



Beliefs about HPV vaccination and awareness of vaccination status: Gender differences among Northern Italy adolescents

Laura Brunelli^{a,b,*}, Giulia Bravo^a, Federico Romanese^{a,c}, Marco Righini^a, Lucia Lesa^{a,d}, Anna De Odorico^a, Elisa Bastiani^e, Stefania Pascut^f, Stefano Miceli^g, Silvio Brusaferrò^a

^a Dipartimento di Area Medica, Università di Udine, Udine, Italy

^b SOC Accreditamento e Qualità, Azienda Sanitaria Universitaria Friuli Centrale, Udine, Italy

^c Dipartimento di Prevenzione, Azienda Sanitaria Universitaria Giuliano Isontina, Trieste, Italy

^d Direzione Medica di Presidio, Azienda Sanitaria Universitaria Friuli Centrale, Udine, Italy

^e Clinica di Malattie Infettive, Azienda Sanitaria Universitaria Friuli Centrale, Udine, Italy

^f Dipartimento di Salute e Benessere Sociale, Comune di Udine, Udine, Italy

^g Dipartimento di Prevenzione, Azienda Sanitaria Universitaria Friuli Centrale, Udine, Italy

ARTICLE INFO

Keywords:
HPV vaccine
Gender
Adolescents
Prevention

ABSTRACT

Human papillomavirus (HPV) is one of the most frequent sexually transmitted infectious agents worldwide, and it is responsible for a significant burden of cancers. The aim of this study was to evaluate HPV knowledge and awareness in a sample of Northeastern Italian adolescents and parental support available to them, in order to highlight potential room for improvement towards optimal HPV vaccination adherence.

Between April and May 2018 an observational questionnaire-based study was conducted in 1st year students of secondary upper schools in Udine (Italy). We quantitatively evaluated HPV knowledge, awareness and parental support level of male and female adolescents. The contribution of sociodemographic characteristics to HPV vaccination knowledge and uptake were explored using Chi-Square or Fisher test and multivariate logistic.

Knowledge about HPV vaccine resulted to be mostly insufficient among enrolled adolescents, with a worrying proportion of them believing that HPV vaccine was expected to prevent HIV/AIDS. Awareness about their vaccination status was poor, and more than half of them were not involved in HPV vaccine uptake deliberation. Girls performed better than boys in relation to knowledge, awareness and engagement.

Our results support the hypothesis that HPV vaccine knowledge and uptake can be affected by some gender bias. Improvements in adolescent health education and vaccination strategies are needed to engage and finally protect both genders from HPV.

1. Introduction

Human papillomavirus (HPV) is one of the most common agents causing sexually transmitted diseases worldwide (Sanjosé et al., 2007; Forhan et al., 2009; De Vuyst, 2009) and during 2018 it has been implied in 48,000 new cancer diagnoses in the sole Central and Eastern Europe (de Martel et al., 2020). More than one hundred papillomavirus strains have been identified already, at least fifteen of them being high-risk types. HPV-associated cancers do not only affect reproductive organs and annexes, but also oral cavity, oropharynx, tonsils, esophagus, larynx and skin (International Agency for Research on Cancer, 2002), regardless of gender. Three HPV vaccines are currently available and their

efficacy in preventing HPV-related cancer and skin lesions, as well as their safety profile, have been thoroughly proved (States et al., 2017). Two doses of HPV vaccine are offered over a six-month period to adolescents between 9 and 15 years of age, or in three doses to individuals aged 16 years or older (European Centre for Disease Prevention and Control, 2021). In Italy this schedule has been adopted for both males and females since 2018 (Ministero della Salute, 2015), but HPV vaccination offer was already in place for girls since 2007 (Intesa tra governo, 2007). Even if access to HPV vaccine is guaranteed well above the teenage years, it is important to undergo vaccination before the start of sexual life to maximize efficacy. In fact, vaccines are freely administered under 26 years of age, and target age-group individuals receive an

* Corresponding author at: via Colugna 50, 33100 Udine, Italy.

E-mail address: laura.brunelli@uniud.it (L. Brunelli).

