

Ethical, Legal, Social, and Health System Implications of 9-valent Human Papillomavirus (9vHPV) Vaccine in the Philippines: A Scoping Review and Qualitative Study

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ABSTRACT

Background. Vaccination for human papillomavirus (HPV) is a key preventive intervention against HPV infections and their associated diseases, including cervical cancer. The bivalent, quadrivalent, and nonavalent HPV vaccines are currently approved for use in the Philippines. The Department of Health (DOH) has included HPV vaccination in its National Immunization Program (NIP) for young girls aged 9 to 14 years old. However, coverage remains limited relative to the target population who should benefit from the program. To achieve equitable and sustained access, there is a critical need to understand how provider and public health decision-maker practices and patient-related factors influence vaccine uptake among Filipino populations.

Objective. The study aimed to understand the factors affecting the ethical, legal, social, and health systems implications of the use of the 9vHPV vaccine, compared to no vaccination, the 2vHPV vaccine, or the 4vHPV vaccine.

Methods. This is a qualitative study design employing a scoping review and semi-structured interviews of ethical, legal, social, and health systems factors influencing the use of the 9vHPV vaccine compared to no vaccination, 2vHPV, or 4vHPV vaccines. Focus group discussions and key informant interviews were conducted with a total of 16 participants. Participants in the focus group discussion were divided into three (3) groups representing the following sectors: government, practitioners and researchers, patient advocates and patient groups. Thematic analysis was conducted using NVivo 14 Qualitative Data Analysis Software.

Results. Evidence suggests high effectiveness of any HPV vaccine type in preventing HPV infection and cervical cancer; however, there are still significant national challenges which contribute to its low utilization rate, primarily due to ethical concerns and cultural or religious misconceptions. The 9vHPV vaccine has yet to be included in the Philippine National Formulary (PNF) and, therefore, cannot be procured for the NIP. Its integration is hindered by health system challenges, particularly its health technology assessment to ensure sustainable financing and strategic investment of the government. Further, the implementation of the government's vaccination strategy is influenced by the decentralization of procurement and program implementation at the local government level, resulting in variability in program delivery.



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Conclusion. The 4vHPV vaccine is preferred for population-wide vaccination due to its perceived cost-effectiveness at the government decision-maker level. Meanwhile, from the perspective of patients, clinicians, and experts, the 9vHPV vaccine is favored for its broader protection. Economic evaluations comparing new vaccines like the 9vHPV to the 4vHPV are essential to determine their added value. Nevertheless, the 9vHPV vaccine should be reviewed for inclusion in the NIP to support the WHO's 90-70-90 cervical cancer elimination goals, after a careful cost-effectiveness evaluation and budget impact analysis. The one-dose strategy recommended in the Philippine Clinical Practice Guidelines for Cervical Cancer and the Treatment of Premalignant Lesions of the Cervix (2023) as an alternative to the two-dose strategy could further improve vaccine accessibility in resource-limited settings.

Keywords: *papillomavirus vaccines, vaccination programs, uterine cervical neoplasms, social impact, bioethical issues, social values, health policy*

INTRODUCTION

The Human papillomavirus (HPV) is a prevalent sexually transmitted infection that can affect the skin, genital region, and throat. Nearly all sexually active individuals will contract HPV at some point in their life, often without experiencing any symptoms. In most instances, the immune system eliminates the virus. However, persistent infection with high-risk HPV can lead to cancer. HPV infection is linked to 90% of cervical cancers and a substantial share of other cancers, such as anal, vaginal, vulvar, penile, and throat cancers.¹

Vaccination has been an important preventive measure for HPV infection, and by extension, to prevent cervical cancer. Six HPV vaccines have been approved for use: three bivalent, two quadrivalent, and one nonavalent. The bivalent vaccines are deemed safe and 97% effective, targeting HPV types 16 and 18, which together account for over 70% of cervical cancer cases. While HPV vaccination is primarily aimed at preadolescents prior to sexual activity, catch-up vaccination programs have demonstrated effectiveness in reducing HPV-related infections and diseases. Furthermore, vaccinating adults following treatment for cervical lesions or recurrent respiratory papillomatosis has shown promise in lowering recurrence rates.^{2,3}

