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HPV knowledge in Mexican college students: implications for intervention programmes

Emily Vogtmann, MPH¹, Siobán D. Harlow, PhD², Aurelio Cruz Valdez, PhD³, Juan Carlos Cruz Valdez, MSc³, and Eduardo Lazcano Ponce, PhD³

¹ Department of Epidemiology, University of Alabama at Birmingham, Birmingham, AL, USA

² Department of Epidemiology, University of Michigan, Ann Arbor, MI, USA

³ Center for Population Health Research, National Institute of Public Health, Cuernavaca, Morelos, Mexico

Abstract

In order to promote new human papillomavirus (HPV) prevention and detection methods effectively in Mexico, it is important to understand how much the population knows about the virus. This study aimed to determine the demographic and behavioural factors associated with HPV awareness and knowledge in a population of Mexican college students. With a response rate of 77%, data were collected from 1,109 college students aged 17 to 25 years old at the Autonomous University of the State of Morelos in 2006. Students completed a questionnaire that assessed demographic and behavioural characteristics along with questions about HPV. A small percentage (16.9%) of the college students had never heard about HPV. Characteristics associated with not having heard about HPV included being male, not having running water, not having health insurance and not having sexual experience. Students had a median score of 5 out of 10 on an HPV knowledge index based on 10 yes/no questions about HPV developed for this study. Students had higher HPV knowledge scores if they studied health science, or science and engineering, were a 4th year student, had running water at home, had health insurance, or were a female who had had a previous Pap smear. Although most of these Mexican college students had heard of HPV, they had limited knowledge about the virus and prevention strategies. Further research in Mexican college students is needed to explain the variations in HPV knowledge to create appropriate health education programmes.

Keywords

Cervical Screening; Cancer; Young People; Knowledge and Attitudes to Cancer; Marginalised Communities

Introduction

Cervical cancer is the second most common cancer in women worldwide with disproportionately high rates occurring in developing countries (Parkin *et al.* 2001). In Mexico, in 2005, mortality from cervical cancer was 10.2 deaths/100,000 women, which is more than four times the rate in the United States during the same year (Secretaría de Salud 2005, Ries *et al.* 2008). Fortunately, cervical cancer mortality rates have been slowly on the decline in Mexico, but despite this trend, cervical mortality risk is still higher for

*Correspondence: Dr. Aurelio Cruz Valdez Avenida Universidad No. 655 Colonia Santa María Ahuacatitlán Cuernavaca, Morelos CP 62508, Mexico,acruz@correo.insp.mx.

marginalized women compared to women living in areas with more social and economic development (Palacio-Mejia *et al.* 2003, Tovar Guzmán *et al.* 2008). In order to combat these disparities in cervical cancer mortality, prevention of the human papillomavirus (HPV), a necessary cause for cervical cancer (Walboomers *et al.* 1999), has become an important health priority around the world and specifically in Mexico.

New interventions and screening tools are being introduced in order to further decrease the incidence and mortality of cervical cancer. One such screening tool is the HPV DNA test which has a higher sensitivity and similar specificity as that of a Pap smear (Salmeron *et al.* 2003). Since women have the ability to collect their own cervical or vaginal specimen, the HPV DNA test may help to increase coverage of high risk women in national screening programmes. Another new technology for decreasing the incidence and mortality from cervical cancer is the HPV vaccine which currently prevents acquisition of HPV types 16 and 18 in females previously unexposed to the virus (Villa *et al.* 2006). It has been hypothesized that the HPV vaccine will dramatically decrease cervical cancer prevention and treatment costs overtime (Insinga *et al.* 2007).

In order to effectively implement HPV DNA testing and vaccination in Mexico, it is important to understand the current knowledge in the population about the disease. To date, research on HPV knowledge has been conducted mainly in the United States and Europe. A systematic review of publications on this topic from 1992 to 2006, with many preceding the release of the HPV vaccine, found that the proportion of study participants who had previously heard about HPV ranged from 13% to 93% out of 10 studies (Klug *et al.* 2008). Research about Mexicans' HPV knowledge is more limited, but the few existing studies suggest that Mexicans know less about HPV than people in more developed countries (Lazcano-Ponce *et al.* 2001, Moraros *et al.* 2006).

