



REVIEW ARTICLE

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SOCIAL CONSIDERATIONS AFFECTING ACCEPTANCE OF HPV VACCINATION IN COLOMBIA. A SYSTEMATIC REVIEW

Aspectos sociales que han afectado la aceptación de la vacunación contra el virus del papiloma humano en Colombia. Una revisión sistemática

Francisco Palencia-Sánchez, MD, MSc, PhD (c)¹; Sandra Johanna Echeverry-Coral, MSc²

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ABSTRACT

Objective: To identify social factors influencing the acceptance of human papilloma virus (HPV) vaccination in the Colombian population before and after the unexpected and poorly defined event of unknown etiology which occurred in 2014.

Materials and methods: A systematic review of the literature was conducted in the following databases: Scopus, Web of Science, Medline via PubMed, Embase, Online Health Library (Biblioteca Virtual en Salud) and Ovid, and also in Google Scholar, academic repositories and in Colombian health institutions, using the terms “recombinant tetravalent vaccine against Human Papilloma Virus types 6, 11, 16, 18”, “Colombia”, “Papilloma” in order to primarily identify systematic reviews, quantitative and qualitative studies, and narrative reviews, focusing on social aspects such as education, access, relationship with healthcare staff and role of the media which may have acted as barriers

or facilitators for the acceptance of HPV vaccination in Colombia between 2006-2018. A narrative synthesis of the data was prepared.

Results: Twenty-four papers were included. The importance attached by parents, adolescents, providers and the media to having greater knowledge about HPV and its association with cervical cancer was identified. The relevance of good communication among healthcare professions and the community to enable adequate sharing of information regarding the risks and benefits of the vaccines was recognized. The inclusion of the vaccine in health insurance plans made access easier. The media must be involved as facilitators in vaccination programs.

Conclusion: Education regarding HPV, patient-centered healthcare, and adequate media coverage influence the acceptance of HPV vaccination in the Colombian population. Close follow-up of any vaccine-related adverse events is required.

Key words: Recombinant tetravalent vaccine against human papilloma virus types 6, 11, 16, 18; Colombia; papilloma.

RESUMEN

Objetivo: establecer los aspectos sociales que afectaron la aceptación de la vacuna del virus del

* Corresponding author: Francisco Palencia-Sánchez, carrera 7, # 40-62, Edificio Hospital San Ignacio, piso 8. fpalencia@javeriana.edu.co

1 MSc in Clinical Epidemiology, PhD (c) in Public Health. Department of Preventive and Social Medicine, School of Medicine, Pontificia Universidad Javeriana, Bogotá (Colombia).

2 Bacteriologist, MSc in Epidemiology. Free-lance Consultant, Bogotá (Colombia).

papiloma humano (VPH) en la población colombiana antes y después del evento mal definido e inusitado de etiología desconocida sucedido en 2014.

Materiales y métodos: se realizó una búsqueda sistemática de literatura en las bases de datos: Scopus, Web of Science, Medline vía PubMed, Embase, Biblioteca Virtual en Salud y Ovid; además, en Google Académico y en repositorios de universidades y en instituciones de salud en Colombia, con los términos: “Vacuna Tetravalente Recombinante contra el Virus del Papiloma Humano Tipos 6, 11, 16, 18”, “Colombia”, “Papiloma” y sus correspondientes términos en inglés, para identificar principalmente revisiones sistemáticas, estudios cuantitativos y cualitativos, y revisiones narrativas que se enfocaran en aspectos sociales como: educación, acceso, relación con el personal de salud, papel de los medios de comunicación, que pudieran haber actuado como barreras o facilitadores para la aceptación de vacunación para VPH en Colombia en el periodo 2006-2018. Se hace una síntesis narrativa de la información.

Resultados: se incluyeron 24 documentos. Se identificó la importancia, para los padres, adolescentes, proveedores y los medios, de tener un mejor conocimiento del VPH y su relación con el cáncer de cuello uterino (CCU). Se reconoce la relevancia de una buena comunicación entre las profesiones de la salud y la comunidad para informar adecuadamente tanto los beneficios como los riesgos de la vacuna. La inclusión en los planes de aseguramiento facilitó el acceso a esta por parte de la población. Los medios de comunicación deben ser considerados para que actúen como facilitadores de los programas de vacunación.

Conclusión: educar en el conocimiento del VPH, una atención en salud centrada en el paciente y una adecuada cobertura de los medios de comunicación influyen la aceptación del programa de vacunación contra VPH en la población colombiana. Se requiere seguir haciendo seguimiento estricto de los efectos adversos asociados a la vacuna.