<https://doi.org/10.1016/j.pmedr.2021.101570>

Received 12 April 2021; Received in revised form 16 August 2021; Accepted 19 September 2021

Available online 24 September 2021

2211-3355/© 2021 The Authors.

Published by Elsevier Inc.

This is an open access article under the CC BY-NC-ND license

(<http://creativecommons.org/licenses/by-nc-nd/4.0/>).

invitation for the administration by the local health authority. Despite the strong evidence of HPV carcinogenicity and the availability of effective vaccines, Italian vaccination coverage rates are still below desired targets, particularly among males (Ministero della Salute, 2017). This worrying issue is partly determined by the vaccine hesitancy phenomenon, as largely demonstrated in recent years (Bianco et al., 2019; Dubé et al., 2019) Even though adherence among boys can be affected by the recent target extension, there are little data on adolescent's knowledge about HPV, while gender inclusive education and vaccination campaigns is needed to tackle misconceptions and false beliefs. The aim of the present study was to evaluate HPV knowledge, awareness and parental support available to Northeastern Italian adolescents in order to highlight the main hindrances preventing optimal HPV vaccination adherence.

2. Methods

2.1. Data collection

Study participation was offered to all 12 upper secondary schools located in the city of Udine, Northern Italy, for a total of 990 potentially eligible students attending the 1st year. The schools were informed about the study aims and were notified that participation of students was voluntary and anonymous. Thus, a convenience sample of students that agreed to participate was identified and a written consent from parents was required for underage (<18 years) adolescents. A paper-based questionnaire was administered and collected by eight professionals from Udine University and the local health authority in each classroom during regular lecture days between April and May 2018; teachers were asked not to participate during data collection. Informed consent and questionnaires were collected separately to ensure confidentiality, a random code was used to pair the two for any further consent modification. The intelligibility of questions was tested by the research group and colleagues working with adolescents. Surveyors of the research group oversaw the data collection procedure, being available to students for any question. The questionnaire included four multiple-choice questions (Q 1–4) that specifically explored knowledge about HPV vaccination and awareness about vaccination status. Knowledge about HPV vaccine (Q1) was assessed by asking to identify the disease(s) that the HPV vaccine could prevent among HIV/AIDS, genital warts, syphilis, herpes, cervical cancer, other. Each student was asked if he/she had received HPV vaccination and, whether that was the case, how many doses he/she received (Q2). In case of HPV vaccination refusal, we investigated reasons for not having adhered (Q3), and if this choice had been discussed within family (Q4). Sociodemographic characteristics collected for each participant included sex, age, high school type (vocational, technical, academic), living place (city, suburbs, village), country of origin (Italy, other). Additional information was collected about parental level of education (primary, lower secondary, upper secondary education or Bachelor's level), occupational status (manager, freelance professional/artisan, office workers, workman/woman, housekeeper, unemployed), country of origin (Italy, other) and native language (Italian, other). The Institutional Review Board of Udine University (Italy) approved the study.

2.2. Data analysis

Considering that Udine high school students during 2018 were approximately 22,600 and assuming that their distribution range per each year could reach a maximum of 5000, a margin of error of 3.31% was calculated based on the number of questionnaires collected (747), an expected prevalence of knowledge of 50% and a 95% confidence interval. Answers given to the question about HPV vaccination aim (Q1) were used to score adolescents' knowledge, which was considered sufficient when ≥ 2 correct and < 3 wrong answers were given; this threshold was set by researchers based on selectable options. Descriptive

analyses were conducted using frequency distribution and mean (\pm SD) for qualitative and quantitative variables, respectively. Chi-Square or Fisher's test were performed to evaluate the association between sex and other variables. A multivariate logistic regression analysis with backward selection was performed to investigate which sociodemographic variable could have an impact on the higher knowledge scores. Variables initially tested in the model (two-sided) were all sociodemographic characteristics with a possible effect on adolescents' knowledge about prevention such as sex, age, type of high school, living place, country of origin, parental level of education, country of origin, SES according to parental occupation, SRH (sexual and reproductive health) information timing, SRH education. All analyses were performed using SAS 9.3 for Windows (SAS Institute Inc., Cary, North Carolina, USA), considering $\alpha = 0.05$.