To further our understanding about HPV knowledge in Mexico, we analyzed data from a study in college students at the Autonomous University of the State of Morelos (UAEM) to assess factors associated with students having heard about HPV and having accurate HPV knowledge. We hypothesized that demographic factors, access to healthcare and sexual behaviours would be associated with HPV knowledge.

Methods

Study design and sample

A cross-sectional study was designed by the National Institute of Public Health in Mexico (INSP) and implemented with students currently enrolled at the Autonomous University of the State of Morelos (UAEM) in 2006 in Cuernavaca, Morelos, Mexico. Cuernavaca is located approximately 85 km south of Mexico City. The purpose of the overall study was to assess the acceptability of the new HPV vaccine; however additional data were collected about HPV knowledge and was the focus of this paper. Inclusion criteria were being a current student at UAEM, studying in an undergraduate programme, and being in the first four years of university studies. At the time of the study, 7,741 students at UAEM qualified to participate in the study. Students from each university department were included and the required sample size for each department was calculated proportional to department size stratified by sex and year of university completed. Sample size calculations for the original study suggested that 1050 completed questionnaires were required; assuming a response rate of 70%, it was decided to distribute 1500 questionnaires. The number of responses was expected to be sufficient to support the main analyses involving multiple regression and logistic regression (Tabachnick & Fidell 2001).

Since the original study purpose was to assess the willingness of college students to be vaccinated against HPV, a questionnaire used to assess acceptability of hypothetical HPV vaccines was adapted (Zimet *et al.* 2000). The questionnaire was translated into Spanish by a professional in coordination with the author of the questionnaire. Questions pertaining to socioeconomic status, demographics, sexual behaviour, and willingness to pay for the vaccine were added to the original questionnaire. A pilot study of 50 male and 50 female students was conducted in order to test the understanding of the adapted questionnaire. The students were interviewed twice over a period of 15 days. When the response to a question was not equivalent at both interviews, the student was asked about what he or she understood the question to mean. After pilot testing, some of the demographic and socioeconomic status questions were changed to align more with the living and social situations of the college students. The final revised questionnaire was distributed to students during specific class periods and courses in each department while those who participated in the pilot study were not sampled. Students were randomly selected from each selected classroom by drawing numbers from an envelope. The students were advised that their participation was voluntary and each gave informed consent. The questionnaire on average was completed in 35 minutes while it ranged from 25 to 48 minutes to complete. No compensation for participation was given and this study was approved by the Ethics Committee of INSP.

HPV knowledge outcomes and predictors of knowledge

The outcomes of interest in this paper were having heard about HPV and level of specific HPV knowledge. Participants were first asked, “have you heard of HPV (yes/no)?” For students who responded in the affirmative, 10 additional yes or no questions were asked about specific HPV knowledge. The questions ranged from information about HPV symptoms to testing for HPV infection and can be seen in Table 1. Each response was coded as correct or incorrect and then the number of correct responses was summed for each participant with a possible range from 0 to 10 which formed the HPV knowledge index. The HPV knowledge index was created for a previous study in women aged 15 to 49 in Mexico and was found to have a Cronbach’s alpha of 0.96 which indicated a high degree of consistency (Lazcano-Ponce E *et al.* 2001). Level of specific knowledge about HPV was analyzed as a continuous variable and its distribution was approximately bell-shaped.