The Department of Health (DOH) has recently taken a significant step toward expanding HPV vaccination in the Philippines by increasing funding for free HPV immunization for Filipino girls in the 2025 national budget. This government-led effort marks an important advancement in public health. However, current coverage remains limited relative to the broader population in need. To ensure sustained and expanded access, it is crucial for the government to develop a long-term strategy that includes consistent budget allocations for

vaccine procurement. Additionally, collaboration with private sector donors, charitable organizations, and international aid agencies can help bolster resources and support broader implementation of the HPV vaccination program.⁴

This study aimed to understand the ethical, legal, social, and health systems implications (ELSHI) of the use of the 9vHPV vaccine, compared to no vaccination, the 2vHPV vaccine, or the 4vHPV vaccine.

METHODS

Study Design

A scoping review of available literature was conducted on the ethical, legal, social, and health systems impact of HPV vaccines in countries with available literature data. Additionally, a review of international and local policies and guidelines relevant to the ELSHI themes was also conducted. The scoping review was used to inform the questionnaire for the qualitative data collection. A scoping review was employed to identify the types of available evidence, assess how relevant research has been conducted, highlight key characteristics and factors, and uncover knowledge gaps. Since the goal was to map and describe existing evidence rather than answer a narrow research question, a scoping review was deemed more appropriate than a systematic review.^{5,6}

A qualitative study design with focus group discussions and key informant interviews was utilized to generate primary data on the ELSHI of the use of the 9vHPV vaccine among the relevant stakeholders in the context of the Philippines.

Scoping Review

Research Question

After outlining the key concepts of the qualitative study, the researchers determined that framing the research question using the Population, Intervention, Comparator, and Outcome (PICO) framework was more practical than using the Population, Concept, and Context (PCC) approach typically applied in scoping reviews. Since the study focused on the ethical, legal, social, and health system implications (ELSHI) of the 9vHPV vaccine, multiple sub-questions were necessary using the PCC approach in order to optimize the literature search. On the other hand, although a scoping review methodology was used, the study elements could still be effectively structured into a PICO-based research question, which became the basis of formulating search strategies that were utilized in exploring the electronic databases. However, it can be observed that the PICO research question formulated is less focused compared to a typical precise research question formulated in systematic reviews.

The research question was refined in consultation with the expert stakeholders as reflected in Table 1.

The final PICO research question was: "Among healthcare professionals, parents, decision makers, and males and females eligible to receive the HPV vaccine, what are the ethical,

Table 1. PICO Research Question

Population	(1) Healthcare Professionals (2) Parents (3) Decision-makers (4) Males and females eligible to receive the HPV vaccine (9 years – 26 years old)
Intervention	(1) Nonavalent HPV vaccine
Comparator	(1) No vaccination (2) Quadrivalent HPV vaccine (3) Bivalent HPV vaccine
Outcome	(1) Ethical, legal, social and health system impact (2) Vaccine preference and intention (3) HPV-related knowledge (4) Barriers and/or facilitators to implementation

legal, social, and health systems impact, vaccine preference and intention, HPV-related knowledge, and barriers and/or facilitators to implementation of the nonavalent HPV vaccine, compared to no vaccination, bivalent HPV vaccine, and quadrivalent HPV vaccine?"

Inclusion and Exclusion Criteria

Articles in the review were studies that discussed the ethical, legal, social, and health system implications of the 9vHPV vaccine which satisfy the following inclusion criteria: (1) original articles; (2) qualitative studies, cross-sectional studies, mixed methods, epidemiologic, observational studies; (3) reported outcomes include ethical, legal, social and health system impact, vaccine preference and intention, HPV-related knowledge, barriers and/or facilitators to implementation and/or other variables; and (4) published in English only, due to the financial and time constraints associated with obtaining high-quality translations of non-English studies. The exclusion criteria of the scoping review were studies that: (1) do not have full-texts available; (2) are duplicate articles; and (3) were classified as editorials, review articles, commentaries, conference presentations, and discussion papers.