3. Results

Five out of twelve high schools adhered to the study. Most parents gave their consent (80.9%, 801/990), but 54 adolescents refused to participate after parental agreement, finally resulting in 747 questionnaires were collected with a total response rate of 75.5% (747/990). Participants were predominantly males (58.8%) attending technical school (41.6%); mean age was 14.8 ± 0.9 years.

Globally, 29.5% of adolescents scored at least sufficient to the HPV vaccine knowledge question, where females scored higher than males (47.2% vs 17.5%, $p < 0.0001$). A significant proportion of them did think that HPV vaccine aim is to prevent HIV/AIDS, being them 60.8% of boys and 41.6% of girls. A total of 248 adolescents (33.2%) reported having been administered at least one HPV vaccine dose, while 139 were aware of having completed the entire vaccination cycle (18.6%). Girls were twice as likely to have received at least one HPV vaccine dose than were boys (55.8% vs 18.0%; $p < 0.0001$). More than half of adolescents did not know whether they had been vaccinated for HPV ($n = 402$, 53.8%), a lack of awareness much more represented among males. Moreover, most students had not been involved in HPV vaccination decision-making as parents were reported to hold the choice in 64.0% of cases ($n = 478$); family discussion and adolescents deciding on their own were more frequent among girls. Levels of knowledge on HPV vaccine, awareness of HPV vaccine uptake and parental support availability to respondents are summarized in Table 1.

Some adolescents ($n = 146$, 19.5%) were not able to report reasons for their HPV vaccination refusal. Reported reasons for the refusal

Table 1
Knowledge, awareness and parental support related to HPV vaccine, analysis performed by gender.

	Male (n = 439)		Female (n = 303)		P value
	No.	%	No.	%	
<i>Q1. Adolescents' perceptions of HPV vaccine prevented disease*</i>					
HIV/AIDS	267	60.8	126	41.6	<0.0001
Genital warts	36	8.2	21	6.9	0.5232
Syphilis	52	11.9	20	6.6	0.0177
Herpes	27	6.2	16	5.3	0.6182
Cervical cancer	57	13.0	130	42.9	<0.0001
<i>Q2. Adolescents' recall of vaccination uptake</i>					
1 dose received	43	9.8	66	21.8	<0.0001
≥ 2 doses received	36	8.2	103	34.0	
0 dose received	55	12.5	42	13.9	
Not known	298	67.9	90	29.7	
<i>Missing = 14</i>					
<i>Q4. Adolescents' perception of vaccination decision-making process</i>					
Discussed within family	61	13.9	66	21.8	<0.0001
Taken by the adolescent	17	3.9	21	6.9	
Taken by parents	281	64.0	197	65.0	
Not known	65	14.8	15	5.0	
<i>Missing = 24</i>					

*Multiple answers allowed.

included fear of side effects (4.0%), lack of confidence or information on HPV vaccine (2.5% and 1.9%, respectively) and the belief of not needing the vaccine as the respondent was a boy ($n = 3$; 0.4%). Reasons given for not being vaccinated are summarized in Table 2.

The multivariate analysis identified the following as sociodemographic characteristics linked to better HPV vaccine knowledge scores: being female (OR 1.54; $p < 0.0001$) and Italy as father's country of origin (OR 0.68; $p = 0.0124$).

4. Discussion

This study revealed gaps in HPV vaccine knowledge that are consistent with a recent report by colleagues from Greece (Vaidakis et al., 2017), but greater than what summarized in a review by Loke et al. (2017). In particular the number of adolescents believing that HPV vaccine can prevent HIV/AIDS is alarming, even if this misconception is not new to the scientific community (Albright and Allen, 2018; Marlow et al., 2013). Genital warts are seldom recognized as an adverse but preventable outcome of HPV infection, supporting previous observation reported for girls (Sopracordevole et al., 2013).