The demographic variables included field of study at UAEM (health science: psychology, medicine, nursing and pharmacy; science and engineering: biological sciences, chemistry and engineering, and fisheries and wildlife; and non-science: accounting and administration, law, humanities, art, communication, education and architecture), year in university, sex, age, marital status and having any children. Students’ socioeconomic status was assessed with questions about housing quality, possessions and income. Of specific interest were variables which demonstrate neighbourhood and personal socioeconomic status which were measured by whether the student had running water and the type of sewage disposal at home. Sexual history variables included whether the student had initiated sexual activity (yes/no), age at first intercourse, number of lifetime sexual partners, and current use of contraception (yes/no). Finally, access to medical care was measured by current use of a prescribed contraceptive method (IUD, implant, injection, pills, patch, vasectomy or tubal ligation), having health insurance and for females, having had a previous Pap smear. In Mexico, Pap smears are often first collected when a female turns 25 years old, but they may be initiated earlier when requested or indicated.

Statistical analysis

All analyses were conducted using SAS 9.2 (Cary, NC). For simplicity, the stratified sampling design was analysed assuming simple random sampling (Machin & Campbell

2005). This analysis therefore may lead to more conservative estimates than if stratification were considered (Bland 2000). Descriptive statistics were estimated for each characteristic of the participants. In a bivariate analysis for each characteristic, a simple logistic regression model was estimated with not having heard of HPV as the dependent variable (Model 1), and a simple linear regression model was estimated with the HPV knowledge index as the dependent (Model 2). Odds ratios and 95% confidence limits were calculated for Model 1 and the difference in mean level of knowledge (unstandardised regression coefficients) and 95% confidence limits were calculated for Model 2. Potential covariates identified in the bivariate analysis were manually included in the multiple regression models hierarchically along with age, gender and health insurance status as theoretical confounders. Covariates were included into the model if they were statistically significant after adjustment for confounding and were removed from the model if they were no longer statistically significant after inclusion of additional covariates. Collinearity and correlations were assessed by looking at frequency tables for categorical variables and correlation coefficients for continuous variables prior to creation of the multiple regression models so that highly related variables did not appear in the same model. The fit of the models were assessed for Model 1 and Model 2 using the pseudo R^2 and adjusted R^2 respectively. Statistical interactions were tested in both models by including interaction terms for all covariates. For Model 2, histograms of the residuals and the quantile (Q-Q) plots were used to assess the normality assumption; however, along with the large sample size for the analysis, the Central Limit Theorem should help ensure the robustness of the regression results. The residuals plotted against the predicted values were examined and no obvious patterns were observed so homoscedasticity was assumed. Statistical significance was considered as a p-value less than 0.05.

Results

Study Sample

With a response rate of 77%, a total of 1,156 complete questionnaires were collected. This sample size represented 14.9% of the eligible student population at UAEM. Most students in the first through eighth semester of university at UAEM were younger than 26 years old, so 47 students were excluded from this analysis due to being older than the average student. Excluded students were more likely to have studied longer at UAEM, be married, have children, have a higher income, have sexual experience, and to have had a previous Pap smear (data not shown).

Heard of HPV

Table 2 shows the demographic, behavioural characteristics and healthcare access for the sample. Of the 1,109 students in this analysis, 16.9% of them had never heard about HPV. A small proportion of students lived in marginalised communities with 14.3% who reported not having running water in their home and 6.0% who reported having inadequate sewage disposal. Among the 60.1% of the students who reported having had sexual experience, the mean age at first sexual experience was 17.5 years and the average lifetime number of sexual partners was 2.9. While 70.7% of sexually experienced students had used some form of contraception, only 11.9% reported having used a medical type of contraception. Over 70% of the students had health insurance yet only 12% of the female students had had a previous Pap smear.

The youngest university students (17–18 year olds) had almost four times the odds of not having heard about HPV compared to the students 23–25 years old. Non-science students had more than three times the odds of not having heard about HPV compared to the health science students while first year students had 1.81 times the odds of not having heard about

HPV compared to fourth year students. Students who had never married had more than two times the odds and students without children had almost 3.5 times the odds of not having heard of HPV compared to their counterparts; however, few individuals were married or had children and the confidence intervals for these odds ratios included one. Students who lived in marginalised communities, as characterized by a home with an inadequate sewage disposal system had 2.5 higher odds of not having heard of HPV. Not having health insurance and not having sexual experience were associated with a 1.5 higher odds of not having heard of HPV while not having a previous Pap smear increased the odds by 2.4 (Table 2).