Palabras clave: vacuna tetravalente recombinante contra el virus del papiloma humano tipos 6, 11, 16, 18; Colombia; papiloma.

INTRODUCTION

According to the World Health Organization, the human papilloma virus (HPV) produces the most common sexually transmitted viral infection of the reproductive tract. (1) HPV serotypes 16 and 18 give rise to lesions that may result in cervical cancer (CC) if left untreated (2). On the other hand, HPV it is also associated with the development of other types of cancer: it has been described that 50% of penile cancer is attributable to HPV, and that it accounts for 43% of vulvar cancer, 70% of vaginal cancer, and 88% of anal cancer (3).

Worldwide, cervical cancer (CC) is the fourth most common type of cancer in women (4). The incidence of CC varies significantly among countries, being the most frequent form of cancer in women in 39 countries and one of the main causes of death in 45 nations, mainly in Sub-Saharan Africa, parts of Asia and some countries in Central and South America (5-7).

The prevalence of CC has been dropping over the past 30 years, probably due to improved living conditions and the implementation of effective primary prevention programs, as is the case with mass screening programs for cervical cancer based on cervicovaginal cytology (7). In Colombia, the frequency of cervical cancer has fallen over the past 40 years, according to the Cali cancer population registry (8); however, it has been reported that this type of cancer was the second cause of death in women (7.1%) between 2012 and 2016, and the fifth cause of mortality for the period between 2014 and 2018 (6.6%). Consequently, it continues to be a public health problem (9).

By March 2017, 37% of all countries in the world had introduced the HPV vaccine in immunization plans for girls, and 6% did so for the male population as well (10). Colombia was among the countries that

pioneered the introduction of HPV vaccination in 2012, with the use of the vaccine in 9-year-old girls (11). Later, Law 1626 of April 30, 2013, ensured free vaccination with the inclusion of the HPV vaccine in the Expanded Program on Immunization (EIP) (12). In 2014, Colombia positioned itself as one of the countries with the highest rates of coverage of the target population for HPV vaccination in the world (13). In 2012, the review of the first vaccination phase revealed a total of 1,015,405 doses administered nationwide, with a coverage of 98% for the first dose, 96.9% for the second, and 89.2% for the third. In 19 out of 36 Colombian departments, coverage of the target population was 100%. Although percent coverage dropped to 87.6% for the first dose of the vaccine during the second phase (2013), a total of 4,006,426 doses were given at a national level, and 53% of the departments still had coverage figures greater than 70% (14).

After 2014, as a result of the incidents that took place in Carmen de Bolívar where more than 500 adverse events supposedly attributed to vaccination (ESAVI) were reported after the administration of the HPV vaccine (15), vaccination rates dropped to 203,276 doses nationwide, with a coverage of 63.6% for the first dose and 1.4% for the second dose by the end of the year of the event, as described by some later studies (16).

Sociocultural factors that could have contributed to a reduction in vaccination rates are not clear. There is a controversy on whether acceptance of the vaccine diminished as a result of the ESAVI or if other factors not yet studied in depth were at play. Therefore, from the conceptual framework of social health determinants (SHD), including “living and work conditions, access to health, and cultural and education factors in a particular context” (17), the aim of this review was to determine if social considerations, beyond what took place in Carmen de Bolívar, could have influenced the acceptance of HPV vaccination among Colombian women. These social considerations include education (parents, children, adolescents and healthcare professionals);

access to the vaccine (cost, socioeconomic level, region); media coverage; and the relationship with healthcare professionals. The information is synthesized in accordance with these considerations.

MATERIALS AND METHODS

This research answers the question of “Which social considerations could have influenced the reduction in HPV vaccination rates in Colombia?”. A systematic review of the published literature in English and Spanish was conducted in 6 indexed databases (Scopus, Web of Science, Medline via PubMed, Embase, *Biblioteca Virtual en Salud* and Ovid), using the search terms specified in Annex 1. Given the focus on approaching HPV vaccine acceptance from a social perspective, a wide range of grey literature documents were also included. Queries were conducted in Google Scholar, repositories of Universidad Nacional de Colombia, Universidad de Antioquia, Universidad del Valle, Pontificia Universidad Javeriana and Universidad del Rosario, as well as websites of Colombian organizations such as the Ministry of Health and Social Protection, the National Institute of Health, the Health Evaluation and Technology Institute, the National Cancer Institute and the National Institute for Food and Drug Surveillance (INVIMA), during the time period between January 2006 and April 2018.