Moreover, awareness about own HPV vaccination status among adolescents is poor similarly to what already showed for German teens (Samkange-Zeeb et al., 2012). Sex resulted to be an important determining factor for higher HPV vaccine knowledge and awareness about own vaccination status, being these results in line with current evidence reporting females to be more likely to have heard about HPV and HPV vaccine, and showing greater knowledge than males (Vaidakis et al., 2017; McBride and Singh, 2018; Patel et al., 2016; Osazuwa-Peters et al., 2017; Adjei Boakye et al., 2017). In regard to actual vaccine coverage, data from the geographical area of Udine show that globally 49.1% of 14 and 15 year old adolescents were administered at least one dose of HPV vaccine, with females doubling the males' coverage (72.5% vs 30.8%); these data confirm the suboptimal vaccine coverage and its uneven distribution between males and females.

Adolescents reported that they were seldom involved in HPV vaccination decision-making, but attention should be taken when interpreting this result in regard to males, as the extension of the HPV vaccination target to them is quite recent. Reasons for HPV vaccination refusal in our study resulted to be similar to those found by Karafillakis and Larson (2017) which were grouped as reasons related to vaccines themselves (vaccine not necessary, concern about vaccine safety), trust (mistrust vaccines), being vaccines *not natural* (alternative public health measures available), lack of information and being too young (*body*).

Besides this, evidence about both HPV-related cancers other than cervical (International Agency for Research on Cancer, 2002) and their increasing incidence is growing (Chaturvedi et al., 2011); it is then important for these reasons to counteract any gender bias in SRH education and HPV vaccine promotion by shifting the paradigm of HPV as a women's health problem (Patel et al., 2016) to acknowledge that HPV is a threat for both men and women (Osazuwa-Peters et al., 2017). While the link between knowledge, awareness and practice has not been fully clarified (Jacobson et al., 2016), its positive effect on HPV vaccine uptake improvement has already been suggested (Licht et al., 2010). In any case, access to health information remains one of the fundamental adolescent rights (United Nations, 2016), considering also that knowledge about HPV was reported as being associated to safer sexual practices among adolescents (Albright and Allen, 2018), thus providing an additional benefit for the larger goal of sexual and reproductive health education and promotion.

As already highlighted by the scientific community, actions that could improve adolescent SRH education and promotion should include:

- Targeting both girls and boys for HPV-related topics (Osazuwa-Peters et al., 2017; Napolitano et al., 2016; Garfield et al., 2016);

Table 2

Reasons for not being vaccinated against HPV in relation with sex.

Q3. Which were the reasons for not getting vaccinated/not being administered HPV vaccine?	Male (n = 439)		Female (n = 303)		P value
	No.	%	No.	%	
Fear of side effects	10	2.3	20	6.6	0.0034
Lack of confidence on HPV vaccine	6	1.4	13	4.3	0.0134
Lack of information on HPV vaccine	9	2.1	5	1.7	0.6908
Not necessary when having regular Pap smear screening	0	0.0	1	0.3	0.2289
Not necessary as teen has not had sexual debut yet	3	0.7	4	1.3	0.3795
Not known	113	25.7	33	10.9	<0.0001
Other	26	5.9	7	2.3	0.0187
Missing = 6					

- Recognizing the importance of all HPV related cancers (other than cervical one) to decrease men and women complacency toward HPV vaccination (Osazuwa-Peters et al., 2017);
- Networking with schools to provide information and support to adolescents (Loke et al., 2017; Lefevre et al., 2019; Gualano et al., 2016);
- Taking advantage of new media to involve young people (Napolitano et al., 2016; Lefevre et al., 2019; Bragazzi et al., 2017; Johnson-Mallard et al., 2019);
- Engaging adolescents in the decision-making process about HPV vaccination (Lefevre et al., 2019);
- Fostering strategies based on healthcare professionals advocacy against vaccine hesitancy (Dubé et al., 2019; Brunelli et al., 2020).

