

# Vaccination against human papillomavirus among 865 female students from the health professions in central Greece: a questionnaire-based cross-sectional study

Dimitrios Papagiannis<sup>1</sup>  
George Rachiotis<sup>1</sup>  
Emmanouil K Symvoulakis<sup>2</sup>  
Alexandros Daponte<sup>3</sup>  
Ioanna N Grivea<sup>4</sup>  
George A  
Syrogiannopoulos<sup>4</sup>  
Christos  
Hadjichristodoulou<sup>1</sup>

<sup>1</sup>Department of Hygiene and Epidemiology, Faculty of Medicine, School of Health Sciences, University of Thessaly, Thessalia, <sup>2</sup>Private Family Practice Unit, Heraklion, Crete, <sup>3</sup>Department of Obstetrics and Gynaecology, University of Thessalia Medical School, Thessalia, <sup>4</sup>Department of Paediatrics, University of Thessaly, School of Medicine, General University Hospital of Larissa, Thessalia, Greece

Correspondence: George Rachiotis  
Department of Hygiene and Epidemiology, Medical Faculty, School of Sciences, University of Thessaly (Greece), 22 Papakyriazi Str, Larissa, Thessalia, Greece  
Tel +30 241 056007  
Fax +30 241 056 5051  
Email g.rachiotis@gmail.com

**Background:** There are still sparse data on vaccination coverage against human papillomavirus (HPV) among students in the health professions. The aim of this study was to investigate HPV vaccination coverage in female students from the health professions in Greece.

**Methods:** A self-administered, anonymous questionnaire was distributed to second-year and third-year female students pursuing degrees in medicine, nursing, and paramedical health disciplines in central Greece.

**Results:** Overall vaccination coverage was 44.3%. The major reason for lack of vaccination was fear about safety of the vaccine. Participants who had received information about safety of the vaccine from the mass media and paramedical students had lower vaccination coverage in comparison with students who had received information about vaccine safety from alternative sources.

**Conclusion:** Further quantitative and qualitative research is needed to design educational activities targeting female students in the health professions in order to create a positive domino effect and improve HPV vaccination coverage levels in Greece.

**Keywords:** human papillomavirus, vaccination, coverage, students, health professions, mass media, Greece

## Introduction

Cervical cancer is a major cause of cancer-related death in women.<sup>1,2</sup> Human papillomavirus (HPV) types 16 and 18 are associated with 70% of cervical cancer cases.<sup>3</sup> For Europe as a whole, there are an estimated 60,000 new cases and 30,000 deaths due to cervical cancer every year.<sup>4</sup> Existing data in Europe suggest that HPV vaccination is currently being implemented in countries with a lower cervical cancer incidence. Countries that adopted a national school-based vaccination program have achieved better vaccination coverage rates in comparison with countries where HPV vaccination is given on demand by health care professionals. In Greece, the HPV vaccine is offered free of charge for females aged 12–26 years and is given on demand. The vaccination coverage rate in Greece is estimated at only 9% of the target population.<sup>4</sup> Moreover, a recent Greek study showed that HPV vaccination coverage among adolescents was 11.9%.<sup>5</sup> A cross-sectional study in northwest Greece reported a prevalence of HPV vaccination of 11%.<sup>6</sup> Published information from Greece concerning the prevalence of HPV infection reports rates varying from 3.7% to 4.7% to 56.3%.<sup>7–10</sup> This wide variation has been attributed to factors like the study sample (colposcopy, clinic hospital, or

population-based), age, and HPV detection technique used. Endorsement of HPV vaccination by health care providers is likely to increase willingness to receive HPV vaccination.<sup>11</sup> Students in the health professions are our future health care workers. To our knowledge, there are still sparse data about vaccination coverage and the attitudes of female students in the health professions regarding vaccination against HPV. The aim of this study was to investigate HPV vaccination coverage and possible associated factors in female students from the health professions in Greece.

## Materials and methods

### Study design

The present cross-sectional study was conducted during the academic year 2011–2012. A short self-administered, anonymous questionnaire was distributed to second-year and third-year students pursuing degrees in medicine, nursing, and the paramedical health professions by a health professional with specific training about the purpose of the study. The questionnaire was distributed to 130 medical students, 500 nursing students, and 400 paramedical students at the University of Thessaly and Technological Educational Institute of Thessaly in central Greece. All participants were aged  $\leq 26$  years (the vaccine subsidy cutoff age).