Inclusion criteria by document type: The search included systematic reviews, controlled clinical trials, observational studies, qualitative studies and narrative reviews that considered social factors influencing acceptance of the HPV vaccine in Colombian female populations candidates to vaccination. Other documents such as editorials, letters to the editor, and government communications containing information that provided answers to the proposed research question were also considered. The Covidence software was used for literature screening based on title and abstract (18); the final selection was made after two independent reviewers read the full text (FP and SJEC); differences were settled by consensus.

The reporting quality of the included documents was assessed independently using the guidelines recommended by the EQUATOR network (19) for the different types of epidemiological and public health studies (STROBE, COREQ y CHEERS) (20-22). The Joanna Briggs critical reading guidelines for opinion texts were applied (23). The tool proposed by Guirao Goris *et al.* (24) was used for narrative review articles. For a narrative reviews with greater methodological structure, the CASPe critical reading guideline was used (25).

The results are presented in narrative form, organized in accordance with the categories defined in advance by consensus among the authors regarding social aspects, based on the DSS framework, that could influence acceptance of the vaccine: education, access to the vaccine, role of the media and relationship with the healthcare staff. The synthesis of the characteristics of the selected documents included author design, quality of the evidence and social determinants of acceptance (Table 1).

The protocol of this review was registered in the International Prospective Register of Systematic Reviews (Prospero), under code CRD42018100755.

RESULTS

Overall, 3,708 entries were identified. Of these, 129 were selected for full text evaluation and, in the end, 24 were selected for qualitative synthesis (Figure 1).

General characteristics of the studies: In terms of design, there were 8 qualitative-type documents (33.3%) which were divided into three types according to their design (26): 3 interpretative studies (27-29), 1 mixed design study (30) and 4 narrative studies (31-34). There were 9 quantitative studies in total (37.5%): 2 case studies (35,36), 1 economic assessment (37), 6 cross-sectional studies (15,16,38-41); 3 papers (12.5%) were narrative reviews (42-44) and 4 (45-48) corresponded to other types of studies (16.7%).

Publication reporting quality: In general terms, reporting quality assessment of the documents

included in the checklists showed a percentage of compliance greater than 80% in 6 documents (27,28,37,46-48); 17 were within an intermediate compliance range of 60-79% (15,16,29-32,34-36,38-45) and 1 was found to have low reporting compliance (<60 %) (33).

Social considerations included in the assessment

Education: Overall, 19 studies (79%) assessed educational factors influencing HPV vaccination in Colombia in groups of parents, adolescents, healthcare professionals and decision-makers (15,27,29-35,38,39,41-46,48). Among parents, education is not perceived as being geared towards the prevention of CC but rather towards the prevention of a sexually transmitted disease (STD). Parents believe that vaccination may induce early initiation of sexual activity among their daughters and that vaccines are only for the population under 5 years of age (28). There is evidence that shows that after receiving adequate information about the benefits of vaccination, parents comprehended the importance of vaccinating their daughters and agreed to do so (34,41). One paper out of 5 that focused on education to adolescents (15,31,34,41,45) describes little knowledge of the existence of the vaccine in this population, given the low frequency of request for medical consultation and the fact that the decision is made by their parents (31). Of 8 studies focused on education among healthcare professionals (15,27,30-33,44,45), one describes lack of adequate knowledge among primary health practitioners, healthcare professionals and decision-makers regarding adverse events and how to communicate them (33). As far as decision-makers are concerned, officials in charge of community health programs are not equipped with sufficient information about this matter (32). Likewise, a narrative review states the need for articulation of health and education domains in public health policy (44). In general, the following issue came to light: concern of physicians

Table 1.
Characteristics of the studies included in the review of the literature dealing with social issues that influenced the acceptance of HPV vaccination in Colombia

Author and year	Paper type	Groups or sources of information used for the analysis	Social considerations that influenced vaccination acceptance	Quality of the evidence (% compliance with the checklist used for the assessment)
Anaya (35)	Case study	3 women vaccinated against HPV	Education	63%-CARE
Aponte-González (37)	Economic assessment	Hypothetical cohort of women between 12 and 76 years of age	Access to the vaccine	87.5%-CHEERS
Benavides(27)	Trial	Parents	Education, relation with healthcare staff	83%-J Briggs Institute Opinion Paper Text
Bermedo-Carrasco (39)	Cross-sectional study	53521 women 13-49 years	Education	77.3% -STROBE
Bermedo-Carrasco (38)	Cross-sectional study	53521 women 13-49 years	Education, access to the vaccine	68.2%-STROBE
Caro Martínez (36)	Case study	Health technology review organizations in three countries: Colombia, Brazil and Poland	Access to the vaccine	66.6%-COREQ
Cortes-García, (30)	Public health doctoral dissertation, study based on several qualitative methodologies	Wayuu women (20-45 years), living in urban and rural areas. Local and department-level health officials (decision-makers and healthcare providers)	Education, relation with healthcare staff, media coverage	66.1%-COREQ
Téllez-Pedroza, (31)	Social science doctoral dissertation, focus group-based qualitative study	Girls, parents, teachers, healthcare providers associated with the mass event in Carmen de Bolívar	Education, relation with healthcare staff, media coverage	66%-COREQ
Jiménez-Cendales (16)	Epidemiology specialization graduation paper, cross-sectional study	Expanded immunization program database 2011-2014	Media coverage	72.5%-STROBE
Maldonado (28)	Trial	Process of introducing the HPV vaccines in the Colombian population	Relation with healthcare staff, media coverage	100% -J Briggs Institute Opinion Paper Text
Martínez (15)	Epidemiology report, cross-sectional study	Children, adolescents and young adults living in El Carmen de Bolívar seen between May 28 and October 15, 2014	Education, relation with healthcare staff	77.3%-STROBE