The adjusted model for awareness of HPV is presented in Table 3. The adjusted model included sex, age, field of study, sewage disposal, health insurance and sexual experience. The adjusted odds of not having heard of HPV were about 50% higher for males compared to females (adjusted OR 1.47). Non-science students had more than 3 times greater adjusted odds of not having heard of HPV compared to health science students while the odds of science and engineering students not having heard about HPV were 1.5 times higher, but the 95% confidence interval did not exclude one. The adjusted odds of not having heard of HPV were more than twice as high for students with inadequate disposal systems, about 50% higher for students with no health insurance and 65% higher for students with no sexual experience. Year in school, not having had a Pap smear and using contraceptives were not associated with awareness of HPV in the adjusted model. The adjusted model only accounted for about 10% of the variance in the outcome and no statistically significant interactions were found. When stratified by sex, females who were non-science students or females who had improper sewage drainage had greater odds of not having heard of HPV. Males who did not have sexual experience, health insurance, or who were non-science students were less likely to have heard about HPV (data not shown).

Specific HPV Knowledge (HPV Knowledge Index)

Students had a mean score of 4.6 (SD 1.7) and a median score of 5 on the 10 item HPV knowledge index (range = 0–9). Overall, females had a higher mean knowledge score compared to men. Students with running water in the home had a higher knowledge score than students without running water but none of the other socioeconomic variables were associated with level of knowledge. Students with sexual experience, who used contraceptives, and had health insurance, had higher knowledge scores than their counterparts, but the confidence intervals included zero. Students who used a medical type of contraceptive had a knowledge score 0.74 points higher than students who did not use contraceptives. Female students who had previously had a Pap smear had a mean knowledge score 1.1 points higher than female students who had not had a previous Pap smear (Table 4).

Two multiple regression models are presented in Table 5. The first model included the original covariates as main effects while the second model also included significant statistical interaction terms. In the first model, after adjustment for age, field of study, year in university, having running water at home, and having had a Pap smear for females, students in health science had higher knowledge than either science or non-science students. Students in their fourth year of university studies scored on average 0.31 points higher than students in earlier years. Students with running water in their home scored 0.46 points higher than students without running water. Females had higher knowledge scores than males and females who had had a previous Pap smear tended to score higher than females without a previous Pap smear. By including significant interaction terms, the second model found that health science students in their fourth year scored 1.30 points higher than non-science students whereas the other health science students only scored 0.49 points higher than non-science students after adjustment. Having running water in the home increased the

HPV knowledge score by about a point compared to students without running water. Having health insurance did not affect students with running water as the interaction term negated the effect of health insurance. Both models only accounted for about 9% of the variation in HPV knowledge.

Discussion

This cross-sectional study explored the level of awareness and knowledge about HPV in a Mexican college population. We found that a large percentage of students (83.1%) had previously heard about HPV, but they could correctly answer only about half of the specific knowledge questions. Participants who were male, studied science and engineering or a non-science field, lived in the most marginalized communities, lacked health insurance or did not have sexual experience were more likely to have never heard about HPV than other participants. Level of knowledge about HPV was higher for fourth year health science students, females who had previously had a Pap smear and students with running water in the home. Having health insurance increased HPV knowledge among students without running water in their home.

The proportion of students who had heard about HPV in our sample was high or comparable with other recent studies of college students. Following the release of the HPV vaccine, the proportion of students who reported they had previously heard about HPV ranged from 29.8% of college and high school students in southern Italy (Di Giuseppe *et al.* 2008) to 78% of college students in Florida (Gerend & Magliore 2008) to 83.8% of young college women in Kentucky (Crosby *et al.* 2007). UAEM students may have been more likely to have heard about HPV due to the proximity of the university to the National Institute of Public Health in Mexico which is one of the sites for the Merck HPV vaccine clinical trials and has conducted numerous studies on the natural history of HPV in men and women (Lazcano Ponce *et al.* 2001, Sánchez-Alemán *et al.* 2002, Salmerón *et al.* 2003, Perez *et al.* 2008).