Search Methods and Data Sources

The studies selected for the scoping review included those that provide results on the ethical, legal, social, and health system implications of the 9vHPV vaccine, which may include, but are not limited to, qualitative studies, cross-sectional studies, mixed methods, epidemiologic, and observational studies. The following electronic databases were consulted for data collection: PubMed, SCOPUS, Web of Science, EBSCOHost, Cochrane Library, HERDIN, Science Direct. The search strategies developed and used for each electronic database are presented in Table 2.

The studies were screened using the PICO research question and were reviewed using a data extraction tool. Since critical appraisal is not mandatory for scoping reviews, studies included in the scoping review were not critically appraised. The process of the scoping review was reported using the

Table 2. Database Search Strategies

Database	Strategies
PubMed	(Nine-valent AND human AND papilloma AND virus) OR "9vHPV" AND vaccine AND ethical
SCOPUS	OR legal OR social OR health AND system AND (impact OR experience)
Web of Science	
EBSCOHost	(9-valent Human Papillomavirus OR HPV9) AND vaccin* AND (cervical cancer) AND ethic* OR legal OR social OR health system* AND (impact
Cochrane Library	AND experience) AND ("public health" OR program) AND (experience* OR preference*)
HERDIN	
Science Direct	(Perception OR Facilitator OR Barrier) AND (nine-valent OR nonavalent OR 9-valent) AND HPV AND vaccine

PRISMA framework. The scoping review was conducted between 27 August and 19 September 2024.

Evidence Synthesis

Thematic analysis using the Guidelines on the Application of Philippine Social Values on HTA (2022) was performed with each of the domains serving as main themes - (a) subpopulations that need special considerations, (b) goals of interventions, (c) healthcare patient-centeredness and client-centeredness, (d) just allocation, (e) consideration of generalized others, and (f) quality healthcare systems. Most frequent themes under each category were detailed and narrated.⁷ An exhaustive literature search was performed after which two (2) independent reviewers screened the titles and abstracts of the articles against the inclusion and exclusion criteria. Where there was ambiguity in the first screening phase, the article was included for further evaluation during the full-text screening. The two (2) independent reviewers then proceeded to the full-text screening, and any disagreements on whether to include or exclude a study were resolved by a third reviewer.

Primary Data Collection

Study population and sampling design

Relevant stakeholders in the implementation of HPV immunization in the country were included in the Focus Group Discussions (FGD). FGDs were organized per sector to ensure homogeneity and to maximize participation of members. More in-depth interviews among key opinion leaders, representing different levels in the health system, were conducted through the key informant interviews (KII).

A representative from each of the identified organizations was invited for the discussion. The organizations identified were the following: Department of Health Expanded Program on Immunization (DOH EPI), DOH Cancer Control Program, PhilHealth Benefits Development and Research Department (PhilHealth BDRD), representative LGUs with health priority on cervical cancer, patient support groups, clinicians, researchers on infectious diseases,

Table 3. List of Invited Participants for FGD Groups by Sector

FGD Group	Sectors Represented	Domains Covered
1	Government	Legal, Social, Health Systems
2	Practitioners and Researchers	Ethical, Legal, Social
3	Advocates and Patient Groups	Ethical, Social, Health Systems

epidemiology, vaccine development, industry supply chain managers; and development partners of areas with medicine access problems. On top of these participants, a representative from the Department of Education (DepEd) was also invited, since in the Philippines the HPV vaccination program is a school-based vaccination program and is part of the Bakuna-Eskwela program.⁸

A total of 53 representatives were invited to participate in the FGDs, while a total of 8 representatives were invited to participate in the KIIs (Table 3).

The selection of participants of the stakeholder consultation of the study had the following inclusion criteria: (1) at least 18 years old; and (2) a representative of the organization with knowledge of scientific, economic, and implementation processes in HPV vaccination. The exclusion criteria of the study were potential participants who: (1) do not respond to the invitation after two follow-up emails and exhaustion of possible communication channels; and (2) do not approve and sign the informed consent form of the study. Key informant interviews included key opinion leaders from relevant organizations and government agencies, such as heads of agencies involved in HPV vaccination implementation in the Philippines (e.g., local government units and PhilHealth) and pediatric infectious disease experts who lead professional organizations (e.g., the Philippine Foundation for Vaccination).