### Questionnaire

The questionnaire included questions about demographics (sex, age, ethnicity, school of health sciences training) and the participants were asked to express their opinion about the value of vaccinations in terms of public health protection (fully agree, agree, uncertain, disagree, completely disagree). The subjects were also asked to express their opinion on vaccination in general (fully agree, agree, uncertain, disagree, completely disagree; dichotomous variable, agree/disagree). Further, the participants were asked: “Have you been vaccinated with the HPV vaccine (yes/no; if yes, did you receive two or three doses of the vaccine, please specify)?” If not, the participant was asked to state the reason for no vaccination (lack of time, inertia, use of alternative drugs, perception of not being at risk of serious illness, fear of vaccine side effects). The students were asked to rate the level of information about the safety of the HPV vaccine (no information, insufficient information, sufficient, very good information; dichotomous variable, sufficient/very good versus no information/insufficient information). Finally, the participants were asked about their source of information regarding the safety of the HPV vaccine, eg, the Internet/Hellenic Centre for Diseases Control and Prevention, medical

journals, representatives of pharmaceutical companies, or the mass media (television, radio, newspapers, magazines).

### Statistical analysis

All data collected were entered into a database created using Epi Info (Epi Info™ 3.5.4, Centers for Disease Control and Prevention, Atlanta, GA, USA) 2000 software. Absolute (n) and relative frequencies (%) are presented for qualitative variables, while the mean (standard deviation) is used for presentation of continuous variables. The chi-square test was used for univariate analysis of qualitative variables and the Student's *t*-test for univariate analysis of continuous data. Logistic regression analysis was used to identify factors independently associated with HPV vaccination. The relative risk, adjusted odds ratios, and 95% confidence intervals were calculated. The level of statistical significance was set at 0.05. All participants gave their informed consent for participation in the study. The study protocol was approved by the scientific committee of the Applied Public and Environmental Hygiene postgraduate program of the Medical Faculty at the University of Thessaly, Greece.

### Results

In total, 119 of 130 medical students returned the questionnaires completed (response rate 91.5%), 449 of 500 nursing students responded (89.8%), and 297 of 400 paramedical students responded (74%). Table 1 shows the basic characteristics of the 865 participants. Their mean age was 20.67 (range 18–26) years, and the majority were nursing students (51.9%) followed by paramedical (34.3%) and medical students (13.8%). In addition, 834 (96.4%) participants were ethnic Greek.

Almost all participants (99.3%) agreed that vaccinations are important for protection of public health. Three hundred and seventy-eight (44.3%) reported that they had been vaccinated against HPV (two or three doses of vaccine). Twelve of the vaccinated participants had received two doses of the vaccine and 366 had received three doses. However, the majority of the students (55.7%) had not received the HPV vaccine. The major reason for nonvaccination was fear of side effects (74.1%). Interestingly, 52.8% of the respondents reported having insufficient information/no information about the safety of the HPV vaccine.

Table 1 suggests that the mass media was the main source of information on the safety of the HPV vaccine. Table 2 shows the results for the univariate analysis of HPV vaccination. School of Health Sciences training and source of information about vaccine safety were significantly associated with the likelihood of vaccination against HPV. Paramedical students had

**Table 1** Characteristics of students in the health professions and their attitudes towards HPV vaccination

Characteristic	n/total (%) or mean (SD)
Age (mean, SD)	20.67 (2.18)
School of Science training	
Doctor	119/865 (13.8)
Nurse	449/865 (51.9)
Paramedical	297/865 (34.3)
Vaccinations are important for protecting public health	
I agree	827/833 (99.3)
I disagree	6/833 (0.7)
My opinion on vaccination is	
I agree	785/792 (92.1)
I disagree	7/792 (0.9)
Have you been vaccinated with the HPV vaccine?	
Yes	378/853 (44.3)
No	475/853 (55.7)
If no, please specify	
I don't have enough time	18/475 (3.8)
Inertia	48/475 (10.1)
Use of alternative drugs	7/475 (1.5)
I am not at risk of serious illness	46/475 (9.7)
Fear over vaccine safety	352/475 (74.1)
My information about HPV vaccine safety is	
No information/insufficient	451/854 (52.8)
Sufficient/very good	403/854 (47.2)
Sources of information	
Internet	236/865 (27.3)
Hellenic Center for Diseases Control and Prevention	22/865 (2.5)
Medical journals/books/medical practitioner	232/865 (26.8)
Pharmaceutical companies	154/865 (17.8)
Mass media	273/865 (31.5)