Our study has some limitations, first of all the recall bias for HPV vaccination uptake and for reported reasons behind vaccination refusal. In addition to this, due to limited information available about socio-economic status (parental education and occupation were the only available information), our study was not able to evaluate its relation with HPV vaccine knowledge and awareness as reported by McBride and Singh (2018) and the choice of non-testing validity of questions represents another limitation of the study. Due to some difficulties reported by schools, no questions on sexual activity were posed to adolescents, preventing us from analyzing this additional aspect. Moreover, as the survey was provided only to adolescents attending high schools in the city of Udine, due to the study design and sampling methods used, we cannot know if results would have been the same in other settings and therefore representativeness of the sample could have been affected by any selection bias unknown to the researchers. Lastly, even if anonymity was clarified to participants, the effect of social desirability bias cannot be ruled out.

5. Conclusion

This study supports the observation that HPV vaccine knowledge and uptake can still be affected by gender and therefore more efforts should be made to engage and finally protect both men and women from HPV.

Declaration of Competing Interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

Acknowledgements

The Authors wish to thank L. Possamai, E. Bertola, R. Condolo, G. Dominici, F. Mattiussi and F. Paglino (Dipartimento di Prevenzione, Azienda Sanitaria Universitaria Friuli Centrale) for their help in data collection, and Dr D. Gnesutta and Dr G. Brianti, from the Dipartimento

di Prevenzione, Azienda Sanitaria Universitaria Friuli Centrale, for their support in the A-SCAN project.

Funding

This research did not receive any specific grant from funding agencies in the public, commercial, or not-for-profit sectors.

