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HPV Vaccination of Children Among Motherse of Mexican Origin

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PREDICTING HPV VACCINATION OF CHILDREN AMONG MOTHERS OF MEXICAN
ORIGIN

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Abstract

Background. The Human Papillomavirus (HPV) is a causative agent for the development of cancer which is a public health concern worldwide. In the United States (US), the highest incidence of cervical cancer is among Hispanics/Latinos. Although Hispanics/Latinos show the highest utilization rate of HPV vaccine, in general, the vaccination rates are still behind the Healthy People 2020 goal of 80%. The knowledge about this virus has been found low or non-existent among most populations in the US, especially among minorities and populations with lower education and socioeconomic status. The knowledge and beliefs of Hispanic/Latin mothers about HPV and HPV vaccination are important for preventing the virus among adolescents. However, studies have shown a low knowledge of HPV and HPV vaccination among mothers of Hispanic/Latin origin.

Aims. This research project aimed to assess the HPV vaccination knowledge, awareness and beliefs of mothers of Mexican origin living in the Midwest of the US who have adolescent children in the 9-18 years age range regardless of gender.

Methods. A cross-sectional study was conducted among 100 mothers of Mexican origin living in Nebraska and neighboring states. Based on questionnaires used in previous studies, using structured questions a bilingual 76-item survey was developed for this study. Prospective participants were identified, and verbal consent was obtained before administering the survey. For the statistical analysis, the Statistical Package for the Social Sciences (SPSS) version 23.0 was used. General descriptive statistics, contingency tables using Pearson Chi-squared test and a logistic regression model (LRM) were utilized.

Results. A total of 100 adult mothers of Mexican origin that were present in the Mexican Consulate between May and July of 2017 were recruited for the study. This was made possible by the partnership of the University of Nebraska Medical Center with OneWorld Community Health Centers and the Mexican Consulate in Omaha. From total mothers interviewed, only 36% of them indicated that their oldest adolescent in the desired age range had at least one dose of the HPV vaccine series. The knowledge about HPV and HPV vaccination was found mostly poor among participants. This result agrees with previous studies developed among Hispanic/Latin women in other regions. A regression model indicated that the HPV and HPV vaccination level of knowledge among the participants is a strong predictor of mothers giving the HPV vaccine to their adolescents.

Keywords: HPV, knowledge, beliefs, vaccination, Hispanic/Latinos Health, minorities.

Introduction

The Human Papillomavirus (HPV) is a causative agent for the development of cancer which is a public health concern worldwide (Forman et al., 2012; Wilson et al., 2016). Being the most common sexually transmitted infection (STI) in the US, HPV has currently infected about 79 million Americans, and another 14 million Americans become newly infected every year (CDC, 2017a). According to data from 2009 to 2013, approximately 39,800 HPV-associated cancers occur in the US each year, the most frequent type of cancers associated to the virus includes cervical, anal, vaginal, vulvar, penile and recent studies have established a link between HPV and oropharynx cancers (CDC, 2017c).

More than 40 types of HPV have been identified, some of them are responsible for cancer and others are responsible for genital warts (Saraiya, Dunne, Stokley, Middleman, & Markowitz, 2013). Infection with HPV 16 and HPV 18 strains are responsible for most cases of cervical cancer (Chapman & Harris, 2016) while HPV 6 and HPV 11 strains are more commonly associated with genital warts which is a sexually transmitted benign condition (Forman et al., 2012). HPV infection is the main risk factor associated with cervical cancer (Forman et al., 2012). Persistent infections with one out of twelve HPV strains are responsible for all cases of cervical cancer (Schiffman et al., 2011). Based on previous research, a woman must be infected with any type of HPV before she develops cancer (American Cancer Society, 2016). Worldwide, the contribution of HPV 18 and HPV 16 strains for adenocarcinoma is 82% (de Sanjose et al., 2010).

In the US the vaccine to prevent HPV and its associated morbidity and mortality was publicly introduced in 2006. Several variations of the vaccine protect against an increasing number of HPV types (Galbraith et al., 2016; Handler, Handler, Majewski, & Schwartz, 2015; Saraiya et al., 2015). Currently, Gardasil and Gardasil 9 are the HPV vaccines approved by the US Food and Drug Administration (FDA) to be administered to all genders. Gardasil prevents against four HPV types (6,11,16,18) and Gardasil 9 prevents against 9 of the most common cervical cancer-causing agents worldwide (6,11,16,18, 31, 33, 45, 52, and 58) (Merck Newsroom Home, 2017). Some of the leading cancers prevented with the vaccine are cervical cancer (66.2%), anal cancer (79.4%), oropharyngeal cancer (60.2%), vaginal cancer (55.1%) and vulvar cancer (48.6%) (Saraiya et al., 2015).

HPV vaccines are recommended for preteen girls and boys to protect against HPV infection

before they get exposed to the virus (CDC, 2017a). After 2016, the Centers for Disease Control and Prevention (CDC) recommends that all preteens who are 11 or 12 years old get the two-dosage series of the HPV vaccine (CDC, 2017a; Galbraith et al., 2016). In the US about 65% of girls and 56% of boys have started the HPV vaccination series but still many children are not completing the series (CDC, 2016). In Nebraska and Iowa, the HPV vaccination coverage among adolescents 13-17 years old is 67.3% and 66.7%, respectively (CDC, 2017b). Currently, many private health plans cover the cost of the HPV vaccine. However, if children and adolescents 18 years of age or younger are either Medicaid eligible, Native American/Alaskan Native, uninsured or if their health insurance does not fully cover vaccines, they can get the HPV vaccine at no cost through the Vaccines for Children (VFC) Program (CDC, 2017d; Merck, 2017).