Research in Mexico on awareness of HPV is scarce and this is the first study to our knowledge focusing on Mexican college students. One study, conducted in Ciudad Juárez, Mexico, a U.S.-Mexico border city, found that 51.7% of the 60 sampled women reported knowing at least a little about HPV (Moraros *et al.* 2006). In a separate study in Morelos, Mexico, only 1.9% of women aged 15 to 49 years old knew that HPV is the main risk factor for cervical cancer (Lazcano-Ponce *et al.* 2001). These previous findings suggest that the college students at UAEM had a higher awareness of HPV which could be due to the students' recent education or to the increased publicity of HPV from the relatively recent release of the HPV vaccine.

We found that males were less likely than females to have heard about HPV. Other studies of studies of students in the Netherlands, United States and Italy also have found that male students are less likely to have heard of HPV (Baer *et al.* 2000, Di Giuseppe *et al.* 2008, Lenselink *et al.* 2008). Additionally, we found that students in health science fields were more likely to have heard about HPV than students in other fields. A study of university and technical school students in the Netherlands also found that medical students were more likely than other students to have heard about HPV (Lenselink *et al.* 2008). In another study, physician's assistant students had higher HPV knowledge than psychology students (Lambert 2001). Although in our study these physician's assistant and psychology students would have both been categorized as health science students, it exemplifies how students in programmes more closely related to medical science had greater knowledge about HPV than someone who has less of that type of focus. Also in agreement with our findings, Dell and colleagues found that sexually inexperienced students were less likely to have heard about

HPV (Dell *et al.* 2000). However, not all studies found this association (Lambert 2001, Hoglund *et al.* 2009).

The evidence of whether females had more accurate knowledge about symptoms and risk factors for HPV than males is conflicting. Two studies found an association between being female and having higher HPV knowledge (Baer *et al.* 2000, Yacobi *et al.* 1999) but two other studies did not find this association (Dell *et al.* 2000, Lambert 2001). Our findings suggest that in this population, women who see physicians for Pap smears have more accurate HPV knowledge. However, in a study of urban Mexican physicians, only 86% of obstetricians and gynaecologists and 79% of general practitioners accurately identified HPV as the main cause of cervical cancer which could imply that some women receiving Pap smears may receive incorrect information about HPV and cervical cancer (Aldrich *et al.* 2005).

We found that students from more marginalised communities, including those with inadequate sewage disposal and no running water in the home, had lower awareness and knowledge about HPV. Among these students, those with health insurance had a higher level of knowledge than those without insurance. It is possible that students from marginalised communities, despite being well educated themselves, live in a community with lower education and health literacy than students living in less marginalised areas. Research in Ghana found that community level literacy, more than individual literacy, was associated with health knowledge (Andrzejewski *et al.* 2009). Therefore, it is feasible that community characteristics were involved in the decreased HPV knowledge we observed among students from highly marginalised communities and that access to health care, as measured by having health insurance, played a particularly critical role in increased knowledge among these students. However, it is beyond the scope of this study to assess the mechanisms through which neighbourhood characteristics and health insurance affected HPV knowledge.

This research has some limitations. Given the cross-sectional study design, we were unable to assess the temporality between the measured factors and HPV awareness and knowledge. It is possible, for example, that health science students chose to study that field because of their already increased knowledge about reproductive health, or it is also possible that they gained the awareness and knowledge about HPV during their studies. Furthermore, only students who were present on the day of the class sampling were included in the study, thus students with high absenteeism would be less likely to be included. It is also important to note that the student population at UAEM may not be representative of students at other Mexican public universities because it is located in the same city as INSP and therefore the students may have been more knowledgeable about HPV than students in other Mexican states since the HPV vaccine trials were conducted in Morelos. Finally, our statistical models accounted for only a small proportion of the variation in knowledge in this population. More research in Mexican college students which investigates other underlying mechanisms of knowledge would be useful to help explain more of the variation in HPV knowledge and to target appropriate health education programmes.