**Abbreviations:** HPV, human papillomavirus; SD, standard deviation.

**Table 2** Univariate analysis of HPV vaccination

Variable	HPV vaccination		
	n/total (%)	RR (95% CI)	P-value
School of Science training			
Medical	58/118 (49.2)	1.38 (1.38–1.75)	0.001
Nursing	215/439 (47.7)	1.37 (1.14–1.64)	
Paramedical	105/295 (35.6)	1.00 (ref)	
My information about safety of the HPV vaccine is			
Sufficient/very good	223/402 (55.5)	1.60 (1.37–1.88)	<0.001
No information/insufficient information	153/444 (34.5)	1.00 (ref)	
Information from mass media			
Yes	99/271 (36.5)	0.76 (0.63–0.91)	0.001
No	279/582 (47.9)		
Vaccinations are important for protection of public health			
Agree	367/815 (45.0)	0.90 (0.40–2.01)	0.807
Disagree	3/6 (50.0)		
Opinion on vaccination in general			
Agree	360/774 (46.5)	1.62 (0.50–5.26)	0.343
Disagree	2/7 (28.6)		

**Abbreviations:** CI, confidence interval; HPV, human papillomavirus; RR, relative risk; ref, reference value.

the lowest vaccination coverage (35.6%) in comparison with medical (49.2%), and nursing (47.7%) students ( $P=0.001$ ). In addition, students who had received information about vaccine safety via the mass media reported lower vaccination coverage (relative risk 0.76; 95% confidence interval 0.63–0.91) in comparison with students who had received information about vaccine safety from alternative information sources. There was no significant difference in mean age between vaccinated and nonvaccinated participants (20.9 years for the vaccinated group and 20.5 years for the nonvaccinated group;  $P=0.15$ ). Multivariate analysis (Table 3) confirmed an independent negative association between information about vaccine safety from the mass media and likelihood of vaccination against HPV (odds ratio 0.70; 95% confidence interval 0.52–0.95). Medical and nursing students were more likely to have been vaccinated against HPV than their paramedical colleagues (odds ratio 1.38; 95% confidence interval 0.98–1.5;  $P=0.06$ ).

Table 4A shows the univariate analysis for source of information and vaccination coverage against HPV. Participants who had received information about vaccine safety from the mass media had lower vaccination coverage. In contrast, students who had received information on HPV vaccine safety from the Hellenic Center for Diseases Control and Prevention had increased vaccination coverage rates against HPV (relative risk 1.88; 95% confidence interval 1.52–2.33). This finding was confirmed by multivariate analysis (Table 4B).

## Discussion

There is limited information available on HPV vaccination among students in the health professions. A recent study done in higher education students in Athens found a vaccination coverage rate of 25.8%.<sup>12</sup> A descriptive study in vocational school students in Germany found that 67% of female students aged 18–20 years were vaccinated against HPV.<sup>13</sup> On the other hand, a study from Malaysia

**Table 3** Multivariate analysis of HPV vaccination

Variable	Vaccination with HPV vaccine	
	OR (95% CI)	P-value
Information on safety of HPV vaccine		
Sufficient/very good	2.34 (1.75–3.1)	<0.001
Insufficient/no information		
Health of science training		
Medical/nursing	1.38 (0.98–1.95)	0.06
Paramedical		
Mass media		
Yes	0.70 (0.52–0.95)	0.025
No		

**Abbreviations:** CI, confidence interval; HPV, human papillomavirus; OR, odds ratio.

**Table 4A** Vaccination with HPV and source of information

Variable	Vaccination with HPV vaccine		
	n/total (%)	RR (95% CI)	P-value
<b>Source of information</b>			
Internet			
Yes	125/234 (53.4)	1.30 (1.12–1.52)	<0.001
No	253/619 (40.9)		
Hellenic center of diseases control and prevention			
Yes	18/22 (81.8)	1.88 (1.52–2.33)	<0.001
No	360/831 (43.3)		
Medical journals/books			
Yes	113/231 (48.9)	1.14 (0.97–1.34)	0.099
No	265/622 (32.6)		
Pharmaceutical companies			
Yes	76/152 (50.0)	1.16 (0.96–1.38)	0.119
No	302/701 (43.1)		
Mass media			
Yes	99/271 (36.5)	0.76 (0.63–0.91)	0.001
No	279/582 (47.9)		