Hispanics are the fastest-growing minority group in the US, representing about 17% of the total US population. About 65% of the Hispanic population in the US are of Mexican origin (U.S. Census Bureau, 2016). In Nebraska, around 10.7% of total population are of Hispanic origin and in Iowa is around 5.8%. Hispanics have a larger proportion of young people and a smaller proportion of older people. Additionally, most of the Hispanic population living in Nebraska and Iowa are of Mexican origin, representing about 78% of all Hispanic/Latinos living in these states (Census.gov, 2017)

Hispanic women in the US have higher rates of cervical cancer than women in other racial or ethnic groups according to data compiled between 1999 and 2014 (CDC, 2017c). Additionally, this minority group tends to present severe cases of cervical cancer and higher mortality rates when compared to other racial groups (Mann, Foley, Tanner, Sun, & Rhodes, 2015). Even

though in the US, HPV vaccine completion rates are higher for Latinas (72.8%) than for non-Hispanic whites (70.6%), HPV vaccination rates continue below other recommended vaccines and below the Healthy People 2020 vaccination goal of 80% (Galbraith et al., 2016)

Even though HPV is not rare, the knowledge about this virus has been found low or non-existent among most populations in the US, especially among minorities and populations with lower education and socioeconomic status (Fernandez et al., 2009). Previous studies have documented low levels of awareness and knowledge about HPV and the HPV vaccine among Hispanics/Latinos. In Utah, a study was conducted to explore factors related to the HPV vaccine knowledge, interest, and uptake among Hispanics/Latinos and results indicated that participants, 71,2% of which were of Mexican origin, had limited knowledge about the HPV vaccine (Kepka, Warner, Kinney, Spigarelli, & Mooney, 2015). Similarly, a study conducted on the Texas-Mexico border indicated that the understanding of HPV role in the etiology of cervical cancer is limited among Hispanics (Fernandez et al., 2009). Among Puerto Rican mothers and adolescents, research was conducted in 2014 and results indicated that women's knowledge about HPV and HPV vaccination was low, especially among mothers (CDC, 2015).

Considering the above figures and the identified knowledge gaps in Hispanic/Latino, the aim of the present research project was to assess the HPV vaccination knowledge, awareness and beliefs of mothers of Mexican origin living in the Midwest who have adolescents in the 9-18 years age range and predict factors associated with the mothers' willingness to vaccinate their children against HPV.

Methods

Study design

A cross-sectional survey was conducted between May and July of 2017 to understand how does a mothers' willingness to give the HPV vaccine to their children relate to the knowledge about HPV vaccination among mothers. The recruitment of 100 adult mothers of Mexican origin that were present in the waiting room of the Mexican Consulate between May and July of 2017 was possible by the partnership of the University of Nebraska Medical Center with OneWorld Community Health Centers and the Mexican Consulate at Omaha.

Study Site

The Mexican consulate at Omaha provides services mostly to Mexican citizens living or traveling in the US who need assistance with US laws and legal system issues. The office in Omaha issues Mexican passports, officially stamps and notarizes legal documents to be used in Mexico and distributes information about the protection of Mexicans in the US. Additionally, OneWorld community Health Centers provides health services and health education at the Health Window located inside the Mexican consulate.

The Mexican consulate in Omaha is the closest office for Mexicans living in Nebraska and Iowa. For the research recruitment purposes, the consulate and the Health Window operated by OneWorld Community Health Centers was an ideal place due to the diversity of participants from Nebraska, Iowa, and Kansas.

Sample

To be eligible for study participation, respondents needed to be female, mother of Mexican origin living in Nebraska or a neighboring state, be at least 19 years or older, have a daughter or son, or daughter and son between 9 and 18 years of age living with her. It was included 9 years of age as a minimum because the HPV vaccine is approved for use after this age. The initial inclusion criteria included mothers from Nebraska only, but after the pilot testing of the questionnaire in the Mexican Consulate it was necessary to adjust it to include participants from other states that are frequently served by the Mexican Consulate in Omaha.

Prospective participants were identified and once the inclusion criteria was met, the principal investigator of the study proceeded to explain the details of the study and ask for their verbal consent to administer the survey.

A total of 132 potential participants were approached between June 17th and July 28th of 2017.

A total of 100 participants agreed with verbal consent and participated in the survey. Of the approached people that met the inclusion criteria 24% refused to participate in the survey because of not having time or interest on the research. Anonymity was guaranteed at all times.