Furthermore, participation in the study was strictly voluntary; participants are (1) allowed to withdraw at any time during their participation upon signing the informed consent form by informing the research team of their withdrawal; and (2) upon withdrawal from the study, the data provided by the participant shall be deleted in full and will not be used for analysis.

Instrumentation

The data collection tool consists of a list of questions to be answered during the FGD or KII. The questions included were created based on the results of the scoping review on the ethical, legal, social, and health systems impact of the 9vHPV vaccine, with additional questions to fit the local setting. The questionnaire is composed of four (4) sections, which included questions on: (1) ethical; (2) legal; (3) social; and (4) health systems impact (Appendix 1). Participants were grouped based on their expertise and ability to answer the questions. FGD Group 1 covered Legal, Social, and Health Systems Impact, FGD Group 2 covered Ethical, Legal, and

Social Impacts, while FGD Group 3 covered Ethical, Social, and Health Systems Impact.

Data collection

Offices of target stakeholders were emailed to request a representative to provide insights on the ethical, legal, social, and health systems impact and considerations that need to be highlighted on the use of HPV vaccines. The representative was then contacted and provided with the following materials: invitation letter to be interviewed for the study, background of the study, an advance copy of the interview questions, informed consent form, and UPMREB acceptance letter. A scheduled date for the FGDs and KIIs was provided to confirm the availability of the participants.

Participants of the study were then requested to read and sign the informed consent form before the conduct of the FGD or KII. They were given the opportunity to contact the investigators through the communication channels provided to them (e.g., email, contact number) for any clarifications regarding the conduct of the study.

An email five (5) working days and one (1) working day prior to the FGD or KII was sent to the participant to remind them of the schedule and their role in the study. The FGD was scheduled as a whole-day (8 hours) event to ensure effective participation of all respondents, while the KII was given a 2-hour schedule, with the interviewee depending on the date of their availability.

The current evidence on HPV vaccines and mathematical models for HPV vaccination was presented before the FGD commenced. The participant/s were reminded that the discussion will be recorded and transcribed verbatim. The study team also ensured that any questions or clarifications of the participant regarding the study were answered before any questions were discussed during the session. In addition, a copy of the transcription was sent to the participant/s to verify the correctness of the transcription. The FGD and KII were conducted between August and October 2024.

Data Analysis

The FGD or KII was transcribed using Microsoft Word and was coded through NVivo 14 Qualitative Data Analysis Software for thematic analysis. The FGD or KII was transcribed using Microsoft Word and was coded through NVivo 14 Qualitative Data Analysis Software for thematic analysis.

Ethical Considerations

The protocol for this study was submitted to the UP Manila Research Ethics Board (UPMREB) prior to the start of the study implementation and was classified as exempted (UPMREB 2024-0389-EX). The study’s review protocol is registered with the Health Research and Development Information Network (HERDIN) under registry ID PHRR240708-007266.

RESULTS

Scoping Review

Systematic Review of Literature

A total of one hundred twenty-one (121) studies from the search results were included in the screening of titles, abstracts, and full texts. After screening, a total of twelve (12) studies were obtained. One hundred nine (109) studies were excluded from the review due to the following reasons: ten (10) were not relevant to the population of interest; seventy-six (76) were not relevant to the intervention of interest; there were six (6) studies irrelevant to the comparator of interest; five (5) were not relevant to the outcomes of interest; eight (8) were not original articles; six (6) have no full text available and four (4) were duplicates. After exclusion, a total of twelve (12) studies were eligible for qualitative synthesis (Figure 1).

The search yielded papers published between 2015 and 2023; there were seven (7) studies included between 2020 and 2023, while there were only five (5) studies scoped between 2015 and 2019. Six studies were from high-income countries - from the United States ($n = 4$), Japan ($n = 1$), and Australia ($n = 1$), while half of the studies were conducted in an upper-middle-income country, China ($n = 6$). No studies came from low-middle-income countries that may be comparable to the Philippines. The majority of the studies employed a cross-sectional design ($n = 6$), where two (2) are epidemiological modeling studies, and another two (2) are qualitative in nature. Further, one (1) retrospective cohort study and one (1) mixed-methods study were included.