As one of the first studies about HPV knowledge in Mexican college students and since research about HPV knowledge remains limited in Mexico, this study provides important information for clinicians, educators and policy makers. Although a large percentage of college students at UAEM had heard about HPV, they did not have highly accurate knowledge about this virus. When the HPV vaccination is more widely distributed in Mexico, accurate HPV knowledge may affect uptake of vaccination since it has been suggested that HPV vaccine uptake is related to perception of risk (Lazcano-Ponce *et al.* 2001). If students do not understand what the risk factors for HPV are, they might not feel at

risk and be more likely to reject vaccination. Accurate HPV knowledge may also affect acceptability and understanding about the HPV DNA test which is currently being evaluated in a population study in Morelos, Mexico at the National Institute of Public Health (Flores *et al.* 2002). Increasing levels of HPV knowledge could help increase rates of cervical cancer screening in the national screening programme. This study provides a baseline estimate of HPV knowledge in college students in Mexico and future studies should evaluate the effect of HPV knowledge on the actual uptake of the vaccine and use of the DNA test.

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Table 1

HPV knowledge index questions

Question
Someone can have an HPV infection without knowing it
If a woman has HPV, she needs to have a Pap smear more often
The Pap smear is the only test to detect HPV infection
Someone can get infected with HPV by using public restrooms, pools or by sharing underwear or towels
HPV infections can be cured with antibiotics
HPV can cause problems with menstruation
HPV is a sexually transmitted infection
Certain kinds of HPV can cause cervical cancer and genital warts
HPV infection does not cause any symptoms (it does not cause pain, itching or burning)
HPV infection can be diagnosed with a test called vaginal cytology (Pap) and with colposcopy

Table 2

Characteristics of study participants and odds ratios for not having heard of HPV

Characteristic	Number (%)	No HPV Knowledge ("not heard of HPV") Number (%)	Odds Ratio	95% Confidence Interval
Demographic characteristics				
Sex				
- Male	477 (43.0)	87 (18.2)	1.19	0.87, 1.63
- Female	632 (57.0)	100 (15.8)	1	
Age				
- 17–18	173 (15.6)	43 (24.9)	3.72	1.67, 8.29
- 19–20	499 (45.0)	84 (16.8)	2.28	1.07, 4.87
- 21–22	339 (30.6)	52 (15.3)	2.04	0.93, 4.45
- 23–25	98 (8.8)	8 (8.2)	1	
Field of study				
- Health science	229 (20.7)	18 (7.9)	1	
- Science and engineering	322 (29.0)	44 (13.7)	1.86	1.04, 3.30
- Non-science	558 (50.3)	125 (22.4)	3.38	2.01, 5.70
Year of study				
- 1 st year	342 (30.8)	74 (21.6)	1.81	1.11, 2.94
- 2 nd year	299 (27.0)	47 (15.7)	1.22	0.73, 2.05
- 3 rd year	272 (24.5)	40 (14.7)	1.13	0.66, 1.92
- 4 th year	196 (17.7)	26 (13.3)	1	
Marital status				
- Never married	1054 (95.0)	182 (17.3)	2.09	0.82, 5.31
- Ever married	55 (5.0)	5 (9.1)	1	
Children				
- Yes	35 (3.2)	2 (5.7)	1	
- No	1074 (96.8)	185 (17.2)	3.43	0.82, 14.44
Running water in the home				
- Yes	950 (85.7)	157 (16.5)	1	
- No	159 (14.3)	30 (18.9)	1.18	0.76, 1.81
Sewage disposal				
- Septic tank/Sewer	922 (83.1)	141 (15.3)	1	
- Drained into a	67 (6.0)	21 (31.3)	2.53	1.46, 4.37
river/none				
- Don't know	120 (10.8)	25 (20.8)	1.46	0.91, 2.35
Has a computer				
- Yes	837 (75.5)	136 (16.3)	1	
- No	272 (24.5)	51 (18.8)	1.19	0.83, 1.70
Personal monthly income (in pesos) ^A				
- < 1,365	445 (42.1)	72 (16.2)	1.03	0.64, 1.67
- 1,365–2,729	289 (27.3)	56 (19.4)	1.28	0.77, 2.12