Data collection

Based on questionnaires used in previous studies on different populations (Allen et al., 2010; Cates, Brewer, Fazekas, Mitchell, & Smith, 2009; Davis, Dickman, Ferris, & Dias, 2004; Fazekas, Brewer, & Smith, 2008; Fuchs, Rahman, & Berenson, 2016; Kepka et al., 2015; Strohl et al., 2015) and surveys that assessed the Hispanic population (Allen et al., 2010; Fuchs, Rahman, & Berenson, 2016; Kepka et al., 2015;) a bilingual (English and Spanish) 76-item survey using structured questions was adapted for this study and administered to participants that

met the inclusion criteria after obtaining their oral consent (Appendix 1). English and Spanish equivalency in the survey was obtained by back-translating the English version to Spanish and vice versa, performed by bilingual personnel of the research project.

All surveys were conducted by the principal investigator as an interview to guarantee the quality of the data collection. After the completion of the survey, information and educational material on HPV and HPV vaccine from the CDC as well as a 5 dollars gift card were given to participants.

Research questionnaire

The questionnaire had four main sections. The first part included demographic characteristics of the mother such as age, number of people in the household, current marital status, age at immigration, level of education, etc. The second part included demographic characteristics of child/children, including the number of children in the 9-18 age range living with them. The third part included questions assessing the mothers' experience and satisfaction with received medical care for themselves and their children. The last section included questions related to the knowledge, awareness, beliefs and experience dealing with HPV and the HPV vaccine.

Data Analysis and management

Scoring

HPV and HPV vaccination knowledge among respondents was assessed by respondents' affirmation or negation of 16 statements. These statements were related to how common is the HPV, perception of risk, detection, transmission, prevention, treatment and possible consequences of HPV infection. The answers to 14 statements were classified as: yes, no, and I do not know, and two questions were of multiple choice option. One point was assigned for

correct answers to the first 15 questions and three points were assigned to the last question for which more than one answer was allowed. The maximum total score possible was 19 points. The level of knowledge was assessed by adding the points obtained in the answers for the items. The total score was divided into three categories according to the percentiles 75th, 50th and 25th: high (15 or more points), medium (from 9 to 14 points) and low (8 or less points). Due to low frequency in the results for the high level of knowledge, we used two separate categories for level of knowledge: poor (score less than 8 points) and good (score more than 9 points). The binary results for level of knowledge (poor or good) permitted testing the knowledge of HPV vaccination against other variables using Chi-Square and regression analysis.

HPV vaccination beliefs were assessed by the answers of 13 statements. Each statement asked about the importance, need, and benefits of vaccinating children in general. In addition, participants were asked about the benefits, safety, and appropriateness of HPV vaccination for children ages 9-12 years old. Beliefs about adverse behavioral consequences of HPV vaccination were assessed by the answer of two questions in the scale of Linkert. The two questions asked if vaccinating their children would send either of these messages: one, it is okay to have sex and two, she/he does not have to use safe sex practices.

Questions assessing HPV and HPV vaccine awareness were also administered. Participants were asked if they had ever heard of HPV, the HPV vaccine and the sources of the information that included radio, TV, medical provider, relatives, friends or school.

Data analysis

The data analysis was performed by providing general descriptive statistics. Contingency tables using Pearson Chi-squared were used to establish association between demographic

characteristics of participants and their specific HPV and HPV vaccination knowledge, awareness and vaccination status of their children. A logistic regression model (LRM) was applied to identify the possible association between the level of knowledge about HPV and HPV vaccination among mothers and the vaccination status of their children; the model was adjusted by length of time in the USA, the age of the mother, health insurance status, HPV/HPV Vaccination Knowledge and level of education of the mother. For the statistical analysis, the Statistical Package for the Social Sciences (SPSS) version 23.0 was used.

This research was approved by the University of Nebraska Medical Center Institutional Review Board (IRB).

Results

Socio-demographic characteristics of mothers

The mean age of the mothers was 40.76 years, with a standard deviation of 6.2. Most of the women interviewed had a basic level of education (up to nine years). The majority had a stable sexual partner, married or cohabiting (70%) and half were dedicated to housework.

Characteristics of the study population are shown in Table 1.

Table 1. Socio-demographic characteristics of mothers (N=100)

Variable	%	P-value
Age		
27-37	29	
38-48	61	
49-59	10	
State of residence		
Nebraska	69	
Iowa	29	
Kansas	2	
Marital Status		
Married	57	
Single	13	
Co-habiting	23	
Other	7	
Country of origin of partner (N=80)		
Mexico	88	
United States	11	
Other	1	
Highest grade of school completed		0.020
High school graduate or less	85	
Some college or technical school or higher	15	
Employment Status		
Homemaker	50	
Employed (includes Self-employed)	46	
Unemployed (but want to work)	3	
Student	1	
Health insurance		0.016
No	65	

	Yes	35
Knowledge level about HPV and HPV vaccination (N=98)		
	Poor	52
	Good	48

*P-Value of the association between demographic characteristics of the mother and the level of knowledge of participants (poor or good)

From total mothers participating in the study, 35 had at least one daughter in the age range 9-18, 35 had at least one son and, 30 had at least one daughter and one son in this age range.

Vaccination status of adolescents reported by mothers

From all mothers, only 36% of them indicated that their oldest adolescent in the age range 9-18 years old, girl or boy, had at least 1 dose of the HPV vaccine series. From the participants that had at least one daughter in the age range 9-18 (N=65), only 33.8% had given at least one dose of the HPV vaccine to their daughters. Similarly, among mothers that had at least one son in the age range 9-18 (N=65), only 29.2% have given at least one dose of the HPV vaccine to their sons.