Majority of the studies ($n = 4$) have parents of the children to receive the HPV vaccine as respondents, some included health care providers ($n = 2$), some included college students both female ($n = 1$) and male ($n = 1$), one study focused on adolescents ($n = 1$), another is on the perspective

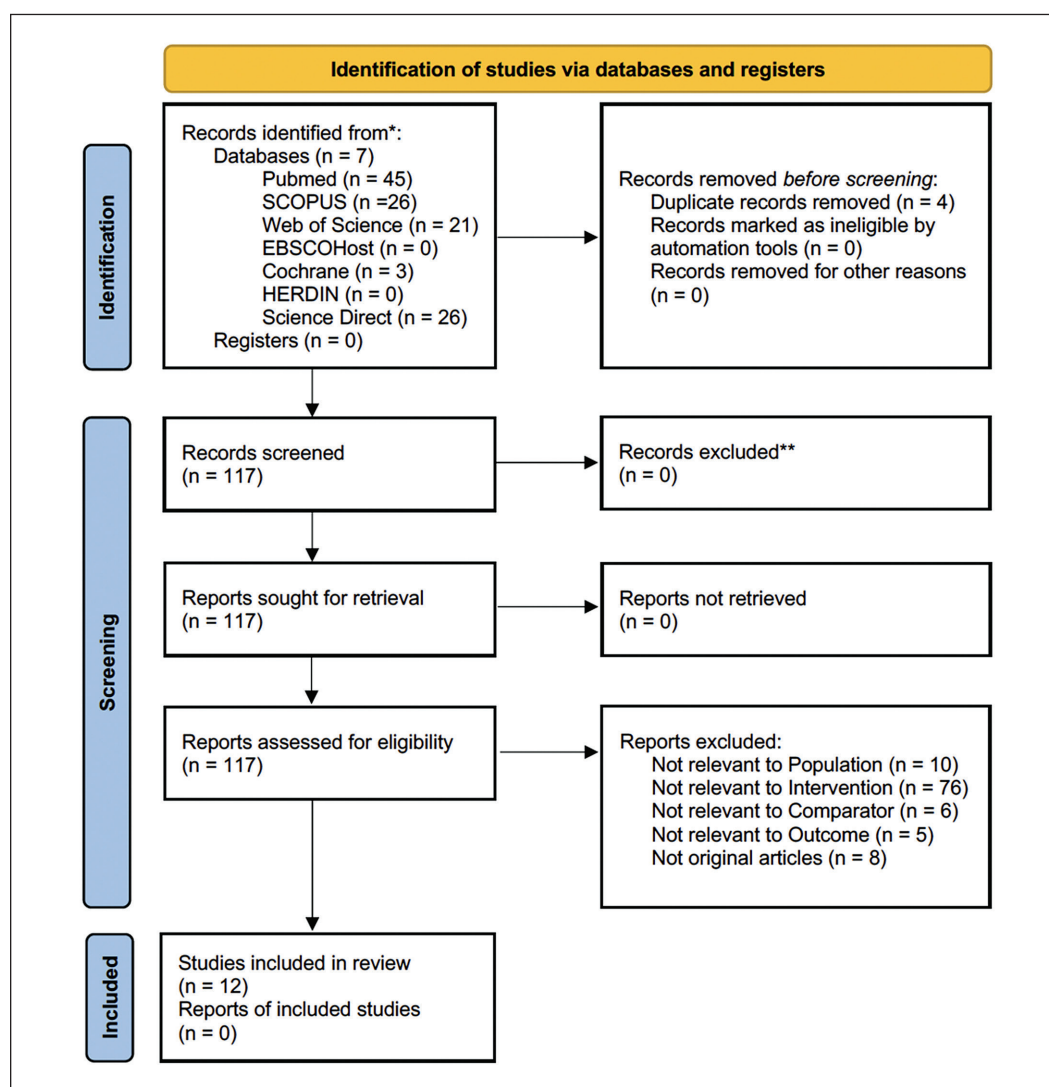


Figure 1. PRISMA Framework.

of key stakeholders of a vaccination program ($n = 1$), while the two studies which employed epidemiological models considered all age groups and all sexes. The characteristics of the included studies in the scoping review are summarized in Appendix 1.