Continuation Table 1

Author and year	Paper type	Groups or sources of information used for the analysis	Social considerations that influenced vaccination acceptance	Quality of the evidence (% compliance with the checklist used for the assessment)
MSPS (45)	Government circular letter	Circular letter 0062 of 2014. HVP vaccination in fourth grade girls 9 years of age and older, and descolarized girls 9 to 17 years of age in the national territory.	Education, relation with healthcare staff	66.6%- Briggs Institute Opinion Paper Text
Molina Sierra (29)	Bioethics specialization graduation paper. Trial	Bioethical implications of introducing HPV vaccine in Colombian children under 14 years of age	Education	66.6%- Briggs Institute Opinion Paper Text
Nogueira- Rodrigues (46)	Commentary	Vaccination programs in Latin America	Education, Access to the vaccine	83.3%- Briggs Institute Opinion Paper Text
Nwanodi (42)	Narrative review	45 articles on attitudes towards vaccination in the Andean region	Education, media coverage	73.3%- CASPe Critical Reading Guidelines
Nwanodi (43)	Narrative review	36 articles on HPV vaccination in the Andean region	Education, media coverage	73,3 %- CASPe Critical Reading Guidelines
Piñeros (32)	Qualitative studies based on semi-structured interviews	Health Secretary General, departmental public health chief, professionals in charge of sexual and reproductive health and immunization programs	Education, relation with healthcare staff	66.6%- COREQ
Piñeros (33)	Focus group-based qualitative study	General practitioners, pediatricians and gynecologists	Education, relation with healthcare staff	55.5%- COREQ
Piñeros (40)	Cross-sectional study	Men and women and between 18 and 45 years of age with suspected genital wart lesions	Education, relation with healthcare staff	77.3%-STROBE
Sánchez-Gómez (47)	Editorial	HPV vaccination program in Colombia	Education, relation with healthcare staff	83,3 %-Briggs Institute Opinion Paper Text
Reina (48)	Editorial	HPV vaccination program in Colombia	Education, relation with healthcare staff	100%- Briggs Institute Opinion Paper Text
Salazar-Fajardo (44)	Narrative review	97 papers on the HPV vaccination strategy	Education, relation with healthcare staff, media coverage	66.6%- CASPe Critical Reading Guidelines

Author and year	Paper type	Groups or sources of information used for the analysis	Social considerations that influenced vaccination acceptance	Quality of the evidence (% compliance with the checklist used for the assessment)
Torrado-Arenas (41)	Cross-sectional study	Parents with children < 18 years	Education, relation with healthcare staff	63.6%-STROBE
Wiesner (34)	Focus group-based qualitative study	Parents of adolescents between 11 and 14 years of age attending public and private schools	Access to the vaccine, education	77.7%-COREQ

Source: Authors.

and parents about education on vaccination coming from pharmaceutical companies (33,41).