Chi-square tests were computed to understand the relationship between demographic characteristics of the mothers and the vaccination status of children (at least one dose of the HPV vaccine series was given to the oldest son/daughter in the range age 9-18 or no vaccine has given). The level of education of the mother and their marital status were statistically significant associated to the vaccination status of their children $\chi^2 (1, N=100) = 4.85, p = .02, \chi^2 (1, N=100) = 4.78, p = .029$. Specifically, mothers with low education level and without a partner are less likely to vaccinate their children against HPV.

Mothers' experience in receiving medical care for themselves and their children

Most of the participants indicated that they were satisfied with the medical care received from their health care providers (83%), their doctors treat their children in a very friendly and courteous manner (95%) and they trust their child/children's health care provider (83.8%). Participants also reported that medical providers were good about explaining the reason for vaccination (65%). However, a large percentage indicated that sometimes doctors use medical terms without explaining what they mean (61%).

General knowledge of HPV and HPV vaccination

The knowledge of the HPV/HPV vaccination among participants was low even though 86% indicated that they had heard of HPV and 76% indicated that they had heard about the HPV vaccine. Regarding the HPV/HPV vaccination knowledge index, the average score obtained among the respondents was 7 (range 0-15). The 52% of participants had poor HPV and HPV vaccination knowledge and 48% had good knowledge. Table 2 shows the percentage of correct answers to the questions assessing knowledge of the HPV/HPV vaccination and its association with the vaccination status of the children. The question asking about how HPV infection can be prevented had six answer options from which three were correct answers. Only 22% of the participants selected all three correct answers: 1. By practicing abstinence, 2. By using condoms and 3. By being vaccinated. Two correct answers were selected by 29% of the participants. One correct answer was selected by 24% of the participants. Lastly, 25% indicated that they did not know the answer or selected a wrong answer.

Chi-square tests were computed to assess the association between demographic characteristics of the mothers and their knowledge about HPV and HPV vaccination. The mothers' level of education and health insurance status were statistically significant associated to HPV/HPV vaccine knowledge (good or poor) $\chi^2 (1, N=98) = 5.4, p = .02$ and $\chi^2 (1, N=98) = 5.8, p = .016$

(Table 1). Specifically, mothers with low education and without health insurance were more likely to report low levels of HPV/HPV vaccination.

The participants' level of education was associated with both the knowledge that HPV affects only females and that HPV is curable, $\chi^2 (2, N=100) = 7.8, p = .02$ and $\chi^2 (2, N=99) = 18.8, p <.01$. Specifically, mothers with higher education (High School or higher) were more likely to report that HPV affects not only females and that there is not a cure for HPV. Similarly, education level was associated with having the son or daughter vaccinated with at least 1 dose of the HPV vaccine $\chi^2 (1, N=100) = 4.8, p = .02$. Additionally, mothers with lower education levels were found more likely to vaccinate their children to prevent a common cold if there were a vaccine for it $\chi^2 (2, N=100) = 8.4, p = .015$.

Table 2. Distribution of the HPV and HPV knowledge of Mexican mothers living in the Midwest of the US (N=100, otherwise noted)

Correct answer	%	P-value
HPV affects not only females	46	<.0001
HPV is spread by sexual contact	67	0.0092
HPV can cause cervical cancer	62	0.0002
HPV is not a rare infection (N=99)	37.8	0.0056
There is not a cure for HPV (N=99)	23.2	0.4182
HPV can cause genital warts	42	0.0131
HPV can cause cancer of the penis	20	0.3485
HPV do not cause HIV	28	0.0689
HPV cannot be detected by pap smears	3	0.0442
The vaccine is recommended to girls at ages 9-26	52	0.0088
The vaccine is recommended to boys at ages 9–26	43	0.1385
More than one injection is needed for the HPV vaccine	38	<.0001
Most medical plans and coupons cover the HPV vaccine	35	<.0001
HPV vaccine is expensive	9	0.4825
How HPV is transmitted by genital skin-to-skin contact	51	0.0531
HPV infection be prevented by practicing abstinence, using condoms and being vaccinated	22	0.0402

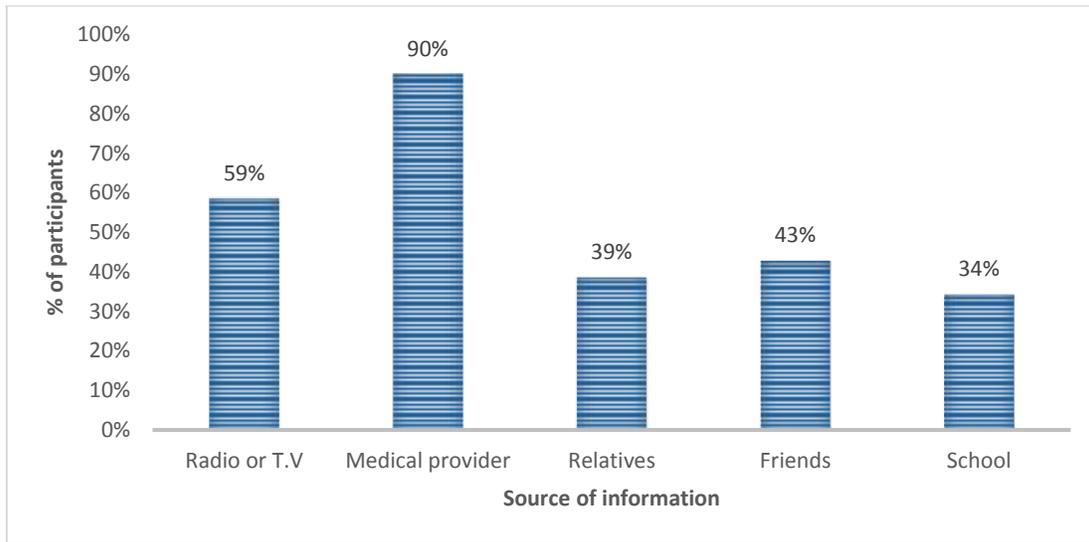
*P-Value of the association between demographic characteristics of the mother and the vaccine status of their children. Chi-square or Fisher exact test were used.