**Abbreviations:** CI, confidence interval; HPV, human papillomavirus; RR, relative risk.

found that only 3.6% of students from medical, dentistry, and pharmacy faculties had been vaccinated against HPV.<sup>14</sup> Our study demonstrated an HPV vaccination coverage rate of 44.3% among students from the health professions in Greece. This rate is well above the estimated national vaccination coverage rate of 9%. Vaccination coverage among female university students in Greece has been estimated at 10.47%.<sup>15</sup> In addition, HPV vaccination coverage among female higher education students in Athens was found to be nearly 26%.<sup>12</sup> Although students from the health professions participating in our study demonstrated considerably higher vaccination coverage (44.3%) in comparison with the national target level (9%), this rate should still be considered as suboptimal. The main reason for not being vaccinated against HPV was fear of side effects. This finding is in line with a previous report that 43.86% of students who had not been vaccinated against HPV were unwilling

**Table 4B** Multivariate analysis of source of information on vaccination with HPV

Variable	Vaccination with HPV vaccine	
	OR (95% CI)	P-value
Internet		
Yes	1.57 (1.15–2.14)	0.004
No		
Hellenic center of diseases control and prevention		
Yes	5.64 (1.88–16.91)	0.002
No		
Mass media		
Yes	0.70 (0.52–0.95)	0.025
No		

**Abbreviations:** CI, confidence interval; HPV, human papillomavirus; OR, odds ratio.

to accept it because of “rumors of serious side effects”.<sup>15</sup> In addition, a recent Greek study showed that one of the most common reasons for women refusing vaccination was a fear of adverse effects.<sup>16</sup> Moreover, in a cross-sectional study of physicians and medical students in Brazil, only 38.5% believed that HPV vaccination would be free of side effects.<sup>17</sup>

Several large-scale studies have shown little or no evidence of severe side effects related to HPV vaccination. The prevalent side effects have been similar to those observed with other vaccines. According to the World Health Organization, the accumulating evidence is reassuring regarding the safety of the HPV vaccine.<sup>18,19</sup>

Our results indicate that the mass media has negatively affected uptake of HPV vaccination. Interestingly, a wave of public uncertainty regarding HPV vaccination was observed when the vaccine became available in Greece.<sup>20</sup> The mass media is a primary source of knowledge concerning HPV, and the reports about HPV vaccination have been inconsistent, varying from positive to negative.<sup>19</sup> Further, in Greece, controversial opinions on the part of health care providers about the side effects of the HPV vaccine have led to extensive debate in the mass media about its safety.<sup>19</sup> This is in accordance with the mass refusal of the H1N1 2009 vaccine due to the very limited support for its safety in the mass media.<sup>21</sup> For this reason, qualitative research is needed to focus on aspects that are complex to be studied with structured tools of data collection. Further, as Arrossi et al have shown, the impact of reports in the mass media on HPV vaccination is hard to assess prospectively in detail since vaccination target groups may differ in terms of socioeconomic status and access to health care services.<sup>22</sup>

There are several limitations to this study which need to be considered. First, its design was cross-sectional, so we could not investigate a cause and effect relationship. Second, the study is questionnaire-based, so some information bias may have occurred. Third, our results cannot be generalized to all female students in the health professions in Greece. Fourth, we did not obtain information on history of sexual activity, so we were unable to assess the effect of sexual activity on uptake of the HPV vaccine. Inclusion of a control group of students from other disciplines could have offered a further step in knowledge about this phenomenon. Finally, paramedical students had a lower response rate in comparison with medical and nursing students, so some selection bias may have occurred.

## Conclusion

In our sample, female students in the health professions had higher HPV vaccination coverage in comparison with the estimated national vaccination coverage level in Greece. Reports in the mass media and paramedical health science training have negatively impacted the likelihood of HPV vaccination among health profession students. Further research, both quantitative and qualitative, is needed to design educational activities targeting female students in the health professions in order to create a positive domino effect and improve the HPV vaccination coverage level in Greece.

## Author contributions

DP participated in study design, data collection, preparation and revision of the manuscript. GR participated in study design, data analysis, and drafting of the manuscript. EKS participated in interpretation of the results, drafting of the manuscript and revised the manuscript for important intellectual content. AD participated in the study design, interpretation of the results, and revision of the manuscript for important intellectual content. ING participated in study design, interpreted results and revised the manuscript for important intellectual content. GAS made substantial contribution in study design, results interpretation, and revision of the manuscript for important intellectual content. CH conceived the idea, defined study design, supervised data analysis, results interpretation and revised the manuscript for important intellectual content. All authors have read and approved the manuscript.

## Disclosure

The authors report no conflicts of interest in this work.

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