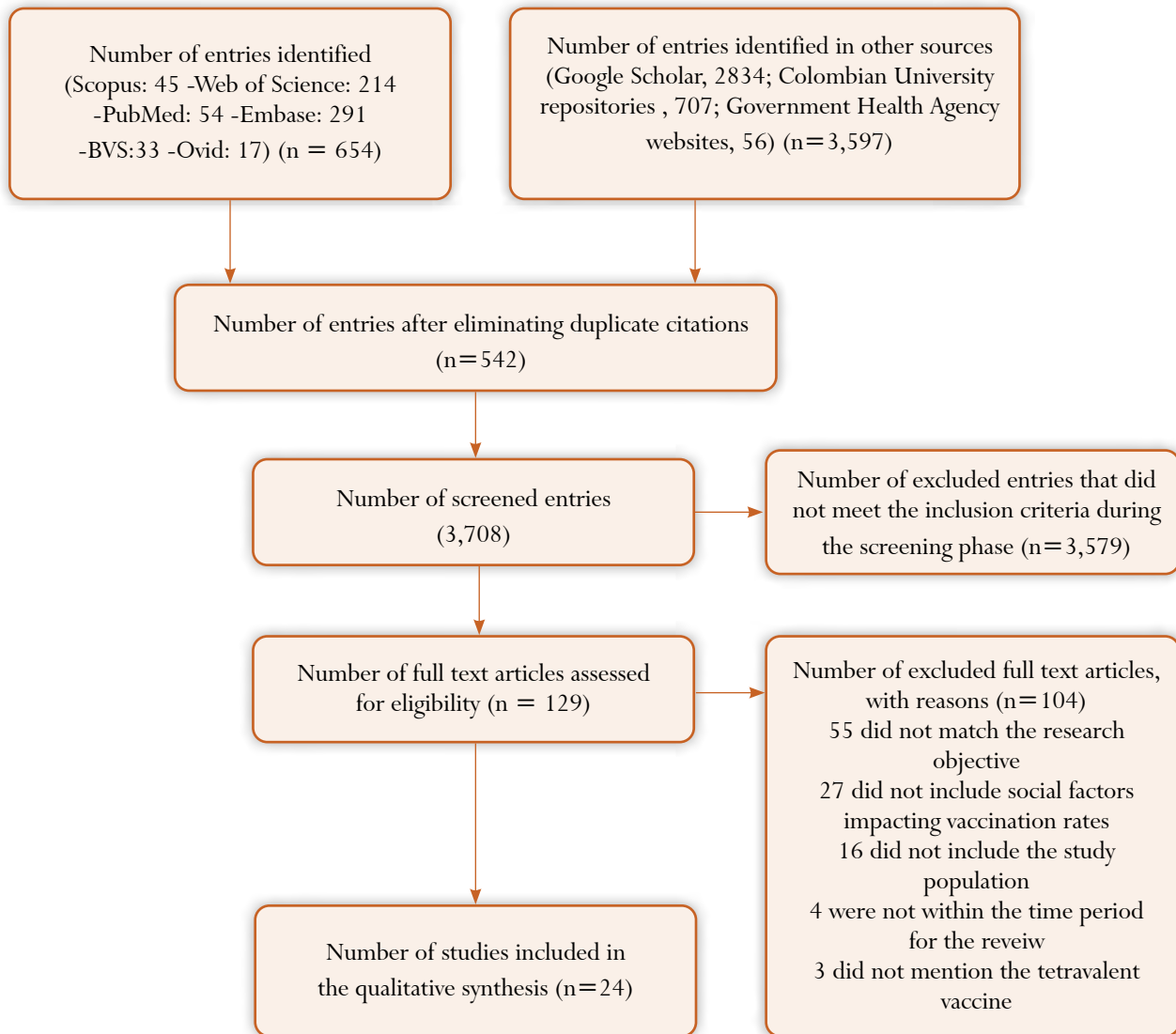
Access to the vaccine: This issue was analyzed in 7 studies (29.1%) (29,34,36-39,46). From this perspective, cost was one barrier to the vaccine before its introduction in the EPI (34); a second barrier was living in rural areas (38,39). In Colombia, from the social perspective, Aponte *et al.* found in 2013 that the vaccine was not cost-effective because of price (37). In fact, Piñeros found that, by 2012, the high cost of the vaccine was a hurdle to accessibility, although some parents would be willing to pay out of pocket because of the potential benefit for their daughters. In general terms, decision makers agreed that the cost of the vaccine could impact acceptance and delay mass implementation (32). For this reason, this vaccination program should be covered by the health system in order to increase acceptance in Latin America (44). A case study conducted after the inclusion in the EPI with health technology reviewers in three countries, including Colombia, found that access to the HPV vaccine could be challenging due to bureaucratic issues and institutional changes (36).

Relationship with the healthcare staff: This factor was examined in 8 studies (33%) (27,28,31-33,41,44,45). Four studies found that, often, healthcare staff does not pay attention to the

concerns of low income populations regarding the vaccine (31,34,41,46). On the other hand, other studies report that lack of enough information from healthcare staff regarding adverse events may be a source of anxiety among parents (27,28,32,41). Finally, information is provided without considering the specific characteristics of the recipients (36). It has been suggested that healthcare staff must be responsible for educating the community regarding the safety of the vaccine in order to avoid misconceptions about adverse events (45).