Mothers' awareness about vaccines and HPV vaccines

From total participants, 76% have heard of the HPV vaccination. The 90% of mothers that had heard about the HPV vaccine heard about it from their medical provider. The 59% of participants had heard about the HPV vaccine on radio or T.V. Other sources include: friends, relatives and school. These three sources were selected by 43%, 39% and 34% of the participants, respectively. Some mothers heard about the HPV vaccine from more than one source. From those that had heard of the HPV vaccine (N=76), 33.3% indicated one source of information, 21.3% have heard about it from two sources, 18.7% from three sources, 18.7% from four sources and only 8% of the mothers that have heard about HPV vaccine heard about it from the five sources indicated above.

Chi-square tests were computed to understand the relationship between demographic characteristics of the mothers and the awareness about the HPV vaccine. Marital Status and health insurance status were the demographic characteristics that were statistically significant associated to the awareness of the HPV vaccine among mothers $\chi^2 (1, N=100) = 9.2, p = .002$, $\chi^2 (1, N=100) = 5.2, p = .021$. Specifically, mothers that were married were more likely to know about the existence of the HPV vaccine. Most of the mothers that indicated not being aware of the HPV vaccine did not have health insurance.

Figure 1. Sources of information about HPV vaccine reported among those participants that have heard previously about the vaccine (N=76)



Mothers' beliefs about vaccines and HPV vaccines

Most participants believed vaccines, in general, are beneficial and that vaccinating their children against infectious diseases is important (94%). Additionally, 97% of the mothers indicated wanting to vaccinate their children if the vaccine prevented cancer. A 71% noted that HPV vaccines are beneficial. However, only 41% indicated that HPV vaccines are appropriate for children 9-12 years of age. A 48% of participants reported the HPV vaccine to be appropriate for not only girls. Only 37% of the mothers believe the HPV vaccine to be safe and 21% indicated prevention in vaccinating their children due to potential side effects of the HPV vaccine.

Detailed information about the mothers' responses are shown in Table 3.

Table 3. Distribution of mothers' beliefs about vaccines

Statement	%
Vaccines (in general) are beneficial	94
Vaccinating my children against diseases that can be spread person-to-person is important	94
If there was a vaccine that prevented the common cold, I would want my children to get vaccinated	78
If there were a vaccine that prevented cancer, I would want my children to get vaccinated	97
I believe that vaccines should be required for diseases that can be spread person-to-person	78
HPV vaccines are beneficial	71
HPV vaccines are appropriate for adolescents (girls and boys as young as ages 9-12)	41
HPV vaccines are appropriate just for girls	13
HPV vaccine is safe	37
Potential side effects of the HPV vaccine would prevent me from getting my child/children vaccinated	21
HPV vaccine is difficult to get	2
HPV vaccine causes health problems	8

Logistic regression model predicting mothers' willingness to vaccinate their children against HPV.

A logistic regression model (LRM) was conducted to examine the association between the response variable 'children received at least one dose of the HPV vaccine' and four covariates. The response variable indicates if the oldest son or daughter was or not vaccinated with at least one dose of the HPV vaccine series. The covariates included: the length of time in the USA, the age of the mother, health insurance status, HPV/HPV Vaccination Knowledge and level of education of the mother. The model indicated that HPV/HPV Vaccination Knowledge among mothers was a significant predictor of their willingness to vaccinate against the HPV their adolescents (Table 4). According to the model, the odds of a mother getting their adolescent vaccinated against HPV is higher for mothers with good HPV/HPV vaccination knowledge OR: 13.8, $p < 0.01$. Specifically, a mother with good HPV/HPV vaccination knowledge has 13.8 times

the odds to vaccinate their children than a mother with a poor HPV/HPV vaccination knowledge.

Hosmer-Lemeshow goodness of fit test indicated no significant lack of fit as $p= 0.36 (>.05)$.

Table 4. Logistic Regression Model predicting mothers' willingness to vaccinate their children against HPV.