References

- Adjei Boakye E, Tobo BB, Rojek RP, Mohammed KA, Geneus CJ, Osazuwa-Peters N. Approaching a decade since HPV vaccine licensure: Racial and gender disparities in knowledge and awareness of HPV and HPV vaccine. *Hum Vaccines Immunother* [Internet]. 2017;13(11):2713–22. Available from: <https://doi.org/10.1080/21645515.2017.1363133>.
- Albright AE, Allen RS, 2018. HPV Misconceptions Among College Students: The Role of Health Literacy. *J Community Health* [Internet]. 2018;43(6):1192–200. Available from: <https://doi.org/10.1007/s10900-018-0539-4>.
- Bianco A, Mascaro V, Zucco R, Pavia M. Parent perspectives on childhood vaccination: How to deal with vaccine hesitancy and refusal? *Vaccine* [Internet]. 2019;37(7):984–90. Available from: <https://doi.org/10.1016/j.vaccine.2018.12.062>.
- Bragazzi NL, Barberis I, Rosselli R, Gianfredi V, Nucci D, Moretti M, et al. How often people google for vaccination: Qualitative and quantitative insights from a systematic search of the web-based activities using Google Trends. *Hum Vaccines Immunother* [Internet]. 2017;13(2):464–9. Available from: <https://doi.org/10.1080/21645515.2017.1264742>.
- Brunelli L, Valent F, Romanese F, Tricarico P, Pellizzaro A, d'Angelo M, et al., 2020. Parental trust and beliefs after the discovery of a six-year-long failure to vaccinate. Available from *Hum. Vaccin. Immunother.* [Internet] 4, 1–5. <https://www.tandfonline.com/doi/full/10.1080/21645515.2020.1777820>.
- Chaturvedi, A.K., Engels, E.A., Pfeiffer, R.M., Hernandez, B.Y., Xiao, W., Kim, E., Jiang, B., Goodman, M.T., Sibug-Saber, M., Cozen, W., Liu, L., Lynch, C.F., Wentzensen, N., Jordan, R.C., Altekruse, S., Anderson, W.F., Rosenberg, P.S., Gillison, M.L., 2011. Human papillomavirus and rising oropharyngeal cancer incidence in the United States. *J. Clin. Oncol.* 29 (32), 4294–4301.
- Committee, A., 2017. Meeting of the Global Advisory Committee on Vaccine Safety, 7–8 June 2017. *Relev. Epidemiol. Hebd.* 92 (28), 393–402.
- de Martel C, Georges D, Bray F, Ferlay J, Clifford GM. Global burden of cancer attributable to infections in 2018: a worldwide incidence analysis. *Lancet Glob Heal* [Internet]. 2020;8(2):e180–90. Available from: [https://doi.org/10.1016/S2214-109X\(19\)30488-7](https://doi.org/10.1016/S2214-109X(19)30488-7).
- De Vuyst H, Clifford J, Li N, Franceschi S. HPV infection in Europe. *Eur J Cancer* [Internet]. 2009;45(15):2632–9. Available from: <https://doi.org/10.1016/j.ejca.2009.07.019>.
- Dubé É, Farrands A, Lemaitre T, Boulianne N, Sauvageau C, Boucher FD, et al. Overview of knowledge, attitudes, beliefs, vaccine hesitancy and vaccine acceptance among mothers of infants in Quebec, Canada. *Hum Vaccines Immunother* [Internet]. 2019; 15(1):113–20. Available from: <https://doi.org/10.1080/21645515.2018.1509647>.
- European Centre for Disease Prevention and Control. Human Papillomavirus Infection: recommended vaccinations [Internet]. Available from: <https://vaccine-schedule.ecdc.europa.eu/Scheduler/ByDisease?SelectedDiseaseId=38&SelectedCountryId ByDisease=-1>. Accessed date 16th August 2021.
- Forhan, S.E., Gottlieb, S.L., Sternberg, M.R., Xu, F., Datta, S.D., McQuillan, G.M., Berman, S.M., Markowitz, L.E., 2009. Prevalence of sexually transmitted infections among female adolescents aged 14 to 19 in the United States. *Pediatrics* 124 (6), 1505–1512.
- Garfield, C.F., Duncan, G., Peters, S., Rutsohn, J., McDade, T.W., Adam, E.K., Coley, R.L., Chase-Lansdale, P.L., 2016. Adolescent reproductive knowledge, attitudes, and beliefs and future fatherhood. *J. Adolesc. Heal.* 58 (5), 497–503.
- Gualano, M.R., Stillo, M., Mussa, M.V., Zotti, C.M., 2016. Cross sectional study investigating the differences in knowledge and behaviors about HPV between vaccinated and non-vaccinated girls. *J. Prev. Med. Hyg.* 57 (3), E121–E127.
- International Agency for Research on Cancer, 2002. International Agency for Research on Cancer Iarc Monographs on the Evaluation of Carcinogenic Risks To Humans. Iarc Monogr Eval Carcinog Risks To Humansarc Monogr Eval Carcinog Risks To Humans [Internet]. 2002;96:i-ix+1-390. Available from: <http://monographs.iarc.fr/ENG/Monographs/vol83/mono83-1.pdf>.
- Jacobson, R.M., Agunwamba, A.A., St. Sauver, J.L., Finney Rutten, L.J., 2016. The most effective and promising population health strategies to advance human papillomavirus vaccination. *Expert Rev. Vaccines* 15 (2), 257–269.