Ethical Impact

The ethical implications of health technology are primarily focused on equity.⁹ The World Health Organization (WHO) defines health equity as providing everyone with a fair chance to achieve their maximum health and well-being.¹⁰ This means that no one should face unjust, avoidable, or correctable disparities that prevent them from reaching their full health potential. When considering the introduction of the 9vHPV vaccine, several equity-related concerns were identified in the reviewed studies.

Stakeholder Preference for 9vHPV Vaccine

The first factor to consider is stakeholder preference, referring to the specific health technology prioritized by stakeholders, such as healthcare providers and patients.¹¹ Among the twelve (12) studies reviewed, three (3) explored vaccine preferences. Two (2) of these studies conducted in China compared the 9vHPV vaccine with the 4vHPV and 2vHPV versions, while one (1) conducted in the United States did not include a comparator.¹²⁻¹⁴ Both of the studies that include comparators found that parents who had not yet vaccinated their children favored the 9vHPV vaccine over its 4vHPV and 2vHPV counterparts.^{12,13} While the study with no comparator corroborated this finding, showing that parents supported the 9vHPV vaccine, as it offered broader protection against more HPV strains.¹⁴

Willingness to Pay for 9vHPV Vaccine

A study done in China assessing the willingness to pay of the mothers of primary school children for HPV vaccines found that a higher percentage of mothers were willing to pay for the 2vHPV (81.2%) and 4vHPV (75.9%) vaccines compared to the 9vHPV vaccine (67.7%). Household income emerged as a significant factor influencing willingness to pay across all vaccine types.¹⁵ Additionally, another study done in the United States noted that preference for the 9vHPV vaccine over the 2vHPV was associated with higher education levels and annual household income.¹⁶ These findings suggest that, while the 9vHPV vaccine is generally preferred over the bivalent and quadrivalent versions, vaccine cost and household income significantly affect parental decisions.

Regional Sociodemographic Distribution of 9vHPV Vaccine

Regional sociodemographic distribution of populations was emphasized by a few studies. A regional stratification study in the United States found that the shift from 2vHPV and 4vHPV vaccines to the 9vHPV vaccine was relatively rapid in North Carolina. However, the uptake was slower in

areas with smaller populations and lower education levels. Adolescents in regions with a higher percentage of residents without a high school education or a greater number of religious organizations were less likely to receive the 9vHPV vaccine.¹⁶ Possible reasons include lower overall vaccination rates in these areas, physicians potentially having higher stocks of older vaccines, or slower adoption by healthcare providers due to financial or knowledge constraints. Additionally, limited access to preventive healthcare and parental hesitancy could contribute to this disparity. Further research is needed to fully understand the factors driving these trends.¹⁷ Included studies conducted in China also highlighted social inequities in HPV vaccine uptake, with higher intent to vaccinate observed among younger, urban mothers with professional jobs, higher education, or personal connections to cervical cancer.^{12,15}

Inclusion of Males in the Target Population

Gender is another key consideration, as HPV vaccination programs typically prioritize females over males, especially targeting adolescent girls aged 9 to 14.¹⁸ However, HPV is also linked to cancers in men, including head, neck, and penile cancers. Expanding vaccination to men could help prevent HPV-related diseases in both genders and reduce the burden on women.¹⁹ Cost-benefit analyses suggest that vaccinating both males and females is more cost-effective than vaccinating females alone.²⁰ One of the included studies found that Chinese male college students were nearly equally divided in their willingness to receive the 9vHPV vaccine, with 45.05% willing to be vaccinated and 54.95% unwilling. Factors such as studying Medicine, having connections to individuals affected by cervical cancer, and being in a romantic relationship increased the likelihood of vaccination acceptance. The study emphasized the need for improved health literacy and public awareness to encourage broader vaccine acceptance among men.²¹

Legal Impact

Local and international regulations relevant to the 9vHPV vaccine

Legal considerations are integral to the HTA process, requiring careful review of applicable local and international regulations, patient rights, disease-specific laws, and relevant health policies.²² This scoping review identified eight (8) mandates governing the 9vHPV vaccine in the Philippines, one at the international level and seven at the national level.