Variable	Odds Ratio	95% C.I. for OR		P-Value
		Lower	Upper	
Level of HPV Knowledge	13.851	4.638	41.366	<.0001
Marital Status	5.483	1.144	26.282	0.0333
TimeInUSA(Years)	1.075	0.993	1.165	0.0729

Final model

Variable	Odds Ratio	95% C.I. for OR		P-Value
		Lower	Upper	
Level of HPV Knowledge	13.235	4.683	37.410	<.0001

Discussion and recommendations

Results from this study are consistent with previous studies. Low levels of knowledge found, in average 8 points out of 19 possible points suggest a need to improve public health programs with information to promote the HPV vaccination among Latinos in Midwest of the US. This information should be tailored to the specific audience by providing it at an appropriate reading level and a culturally sensitive way to increase the level of knowledge about the HPV and its vaccine.

Two equal groups of mothers were possible, one group with at least one daughter (N=65) and another group with at least one son (N=65), both having a child in the 9-18 years old range. Male vaccination of at least one HPV vaccine dose was found at 29.2% compared to 33.8% of female vaccination of at least one HPV vaccine dose, agreeing with a gender gap in HPV vaccination rates. Given that the mothers' interest in vaccinating their boys against HPV was lower than mothers interest in given the vaccine to their girls, a gender-neutral approach when developing HPV prevention programs is necessary. The HPV vaccination for boys is critical for reducing the risk of HPV transmission to sexual partners and decreasing the risk of HPV and HPV-related diseases in the population.

Due to the importance of the HPV infection prevention efforts, there is a large need for more reliable measures to estimate the Hispanic/Latino mothers' level of knowledge, awareness and beliefs about the HPV/HPV vaccination. These estimates are an essential tool for guiding educational efforts among Latinos, the largest minority group in the US with the highest cervical cancer rates.

Results from the present study suggest a need for increasing public health education among Mexican mothers in the Midwest on HPV/HPV vaccination and its association with cancers in males and females.

Policies from the state should support vaccination in school settings to improve HPV vaccination rates. Schools should include more education on public health topics that involve students' health to deliver it in an appropriate language to parents of Hispanic origin. Subjects such as the HPV and the importance of vaccination against HPV should be something that schools could promote even if they do not require HPV vaccination for their students.

Engage the Mexican Consulate through the Health Window in disseminating more information about HPV/HPV vaccination.

Findings suggest the importance of increasing awareness about the benefits of the HPV vaccine among Mexican mothers. Results indicated that schools are not the main source of information about HPV/HPC vaccination. Since schools play an important role in disseminating information among parents, it is suggested to improve cooperation between schools and health offices in order to increase rates of vaccination among Mexicans in the Midwest of the US.

Future studies

An assessment of knowledge about HPV/HPV vaccination and another cancer-related viruses among Hispanic/Latina Promotoras de Salud (lay health workers) in OneWorld Community Health Centers could be conducted. In addition, potential training programs according to results obtained could be implemented.

Most of the mothers indicated lack of medical insurance. However, some of them reported that their son(s)/daughters(s) had access to Medicaid when asked if they received benefits from government assistance programs. Future studies should be more emphatic in asking mothers if their children have medical insurance. Knowledge of health insurance status may improve conclusions regarding the association between children's health insurance and being vaccinated against HPV.

Even though this study did not analyze the level of English proficiency among participants, some respondents indicated that language might be a barrier when communicating with their medical providers. Additionally, participants mentioned the limited time of medical appointments making it difficult to receive education on topics such as ETS, including HPV. Future related research should emphasize the English level of participants to assess its relationship with the knowledge about HPV/HPV vaccination among Mexican mothers.

The inclusion criteria for a similar study should include people with at least a year of living in the US to better understand their experience regarding medical services and health education in the US.

Strengths and Limitations

Strengths

- The site was appropriate for recruitment of participants due to a high number of Mexicans that visit the Mexican consulate every day and that are living currently in different regions of Nebraska and neighboring states.
- The method used to conduct the surveys allows data collection quality:

- Due to the long-time people have to wait for their turn at the Mexican consulate, they use their time in other activities such as visiting the Health window.
- Time was not an issue for conducting an interview, in fact, they indicated to be comfortable by being assisted than filling out the questionnaire by themselves.
- There was extra time for providing Health education on the topic to the participating mothers.
- The study minimized bias by using a recruitment site not related to a health care institution which would be more likely to have access to participants already vaccinated; allowing the group of obtained participants to be very diverse.

Limitations

- This study was limited by a small sample size and the restriction of sampling to the Midwest US, prevents results to be generalized.
- Since people are waiting for several hours to obtain services at the Mexican Consulate, additional education and information in different areas is provided, leading to a possible refusal to participate in the study due to participants' being overwhelmed by all the activities in the site.

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Service Learning/Capstone Experience Reflection

OneWorld Community Health Centers is a community organization that provides culturally respectful, quality health care with special attention to the underserved. I have learned that it provides accessible health services to the community, and the Latino community Omaha is one of the most benefited from this. OneWorld collaborates with the Mexican Consulate through the Health Window that is located in its installations.

Through the Health Window located at the Mexican Consulate, OneWorld helps the community served by the Mexican Consulate by identifying the health services they and their family need in the US. Through this service, it is possible to refer community members to the health services available where they live and also provide them with information and education on a variety of health topics. The primary goals of the Health Window are to help prevent diseases, promote healthy habits and to refer families to health services, like those offered by community clinics where they can establish a medical home and receive the health care that they need. Some basic health screenings are conducted in the Health Window such as the measurement of the BMI, the glucose level, and the blood pressure. Results of these tests are accompanied with health education.