The media: Overall, 8 studies (33%) considered this factor which is of the greatest importance when it comes to implementing vaccination programs (15,16,28,31,42-44,47). One study describes that media coverage of adverse events, even if they are not of the magnitude of what happened in Carmen de Bolívar, has an impact on community acceptance of the vaccine (31). On the other hand, information provided by the media can be confusing not only for the public at large but also for members of the scientific community (16). Moreover, media coverage also creates tensions between parents and experts when reporting on vaccines and, in particular, on adverse events (28). Notwithstanding the above, media coverage is also very influential in paving the way towards acceptance of vaccination programs (27,28,42,43,47).

Figure 1.
PRISMA flow diagram depicting the article selection process



Source: Authors.

DISCUSSION

This literature review shows that vaccination rates and coverage dropped as a result of social factors such as education, the relationship with the health-care staff, and media coverage, as well as due to other considerations such as access to the vaccine in

Colombia and the ESAVI that occurred in Carmen de Bolívar in 2014 (16,27,28,44,46,47).

Regarding education, the importance of knowledge about HPV and its association with CC was identified. As for healthcare professionals, good communication is found to be relevant when it

comes to informing about the benefits and also the potential adverse events of the vaccine because healthcare professionals have the knowledge and, in some communities, the credibility as experts (40). They must improve the way they communicate the safety of the vaccine and develop stronger relationships with the adolescent population and their families (27). Including a vaccine in the EPI is an intervention that improves access for the population, regardless of their income level (36).

This points to the need for patient-centered strategies built on stronger physician-patient relationships designed to persuade rather than force people to accept vaccination. In this way, healthcare staff can be perceived as a legitimate and credible source of information (27,39).

Results show that there is a need to implement education programs targeted to the general population regarding CC and its relationship with HPV in order to increase knowledge about this association and promote vaccination (39). On the other hand, vaccination campaigns have avoided focusing on the issue of sexuality, although the literature suggests that understanding sexual transmission of HPV and the importance of vaccination plays a key role. This approach has probably been adopted in order to avoid the association between the vaccine and early initiation of sexual activity, which would hinder parental acceptance (28).

It is important to bear in mind that national vaccination programs as public health policy interventions have an intrinsic social dimension; therefore, they should consider social factors in the population in which they are implemented, not only to ensure success, but also to achieve the desired impact. Consequently, adequate community education about the risks and benefits of vaccination is relevant because uncertainty about the safety of a vaccine will play against its acceptance (34,41).

The media community must be educated about health topics so that it can provide guidance to the public (15). Likewise, when it comes to these types of interventions, communication should be

spearheaded by health authorities and not by other sources (40,41) in order to avoid misinformation.

Direct and clear communication with the community regarding potential adverse events is paramount. Additionally, given that the vaccine was promoted on television, radio and written press, it is important to ensure coordination between institutional communication channels and the media so that the latter become partners when reporting about these interventions (31).

All information reaching young girls and parents must be legitimate, reliable and adjusted to the socioeconomic and education characteristics of the target population (15,31,33,41). On the other hand, the adverse events that affected the girls and adolescents in Carmen de Bolívar brought to light the need for increased credibility of the health authorities. This requires greater pharmacovigilance data (31,36), based on effective tracking of adverse events in the vaccinated population, given that reporting and classification processes may fail (16).

Finally, as far as results are concerned, the issue of access was solved with the inclusion of the vaccine in the EPI, reducing the weight of this matter among other social factors influencing acceptance of the vaccine by the population (36,37).

The main strength of this study is the breadth of the literature search when compared to similar work such as that of Nwanodi on the topic of HPV vaccination (42,43); this author limited the search to PubMed, whereas our work was based on a wider search, including grey literature. Moreover, the review of the grey literature was not limited only to Google Scholar but also included a systematic search in repositories of important Colombian universities. Also, given that papers with different methodologies (qualitative, quantitative) were considered, the review was conducted from a broad perspective.

The limitations of this study include that the objective was to examine the problem in the Colombian context and, this undermines the external validity of the recommendations derived from this research, but the interval validity of the recommendations derived

from this work in the Colombian context is high. Another limitation was failure to focus on qualitative methodology only, explained by the fear of missing information that could be found in quantitative-type papers that could answer the research question.

CONCLUSIONS

Recognizing the implications of sociocultural considerations for practice is essential in order to increase acceptance of the vaccine by means of stronger education strategies targeted to the various stakeholders. As far as communication in the framework of the HPV vaccination program is concerned, involvement and coordination of the different players is crucial, including the media, healthcare professionals and school teachers. Healthcare professionals would benefit from training in a patient-centered care model, with the aim of building stronger relations with the patients. Further research is needed about the problems associated with HPV infection and the vaccine from a population perspective, in order to improve acceptance of this prevention measure.