Characteristic	Number (%)	No HPV Knowledge (“not heard of HPV”) Number (%)	Odds Ratio	95% Confidence Interval
- 2,730–4,094	153 (14.5)	22 (14.4)	0.90	0.49, 1.65
≥ 4,095	171 (16.2)	27 (15.8)	1	
Behavioural characteristics				
Sexual experience				
- Yes	666 (60.1)	91 (13.7)	1	1.27, 2.40
- No	443 (39.9)	96 (21.7)	1.75	
Contraceptives used ^B				
- Yes	471 (70.7)	58 (12.3)	1	0.91, 2.31
- No	195 (29.3)	33 (16.9)	1.45	
Access to healthcare				
Health insurance				
- Yes	790 (71.2)	117 (14.8)	1	1.16, 2.25
- No	319 (28.8)	70 (21.9)	1.62	
Type of contraceptives used ^B				
- Condom	356 (53.4)	49 (13.8)	1.42	0.64, 3.12
- Medical	79 (11.9)	8 (10.1)	1	
- Other	36 (5.4)	1 (2.8)	0.25	0.03, 2.11
- None	195 (29.3)	33 (16.9)	1.81	
Previous Pap smears				
- Yes	76 (12.0)	6 (7.9)	1	1.00, 5.62
- No	556 (88.0)	94 (16.9)	2.37	

^A N = 1058; 51 students responded "other" and were excluded

^B N = 666; 443 students were missing because they had not had sex

Table 3

Adjusted odds ratios of not having heard of HPV among Mexican college students from stepwise logistic regression ^A

Characteristics	Adjusted odds ratio ^B N = 1109	95% CI
Sex		
- Male (vs. female)	1.47	1.04, 2.08
Field of study		
- Health science	1	
- Science and engineering	1.68	0.93, 3.05
- Non-science	3.26	1.92, 5.54
Sewage disposal		
- Septic tank/Sewer	1	
- Drained into a river/none	2.40	1.35, 4.25
- Don't know	1.63	0.99, 2.69
Health insurance		
- No (vs. yes)	1.47	1.05, 2.08
Sexual experience		
- No (vs. yes)	1.65	1.17, 2.33

^A The adjusted model also included continuous age centered at the median

^B Pseudo R-square = 0.1015

Table 4

Mean scores and unstandardised regression coefficients for HPV knowledge index among Mexican college students