It is known that the best way to learn about a topic is to explain it to others, and it is what exactly I was able to do during my Service Learning and Capstone Experience in the Health Window. Due to the installations and population served in this place, services are mainly focused on health education. I had the opportunity to contribute to the public health of the community served by the Mexican Consulate that comes from Nebraska and neighboring states in the following topics:

- Vaccination in general

- HPV and HPV vaccination
- Nutrition
- Physical activity
- Obesity prevention
- Chronic diseases
- Zika virus

My Service Learning included daily activities such as informing the Mexican consulate users about the free health services that OneWorld offers at the Health Window as well as inviting them to use these services. People that were interested were asked if they wanted their glucose level, blood pressure and the Body Mass Index (BMI) measured. After completing these tests, depending upon the results, I supported the Health Window personnel by providing education in the areas needed as well as recommending them to a community health center in case any test results were not in the desired range. This way, health education provided varied from user to user depending on their specific needs. Additionally, twice a week the Mexican consulate provided the Health Window with a space to provide public presentations about a health topic of interest. I participated by providing presentations in Spanish about vaccines in general and the Zika virus.

Furthermore, I was able to recruit participants for the study that was funded by the Cancer Epidemiology Education in Special Populations (CEESP) program. The recruitment consisted of 100 interviews applying a 76-item bilingual questionnaire in the language of preference of participants. The informed consent was applied verbally before starting each interview, and at the end of the survey, I provided health education on HPV and HPV vaccination to Mexican mothers as well as a gift card to thank them for their participation.

The recruitment of participants started on June 19, and after two days of data collection, I realized that a lot of users of the Mexican consulate are from neighboring states of Nebraska and my initial inclusion criteria included only participants living in Nebraska. I met with my advisor who advised me on amending the IRB on the inclusion criteria to include people from not just Nebraska but neighboring states to improve the chances to recruit the sample size of the pilot study.

The Service Learning and Capstone Experience improved my understanding of how a research project needs to be planned and executed and the obstacles that might be overcome for a successful completion. I completed an IRB protocol as a principal investigator and designed a structured bilingual questionnaire based on literature review with help from Dr. Armando de Alba, the staff member of the committee and Mariela Bahena, a CEESP fellow conducting a similar study in Veracruz, Mexico. I recruited participants, delivered accurate health education using CDC resources and analyzed the data obtained. A manuscript for publication was prepared.

I started communications with the preceptor of the SL/CE months before starting my Service Learning, and it was helpful for keeping the project working. Even so, some delays were experienced, and it affected the timeline of my project. Even though the UNMC and One World had a previous affiliation agreement, the greatest challenge that I faced during my SL/CE was related to paperwork and communication with directives of both One World and the Mexican Consulate to get specific permissions to start the project. In my opinion, the constant communication with all parts involved in the research project including the site representatives, the UNMC SL/CE administrator, members of the SL/CE committee as well as the IRB administrators is critical.

After completing the Service Learning, I had the opportunity to present preliminary results to the CEESP committee and the SL/CE committee and obtained feedback to work in the final SL/CE report and prepare a manuscript for publication. Meetings with the SL/CE committee members for

follow-up on the results of the research project and manuscript preparation for publication were essential for the completion of the SL and CE.

In conclusion, the SL/CE reaffirmed my skills in working with communities and being able to participate in supporting the Health Window activities strengthened my skills in community health education. Additionally, my language and cultural background are assets that helped me to be closer to the Mexican community learning from their culture as well as being able to support the health activities promoted by the Health Window at the Mexican consulate. I have also been strengthening my skills in study design and in creating instruments for data collection as well as developing the recruitment of participants in a successful way. In the process of generating the final report, I used SPSS software package for data management, statistical analyses, and data presentation. I applied statistical knowledge to perform data analysis, and I improved my analytic skills as well as scientific writing.

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Appendices

Appendix 1. Questionnaire used for the research project.

ASSESSMENT OF KNOWLEDGE AND BELIEFS ABOUT HPV VACCINATION AMONG MOTHERS OF MEXICAN ORIGIN IN NEBRASKA AND NEIGHBORING STATES (IRB#331- 17-EP)

Part A. Demographic characteristics of the mother

1. Zip code: _____
2. What is your age? _____
3. In what part of Mexico were you born? State _____
4. Including yourself, how many people live in your household? _____
5. What is your current marital status?
 - 1 Married
 - 2 Single
 - 3 Cohabiting
 - 4 Widowed
 - 5 Separated
6. If married or partnered, in what country was your partner born?
 - 1 US
 - 2 Mexico
 - 3 Guatemala
 - 4 El Salvador
 - 5 Other (Indicate) _____
7. How old were you when you immigrated to the US? _____
8. How long have you lived in the US? _____ months _____ years
9. How long have you lived in Nebraska? _____ months _____ years
10. What is the highest grade or year of school you completed?
 - 1 Never attended school
 - 2 Elementary school (Grades 1-6)
 - 3 Middle School (Grades 7-9)
 - 4 Some High school
 - 5 High school graduate or GED
 - 6 Some college or technical school
 - 7 College graduate
11. Are you?
 - 1 Employed (Full-time)
 - 2 Employed (Part-time, but want to work full-time)
 - 3 Employed (Part-time by choice)
 - 4 Self-employed (ex. informal work)
 - 5 Unemployed, but want to work
 - 6 Unemployed by choice
 - 7 Student
 - 8 Homemaker
 - 9 Retired
12. Do you have any kind of health insurance?