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AUTHORS' CONTRIBUTIONS

Francisco Palencia-Sánchez: Conception of the review and methodological development, article search and review, information extraction, drafting and review of the paper. Sandra Johanna Echeverry-Coral: Conception of the review and methodological development, article search and review, information extraction, drafting and review of the paper.

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Annex 1.

Search strategies

Database	Search strategy used
SCOPUS	TITLE-ABS-KEY ((“human papillomavirus vaccine” OR “gardasil” OR “quadrivalent hpv vaccine” OR “hvp” OR “4HPV” OR “4hvp” OR “hvp” and (impact or effectiveness or epidemiological and monitoring or population and surveillance or program and evaluation or prevalence)) and (“ colombia “ for “ colombian AND population)) AND (EXCLUDE (SUBJAREA , “VETE “))
	TITLE-ABS-KEY ((“human papillomavirus vaccine” OR “Gardasil” OR “quadrivalent hpv vaccine” OR “qHPV” OR “4HPV” OR “4VHPV” OR “HPV4”) AND (impact OR effectiveness OR “epidemiological monitoring” OR “population surveillance” OR “program evaluation” OR prevalence) AND (“Colombia”) OR (“Colombian population”))
	TITLE-ABS-KEY ((“human papillomavirus vaccin*” AND “Colombia”))
	TITLE-ABS-KEY ((“human papillomavirus vaccine” OR “Gardasil” OR “quadrivalent hpv vaccine” OR “qHPV” OR “4HPV” OR “4VHPV” OR “HPV4”) AND (“Colombia”) OR (“Colombian population”))
BVS	(tw:(human papillomavirus vaccine L1, type 6,11,16,18)) AND (tw:(population surveillance)) AND (tw:(Colombia))
	(tw:(human papillomavirus vaccine L1, type 6,11,16,18)) AND (tw:(prevalence)) AND (tw:(Colombia))
	(tw:(vacuna cuadrivalente contra el virus del papiloma humano (tipo 6,11,16,18))) AND (tw:(Colombia))
	(tw:(vacuna tetravalente recombinante contra el virus del papiloma humano tipos 6,11,16,18)) AND (tw:(Colombia))
	(tw:(vacuna tetravalente recombinante contra el virus del papiloma humano tipos 6,11,16,18)) AND (tw:(prevalencia)) AND (tw:(Colombia))
	(tw:(vacuna vph)) AND (tw:(Colombia))
Pubmed	(“human papillomavirus vaccine L1, type 6,11,16,18”[All Fields] OR “gardasil”[All Fields]) AND (“Colombia” OR “Colombian” OR “Colombian population”[all fields])
	(“quadrivalent hpv vaccine”[all fields] OR “qHPV”[all fields] OR “HPV4”[all fields] OR “4HPV”[all fields] OR “4VHPV”[all fields] AND (“Colombia” OR “Colombian” OR “Colombian population”[all fields]))
	(“quadrivalent hpv vaccine”[all fields] OR “qHPV”[all fields] OR “HPV4”[all fields] OR “4HPV”[all fields] OR “4VHPV”[all fields] OR “human papillomavirus vaccine L1, type 6,11,16,18”[Supplementary Concept] OR “human papillomavirus vaccine L1, type 6,11,16,18”[All Fields] OR “gardasil”[All Fields] OR “silgard”[All Fields]) AND (“Colombia” OR “Colombian” OR “Colombian population”[all fields])
	((“quadrivalent hpv vaccine”[all fields] OR “qHPV”[all fields] OR “HPV4”[all fields] OR “4HPV”[all fields] OR “4VHPV”[all fields] OR “human papillomavirus vaccine L1, type 6,11,16,18”[Supplementary Concept] OR “human papillomavirus vaccine L1, type 6,11,16,18”[All Fields] OR “gardasil”[All Fields] OR “silgard”[All Fields]) AND (“Impact” OR “effectiveness” OR “epidemiological monitoring” [MeSH] OR “population surveillance” [Mesh] OR “program evaluation” [MeSH] OR prevalence) AND (“Colombia” OR “Colombian” OR “Colombian population” [all fields]))