Characteristic	N	Mean (SD)	B ^A	95% Confidence Interval
Demographic characteristics				
Sex				
- Male	390	4.3 (1.8)	Ref	
- Female	532	4.9 (1.6)	0.51	0.29, 0.73
Age				
- 17–18	130	4.5 (1.7)		
- 19–20	415	4.5 (1.7)		
- 21–22	287	4.7 (1.7)		
- 23–25	90	5.2 (1.8)		
Age (continuous)	922		0.11	0.05, 0.18
Field of study				
- Health science	211	5.2 (1.7)	0.78	0.51, 1.06
- Science and engineering	278	4.7 (1.6)	0.29	0.04, 0.55
- Non-science	433	4.4 (1.7)	Ref	
Year of study				
- 1 st year	268	4.4 (1.7)	Ref	
- 2 nd year	252	4.7 (1.8)	0.24	−0.05, 0.53
- 3 rd year	232	4.6 (1.6)	0.15	−0.14, 0.45
- 4 th year	170	5.9 (1.7)	0.68	0.35, 1.00
Marital status				
- Never married	872	4.6 (1.7)	Ref	
- Ever married	50	5.4 (1.7)	0.77	0.28, 1.25
Children				
- Yes	33	5.1 (2.1)	0.50	−0.09, 1.10
- No	889	4.6 (1.7)	Ref	
Running water in the home				
- Yes	793	4.7 (1.7)	0.43	0.12, 0.75
- No	129	4.3 (1.8)	Ref	
Sewage disposal				
- Septic tank/Sewer	781	4.7 (1.7)	−0.08	−0.58, 0.43
- Drained into a river/none	46	4.7 (2.0)	Ref	
- Don't know	95	4.4 (1.7)	−0.38	−0.98, 0.22
Has a computer				
- Yes	701	4.7 (1.7)	0.15	−0.11, 0.41
- No	221	4.5 (1.7)	Ref	
Personal monthly income (in pesos) ^B				
- < 1,365	373	4.5 (1.8)	Ref	

Characteristic	N	Mean (SD)	B ^A	95% Confidence Interval
- 1,365 – 2,729	233	4.8 (1.7)	0.34	0.06, 0.62
- 2,730 – 4,094	131	4.7 (1.7)	0.19	-0.15, 0.53
- ≥ 4,095	144	4.6 (1.6)	0.12	-0.21, 0.45
Behavioural characteristics				
Sexual experience				
- Yes	575	4.7 (1.7)	0.10	-0.13, 0.33
- No	347	4.6 (1.7)	Ref	
Age at first sexual experience ^C	575		0.10	0.03, 0.17
Contraceptives used ^C				
- Yes	413	4.7 (1.7)	0.21	-0.11, 0.52
- No	162	4.5 (1.8)	Ref	
Access to healthcare				
Health insurance				
- Yes	673	4.7 (1.7)	0.14	-0.11, 0.39
- No	249	4.5 (1.7)	Ref	
Type of contraceptives used ^C				
- Condom	307	4.6 (1.7)	0.08	-0.24, 0.41
- Medical	71	5.3 (1.7)	0.74	0.27, 1.22
- Other	35	4.7 (1.7)	0.22	-0.41, 0.84
- None	162	4.5 (1.8)	Ref	
Previous Pap smears				
- Yes	70	5.8 (1.5)	1.05	0.66, 1.43
- No	462	4.7 (1.5)	Ref	

^A The unstandardised regression coefficient (B) evaluates the difference in means compared to the reference category for categorical variables

^B N = 881; 41 students responded "other" and were excluded

^C N = 575; 347 students were missing because they had not had sex

Table 5Adjusted unstandardised regression coefficients for HPV knowledge score among Mexican college students ^A

Characteristics	Model without interactions ^B N = 922	95% CI	Model with interactions ^C N = 922	95% CI
Field of study				
- Health science	0.66	0.39, 0.93	0.49	0.19, 0.79
- Science and engineering	0.40	0.15, 0.65	0.42	0.17, 0.67
- Non-science	Ref		Ref	
Year of study				
- 4 th year (vs. 1 st – 3 rd year)	0.31	0.01, 0.61	0.10	-0.24, 0.44
Interaction				
- Health science*4 th year			0.81	0.20, 1.43
Running water in the home				
- Yes (vs. No)	0.46	0.16, 0.77	1.04	0.44, 1.64
Health insurance				
- Yes (vs. No)	0.11	-0.13, 0.35	0.78	0.13, 1.43
Interaction				
- Running water*Health insurance			-0.77	-1.46, -0.07
Previous Pap smears				
- Female - Yes	1.27	0.85, 1.70	1.28	0.85, 1.70
- Female - No	0.39	0.17, 0.62	0.39	0.17, 0.61
- Male	Ref		Ref	

^A All models adjusted for continuous age centered at the median^B Adjusted R² = 0.0875^C Adjusted R² = 0.0960