- 1 Yes
- 0 No
- 2 Don't Know

13. If you answered yes to the question above, what kind of health insurance do you have?

- 1 Private health insurance plan (BlueCross BlueShield)
- 2 Federal coverage programs (Medicaid, Medicare, CHIP)
- 3 VA (Veterans Health Administration)

14. Which of the following government assistance programs do you have?

- 1 SNAP (food stamps)
- 2 Vaccines for Children program (VFC)
- 3 Other (Indicate) _____
- 4 None

Part B. Demographic characteristics of child/children

15. How many sons 9-18 years old do you have living with you? _____

16. How many daughters 9-18 years old do you have living with you? _____

Please answer the following questions about yourself or your oldest son and/or daughter between the ages of 9-18.

Part C. Mothers's experience in receiving medical care for themselves and their children

	Yes	No
17. Please, think of the last time that you received medical care. Did you feel that the doctor needed to be more thorough in treating and examining you?		
18. Please, think of the last time that your child received medical care. Did you feel that the doctor needed to be more thorough in treating and examining your child?		
19. Please, think of the last time that you received medical care. Were you very satisfied with the medical care you received?		

	Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree
	1	2	3	4	5
20. In general, I feel that doctors are good about explaining the reason for vaccines	<input type="checkbox"/>				
21. In general, sometimes doctors use medical terms without explaining what they mean	<input type="checkbox"/>				
22. My doctors treat my child/children in a very friendly and courteous manner	<input type="checkbox"/>				
23. I trust my child/children's health care provider	<input type="checkbox"/>				

HPV vaccine awareness

	Yes	No	I don't know
41. I have heard of the cervical cancer vaccine, also known as the HPV (human papillomavirus) vaccine or Gardasil	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
42. I have heard of the HPV (human papillomavirus) vaccine on the radio or television	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
43. I have heard of the HPV (human papillomavirus) vaccine from medical providers	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
44. I have heard of the HPV (human papillomavirus) vaccine from relatives	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
45. I have heard of the HPV (human papillomavirus) vaccine from friends	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
46. I have heard of the HPV (human papillomavirus) vaccine from school (child's school)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Personal experience with HPV vaccine

	Yes	No	I don't know
47. The HPV (human papillomavirus) vaccine has been offered to my daughter	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
48. The HPV (human papillomavirus) vaccine has been offered to my son	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
49. I am planning to give the HPV (human papillomavirus) vaccine to my daughter	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
50. I am planning to give the HPV (human papillomavirus) vaccine to my son	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Vaccine beliefs

	Yes	No	I don't know
51. Vaccines (in general) are beneficial	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
52. Vaccines (in general) are unnecessary	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
53. Vaccinating my children against diseases that can be spread person-to-person is important	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
54. If there was a vaccine that prevented the common cold, I would want my children to get vaccinated	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
55. If there were a vaccine that prevented cancer, I would want my children to get vaccinated	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
56. I believe that vaccines should be required for diseases that can be spread person-to-person	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
57. HPV (human papillomavirus) vaccines are beneficial	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
58. HPV (human papillomavirus) vaccines are appropriate for adolescents (girls and boys as young as ages 9-12)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

59. HPV (human papillomavirus) vaccines are appropriate just for girls	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
60. HPV (human papillomavirus) vaccine is safe	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
61. Potential side effects of the HPV (human papillomavirus) vaccine would prevent me from getting my child/children vaccinated against HPV (human papillomavirus)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
62. HPV (human papillomavirus) vaccine is difficult to get	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
63. HPV vaccine causes health problems	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Beliefs about adverse behavioral consequences of HPV vaccination

Vaccinating my children would send a message that:

	Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree
	1	2	3	4	5
64. It is okay to have sex	<input type="checkbox"/>				
65. She/he doesn't have to use safe sex practices	<input type="checkbox"/>				

Information regarding your oldest son in the 9–18 years age range

66. Age _____

	Yes	No	I don't know
67. Has your son started (but not completed) the HPV (human papillomavirus) vaccine series?			
68. Has your son completed the HPV (human papillomavirus) vaccine series?			
69. Does your son have an appointment to receive the HPV (human papillomavirus) vaccine?			
70. Has your son not received any doses of HPV (human papillomavirus) vaccine?			

Information regarding your oldest daughter in the 9–18 years age range

71. Age _____

	Yes	No	I don't know
72. Has your daughter started (but not completed) the HPV (human papillomavirus) vaccine series?			
73. Has your daughter completed the HPV (human papillomavirus) vaccine series?			

74. Does your daughter have an appointment to receive the HPV (human papillomavirus) vaccine?			
75. Has your daughter not received any doses of HPV (human papillomavirus) vaccine?			

76. If your child/children are not vaccinated against HPV, what is the reason your child did not get the vaccine?

- 1 Concern over side-effects
- 2 Costs
- 3 Not enough information to make decision
- 4 Not offered
- 5 Concerns about sexual practices
- 6 Other (Indicate) _____