001$), as were mothers reporting higher household incomes (< 200% federal poverty level [FPL]—34.4%; 200–299% FPL—78.9%; > 400% FPL—88.5%; $p < .0001$).	Participants had never heard of the vaccine, had received no or limited information from doctors, or had received misleading information/negative opinions from their social networks: “I have never heard of this vaccine.” “This vaccine is new to me because I only heard of it when I came to the U.S. I don’t really know much about it since my doctor never gave me information.” “No, the doctor in Egypt never recommended it for any of my kids and I have never heard of it.” “The doctor explained to me that it’s a vaccine to prevent cervical cancer so I assume it’s just for girls. That’s all the doctor told me at the time.” “The vaccine is only for girls because HPV only affects girls.” “My daughter was 12. She got the HPV vaccine along with many other vaccines [...] I didn’t find until later that it was to prevent sexually transmitted diseases. The doctor should have explained what it was.” “I found out from friends in our community that it is not advisable to give this vaccine to our daughters since it encourages them to have sex before marriage or have multiple partners.”
Provider Recommendation	37% of the mothers said that their provider did not recommend the HPVV for their child. 40.7% of mothers reported that if their provider recommended the HPVV, they would be willing to vaccinate their children. 57.1% of mothers reported that they did not have enough information about the vaccine to decide whether to vaccinate their children.	Some participants had not received a provider recommendation, felt that the recommendation was weak, or felt that their provider’s recommendation was influenced by perceptions of the mother’s culture: “Now we have an Arab doctor and he speaks Arabic. He has never mentioned this vaccine, but he has recommended other vaccines for my kids.” “No, my doctor never recommended the vaccine for my kids. I’ve never heard of this vaccine. My kids got many vaccines, but not the HPV vaccine.” “When I refused, the doctor didn’t really push for it either, at least not like the other vaccines. I didn’t get the impression from him that it was important for my kids.” “Our doctor had talked to me about it one time for my oldest daughter when she was 16, but she didn’t push for it since she knows she’s not sexually active and understands our culture.”
Cultural and Religious Beliefs	15.4% of the mothers felt that the vaccine was not necessary for their child. 19.8% of the mothers said that their religion or culture was a reason for their child not receiving the HPVV. Christian mothers were more likely than Muslim mothers to report awareness of the HPVV (65.5% vs. 41.3%; $p = .014$) and to have their children vaccinated (43.1% vs. 23.1%; $p = .048$).	Prohibitions based on cultural and religious practices and beliefs were reasons for not having HPVV: “I later was talking to some friends and they told me it was for kids that are sexually active. I was upset that my daughter was vaccinated since it was not necessary for her. I didn’t let my other kids get the vaccine. We are Arab so we don’t have sex before marriage or date.” “We are from Jordan and no one gets the HPV vaccine there since sex before marriage is not something that is encouraged in our culture. I don’t see any benefits to getting the HPV vaccine since my kids don’t have to worry about getting any sexually transmitted diseases.” “Our religion doesn’t allow sex before marriage; therefore, I didn’t think it’s necessary for my kids.” “A lot of friends and people in the Arab Muslim community didn’t vaccinate their daughters. In our religion, you only have sex with your partner/husband, you don’t have a high chance of getting cervical cancer.”
Language	49.4% of the mothers were limited English proficient. The mothers with limited English proficiency were less likely than English proficient mothers to be aware of HPVV (30% vs. 69.5%; $p < .001$) or to have had their child vaccinated (11.2% vs. 48.8%; $p < .001$).	Language was perceived as a barrier to effective HPVV communication: “I have a hard time communicating with the doctor because she doesn’t speak Arabic, so I also might be mistaken. My kids help translate.” “We were first seeing an American doctor who didn’t speak English, so I may have not understood him.” “The doctor only spoke English, so I didn’t understand very well. He may have recommended it, and I never understood.”

advisable to give this vaccine to our daughters since it encourages them to have sex before marriage or have multiple partners.”

Language

Mothers mentioned that language was a barrier to effective HPV/HPVV communication, with one mother saying, “I don’t understand English, so the doctor may have recommended [HPV], and I just didn’t understand.” Several mothers stated that they relied on their children to interpret at doctor appointments, so they were not certain whether the doctor had recommended HPVV.

Discussion

In this sample of 162 NYC Arab American immigrant mothers with vaccine-eligible children, HPVV awareness was low and provider recommendation lacking. Less than one-third reported that their child/children aged 9 through 26 years had received the HPVV. Factors related to HPVV awareness and uptake included mother’s level of education, U.S. length of residence, English proficiency, household income, and religious affiliation. Most participants indicated willingness to vaccinate their child/children if their doctor recommended it.