Database	Search strategy used
Web of Science	(((((TS=((Human) (papillomavirus) (vaccin*)))) OR (TS=(gardasil))) OR (TS=((quadrivalent) (hvp) (vaccine)))) OR (TS=(hvp))) OR ((TS=(4hpr)))) AND (TS=(Colombia*)) Indexes=SCI-EXPANDED, SSCI, A&HCI, ESCI Timespan=All years
	TITLE: (human papillomavirus vaccin*) AND TITLE: (Colombia*) Indexes=SCI-EXPANDED, SSCI, A&HCI, ESCI Timespan=All years
	(((((TS=((Human) (papillomavirus) (vaccin*)))) OR (TS=(gardasil))) OR (TS=((quadrivalent) (hvp) (vaccine)))) OR (TS=(hvp))) OR ((TS=(4hpr)))) AND (TS=(Colombia*)) Indexes=SCIELO Timespan=All years
OVID	("Human papillomavirus vaccine" and "Colombia").mp. [mp=title, abstract, full text, caption text]
	(human papillomavirus vaccination and Colombia).mp. [mp=title, abstract, full text, caption text]
	(gardasil and Colombia).mp. [mp=title, abstract, full text, caption text]
EMBASE	('wart virus vaccine':ti,ab,kw OR 'human papillomavirus vaccine l1 type 6 11 16 18':ti,ab,kw OR 'human papillomavirus vaccine l1 type 16 18':ti,ab,kw OR 'human papillomavirus vaccination':ti,ab,kw OR 'human papillomavirus type 18-transformed cell line':ti,ab,kw) AND 'colombia*':ti,ab,kw
	female'/exp AND ('colombia'/exp OR 'colombia' OR 'columbia') AND ('wart virus vaccine'/exp OR 'human papilloma virus vaccine' OR 'human papillomavirus vaccine' OR 'papillomavirus vaccine' OR 'papillomavirus vaccines' OR 'wart virus vaccine' OR 'ceravix' OR 'cervarix' OR 'gardasil' OR 'gardasil 9' OR 'human papillomavirus recombinant vaccine quadrivalent, types 6, 11, 16, 18' OR 'human papillomavirus type 16 vaccine' OR 'human papillomavirus vaccine (types 16, 18)' OR 'human papillomavirus vaccine (types 6, 11, 16, 18) , recombinant, adsorbed' OR 'papilloma virus vaccine' OR 'silgard')
	('female'/exp OR 'female') AND ('colombia'/exp OR 'colombia') AND ('human papilloma virus vaccine'/exp OR 'human papilloma virus vaccine' OR 'human papillomavirus vaccine'/exp OR 'human papillomavirus vaccine' OR 'papillomavirus vaccine'/exp OR 'papillomavirus vaccine' OR 'papillomavirus vaccines'/exp OR 'papillomavirus vaccines' OR 'wart virus vaccine'/exp OR 'wart virus vaccine' OR 'ceravix'/exp OR 'ceravix' OR 'cervarix'/exp OR 'cervarix' OR 'gardasil'/exp OR 'gardasil' OR 'gardasil 9'/exp OR 'gardasil 9' OR 'human papillomavirus recombinant vaccine quadrivalent, types 6, 11, 16, 18'/exp OR 'human papillomavirus recombinant vaccine quadrivalent, types 6, 11, 16, 18' OR 'human papillomavirus type 16 vaccine'/exp OR 'human papillomavirus type 16 vaccine' OR 'human papillomavirus vaccine (types 16, 18)'/exp OR 'human papillomavirus vaccine (types 16, 18)' OR 'human papillomavirus vaccine (types 6, 11, 16, 18) , recombinant, adsorbed'/exp OR 'human papillomavirus vaccine (types 6, 11, 16, 18) , recombinant, adsorbed' OR 'papilloma virus vaccine'/exp OR 'papilloma virus vaccine' OR 'silgard'/exp OR 'silgard')
Google Scholar (Grey literature)	(papilloma) OR (HPV) AND (vaccine) AND (adverse) AND (Colombia) AND (Colombian population)
	(papilloma) OR (HPV) AND (vaccine) AND (adverse events) AND (Colombia) AND (Colombian population)
	(papilloma) OR (HPV) AND (vaccin*) AND (adverse events) AND (Colombia) AND (Colombian population)
	(papiroma) OR (VPH) AND (vacuna) AND (adversos) AND (Colombia) AND (población colombiana)
	(papiroma) OR (VPH) AND (vacuna) AND (eventos adversos) AND (Colombia) AND (población colombiana)

Database	Search strategy used
Google Scholar (Grey literature)	(human papillomavirus vaccine L1, type 6,11,16,18) AND (Colombia) or (Colombian population)
	(human papillomavirus vaccine L1, type 6,11,16,18) AND (Adverse events) AND (Colombia) or (Colombian population)
	(quadrivalent hpv vaccine) AND (Colombia) or (Colombian population)
	(quadrivalent hpv vaccine) AND (adverse events) AND (Colombia) or (Colombian population)
	(Human papillomavirus vaccine) AND (adverse events) AND (Colombia) or (Colombian population)