- Johnson-Mallard, V., Darville, G., Mercado, R., Anderson-Lewis, C., MacInnes, J., 2019. How health care providers can use digital health technologies to inform human papillomavirus (HPV) decision making and promote the HPV vaccine uptake among adolescents and young adults. *Biores Open Access.* 8 (1), 84–93.
- Intesa tra governo, Regioni e Provincie autonome, 2007. Strategie per l'offerta attiva del vaccino contro l'infezione da Hpv in Italia. 2007.
- Karafilakis E, Larson HJ. The benefit of the doubt or doubts over benefits? A systematic literature review of perceived risks of vaccines in European populations. *Vaccine* [Internet]. 2017;35(37):4840–50. Available from: <https://doi.org/10.1016/j.vaccine.2017.07.061>.
- Lefevre, H., Samain, S., Ibrahim, N., Fourmaux, C., Tonelli, A., Rouget, S., Mimoun, E., Tournemire, R.D., Devernay, M., Moro, M.R., Lachal, J., 2019. HPV vaccination and sexual health in France: empowering girls to decide. *Vaccine* 37 (13), 1792–1798.
- Licht, A.S., Murphy, J.M., Hyland, A.J., Fix, B.V., Hawk, L.W., Mahoney, M.C., 2010. Is use of the human papillomavirus vaccine among female college students related to human papillomavirus knowledge and risk perception? *Sex Transm. Infect.* 86 (1), 74–78.
- Loke, A.Y., Kwan, M.L., Wong, Y.-T., Wong, A.K.Y., 2017. The uptake of human papillomavirus vaccination and its associated factors among adolescents: A systematic review. *J. Prim Care Commun. Heal.* 8 (4), 349–362.
- Marlow LAV, Zimet GD, McCaffery KJ, Ostini R, Waller J. Knowledge of human papillomavirus (HPV) and HPV vaccination: An international comparison. *Vaccine* [Internet]. 2013;31(5):763–769. Available from: <https://doi.org/10.1016/j.vaccine.2012.11.083>.
- McBride, K.R., Singh, S., 2018. Predictors of Adults' Knowledge and Awareness of HPV, HPV-Associated Cancers, and the HPV Vaccine: Implications for Health Education. *Heal Educ. Behav.* 45 (1), 68–76.
- Ministero della Salute, 2015. Piano Nazionale Prevenzione Vaccinale 2016-2018. Ministero della Salute. Coperture vaccinali al 31/12/2017 per HPV. 2017;1997:13.
- Napolitano F, Napolitano P, Liguori G, Angelillo IF. Human papillomavirus infection and vaccination: Knowledge and attitudes among young males in Italy. *Hum Vaccines Immunother* [Internet]. 2016;12(6):1504–10. Available from: <https://doi.org/10.1080/21645515.2016.1156271>.
- Osazuwa-Peters N, Adjei Boakye E, Mohammed KA, Tobo BB, Geneus CJ, Schootman M. Not just a woman's business! Understanding men and women's knowledge of HPV, the HPV vaccine, and HPV-associated cancers. *Prev Med (Baltim)* [Internet]. 2017; 99(2017):299–304. Available from: <https://doi.org/10.1016/j.ypmed.2017.03.014>.
- Patel, H., Jeve, Y.B., Sherman, S.M., Moss, E.L., 2016. Knowledge of human papillomavirus and the human papillomavirus vaccine in European adolescents: A systematic review. *Sex Transm. Infect.* 92 (6), 474–479.
- Samkange-Zeeb, F., Spallek, L., Klug, S.J., Zeeb, H., 2012. HPV infection awareness and self-reported HPV vaccination coverage in female adolescent students in two German cities. *J. Commun. Health.* 37 (6), 1151–1156.
- Sanjosé, S., Díaz, M., Castellsagué, X., Clifford, G., Bruni, L., 2007. Worldwide prevalence and genotype distribution of cervical HPV in women with normal cytology. Available from *Lancet Infect* [Internet]. 7 (7), 453–459. <http://www.ncbi.nlm.nih.gov/pubmed/17597569>.
- Sopracordevole, F., Cigolot, F., Mancioi, F., Agarossi, A., Boselli, F., Ciavattini, A., 2013. Knowledge of HPV infection and vaccination among vaccinated and unvaccinated teenaged girls. *Int. J. Gynecol. Obstet.* 122 (1), 48–51.
- States, M., Strategic, WHO, Group, A., Grade, T., Sage, T., 2017. Human papillomavirus vaccines: WHO position paper, May 2017. *Relev. Epidemiol. Hebd.* 92(19):241–268. [34] United Nations, 2016. General Comment No. 22: the right to sexual health and reproductive health [Internet]. 2016. Available from: <http://docstore.ohchr.org/SelfServices/FilesHandler.ashx?enc=4siQ6QSmIBEDzFEovLCuW1a0Sza b0oXTdimnsJZZVQFQejF41Tob4CvIjeTiAP6sGFQktiae1vlbbOAEkmaOwDOWsUe 7N8TLm%2BP3HJpzjHySkUoHMavD%2Fpyfcp3Ylzg>.
- Vaidakis D, Moustaki I, Zervas I, Barbouni A, Merakou K, Chrysi MS, et al. Knowledge of Greek adolescents on human papilloma virus (HPV) and vaccination. *Med (United States).* 2017;96(1).