Participants most commonly reported never having heard of the vaccine as a reason for their child not receiving the vaccine, few knew its purpose, and the most common perceived barrier to vaccination was not having enough information to make a decision, suggesting a lack of HPVV knowledge and awareness in the study population. Mothers mentioned that they had never heard of the HPVV because of its lack of availability in Arab countries. Recent MENA studies have found women’s HPVV knowledge and awareness to be “poor” [26, 27]. In a qualitative study among Arab, mostly immigrant, parents of vaccine-eligible children in Sydney, Australia, not having enough information to make a decision was also an HPVV barrier [28]. Our findings suggest that, although the HPVV has been approved for over fifteen years, information about it has not been disseminated sufficiently through the NYC Arab immigrant parent population.

Studies in the general population have found that strong provider recommendation is a facilitator of HPVV uptake [8]. In our study, lack of provider recommendation was the second most common reason for children not having received the HPVV (after not having heard of it). Several participants also reported receiving weak recommendations, which some attributed to their providers’ beliefs about Arab culture. Providers’ preconceptions of their patients’ cultural attitudes have been found to affect HPVV recommendation

practices in studies in other U.S. populations [29]. Most of the mothers in our survey were willing to vaccinate their children if their provider recommended it. These findings suggest a potential missed opportunity for vaccine uptake among Arab American immigrant mothers who may lack a strong provider recommendation.

Cultural and religious HPVV barriers were evident in this population. In our qualitative data, Christian and Muslim participants often attributed this to cultural and religious prohibitions on sex before marriage. Misinformation and negative opinions from people in their social networks and religious and cultural beliefs around promiscuity, sex, and STIs were also perceived as HPVV barriers. Arab participants in the Australian study felt that religion played an integral role in their HPVV decision making [28]. In our study, HPVV awareness and uptake were significantly associated with participants’ religious affiliation (Islam or Christianity). Greater proportions of Christian than Muslim mothers reported having heard of the HPVV, knowing its purpose, and having vaccinated their children. This could be, in part, because Christian women more frequently preferred English to Arabic in the healthcare setting and may have had more access to language-concordant HPVV information than Muslim mothers. Among mothers whose child/children had not received HPVV, Christians more frequently reported religious/cultural reasons for this than Muslim mothers. Conservative religious beliefs are found in both Christian and Muslim Arab communities and culturally tailored messaging is needed for both.

Significantly higher proportions of LEP than non-LEP study participants were unaware of the HPVV and had children who had not received it. Mothers felt that language discordance was a barrier to HPV/HPVV communication with the provider, including the possibility that the message was lost when a child interpreted the encounter. Similar issues were detected among Arab immigrant parents in Australia [28]. Providers need Arabic language educational materials to distribute to Arabic-speaking parents and ready access to professional medical interpretation services.

This study had some limitations. We used maternal report of their children’s HPVV status, potentially limiting data reliability, and we did not collect information on children’s gender, precluding an investigation of HPVV by child’s gender. Also, we did not assess acculturation and whether it affected HPVV decision making. Only a subset of participants were asked the free-response questions. Additionally, the sampling method changed after 73 participants from in-person to phone recruitment secondary to the pandemic. Those contacted by phone took part in a breast cancer screening and prevention program [18], potentially biasing the sample. The study was a convenience sample, and was conducted in NYC and may not be generalizable to other U.S. Arab populations whose demographic profiles vary.

Conclusions

This study is unique in identifying factors associated with HPVV awareness and uptake in the NYC Arab American immigrant community and could inform interventions. A U.S. study recommended focusing parent-provider discussions on HPVV knowledge, safety, and necessity [8]. Media messaging in the Abu Dhabi government's HPVV campaign focused on scientific evidence about cervical cancer and HPVV efficacy [14]. However, knowing HPV's mode of transmission is important to Arab immigrant parents [28]. Upon survey completion, we provided a 10-min tailored HPVV information session in English or Arabic to participants [22]. Afterwards, most mothers expressed openness to obtaining the HPVV or to discussing it with their provider. Culturally tailored messaging that emphasizes scientific evidence and that also includes HPV's mode of transmission, in English and Arabic, should be investigated.

Our findings indicate three compelling opportunities to address potentially low rates of HPVV among children of Arab American immigrant parents: (1) Increase population knowledge about HPVV's purpose and efficacy, through culturally responsive English/Arabic education. (2) Activate the population to seek the HPVV for eligible children through navigation services and HPVV information dissemination in settings where Arab immigrant parents congregate, such as CBOs. (3) Train providers to make strong HPVV recommendations with culturally tailored messaging, using tailored English/Arabic educational resources and ensuring language access services availability. Linguistically and culturally tailored interventions could help to increase protection of Arab Americans from preventable HPV-related cancers.

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Data Availability Data are available upon request. Please contact the last author.

Code Availability Not applicable.

Declarations

Conflict of Interest To the best of our knowledge, no conflict of interest, financial or other, exists for any of the authors.

Ethical Approval The project received Memorial Sloan Kettering Cancer Center Institutional Review Board exemption, and written consent was waived.

Consent to Participate The data usage policy and patients' right to withdraw at any point were explained to all potential participants. Eligible and interested individuals were informed of the study purpose and verbal consent was obtained to begin the questionnaire in their preferred language (Arabic/English).

Consent for Publication Not applicable.

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