The WHO Global Strategy for Cervical Cancer Elimination aims to reduce cervical cancer incidence to fewer than 4 cases per 100,000 women by 2030. Key targets include vaccinating 90% of girls with HPV by age 15, screening 70% of women by ages 35 and 45, and ensuring 90% of women with pre-cancer or invasive cancer receive appropriate treatment. The strategy emphasizes securing affordable HPV vaccines, improving delivery systems, enhancing communication to

address social barriers, and updating national guidelines as evidence evolves.²³

The National Integrated Cancer Control Act (RA 11215) establishes a comprehensive framework to reduce cancer incidence through preventive measures, including vaccination, public awareness campaigns, and health education. It mandates the implementation of nationwide cancer screening programs, particularly for common cancers like cervical cancer, to ensure early detection and timely intervention. It also strengthens cancer treatment by improving public health infrastructure, expanding cancer care facilities, and ensuring access to quality and timely care, including financial assistance through government programs like PhilHealth. Additionally, it mandates the integration of palliative care, psychosocial support, and community-based services, overseen by a National Cancer Control Council for coordinated implementation.²⁴

Republic Act No. 11223, or the Universal Health Care Act, ensures access to preventive health services, including vaccines, contingent on a Health Technology Assessment (HTA) process. HTA evaluates the safety, cost-effectiveness, and accessibility of health technologies like the 9vHPV vaccine before inclusion in the public health system.²⁵

Previously, Republic Act No. 9184, or the Government Procurement Reform Act, governed the procurement of government public health resources. If the 9vHPV vaccine passes HTA evaluation, it can be procured by the government through competitive bidding or direct contracting, depending on pricing and supply conditions.²⁶ However, the New Government Procurement Act (RA 12009) was recently enacted; the requirements of the said law will be fully implemented within a 3-year transitory period. One of the crucial amendments of the new procurement law was the strategic procurement planning and budgeting linkage, which explores and highlights the potential of the procuring entity (e.g., DOH, LGUs) to make use of framework agreements as a procurement strategy to expand the pool of suppliers and take advantage of economies of scale in the procurement of goods, e.g., health technologies. Procuring entities are encouraged to develop a comprehensive procurement strategy that is fit-for-purpose, considers the project's lifecycle, and aims to achieve value for money. This approach helps ensure the government makes well-informed decisions focused on long-term cost-efficiency.²⁷

Lastly, the DepEd Order No. 051 s. 2022 posed problems in the school-based vaccination program of the DOH, which includes HPV vaccination, prohibiting the use of schools as vaccination centers.⁸ However, under Joint Administrative Order No. 2022-0001, which outlines the guidelines for the Healthy Settings Framework in learning institutions, immunization is identified as a key priority area in the Health Promotion Framework Strategy (HPFS). Consequently, immunization rates and vaccine coverage are expected to be included among the standards and indicators for recognizing healthy learning institutions.²⁸ Furthermore, the DepEd has

released the Department Memorandum No. 2024-0250, which outlines the guidelines on the resumption of school-based immunization (SBI) after the COVID-19 pandemic. Currently, the DOH is working with the DepEd to implement the Bakuna-Eskwela program, aimed at increasing HPV vaccine coverage in public schools, following directives from the president to strengthen national immunization efforts.²⁹

Social Impact

The social impact of a health technology refers to the influence of diverse social and cultural determinants on its acceptance or rejection by the population.⁹ For this evaluation, the Guidelines on the Application of Philippine Social Values on Health Technology Assessment (HTA) served as the foundational framework. These guidelines provide a structured approach to assess how societal norms, beliefs, and cultural contexts may shape the public's perception and uptake of health technologies, ensuring that these factors are systematically integrated into decision-making processes.⁷ The studies reviewed provided minimal information regarding the social impact of the 9vHPV vaccine in the Philippine context. This limitation arises from the fact that the included studies were conducted in high-income countries (Australia, the United States, and Japan) and an upper-middle-income country (China).³⁰ Additionally, none of the studies explored the role of cultural factors in the uptake of the 9vHPV vaccine. According to the guidelines, key social values for Filipinos in healthcare are categorized into: (a) subpopulations that need special considerations, (b) goals of interventions, (c) healthcare patient-centeredness and client-centeredness, (d) just allocation, (e) consideration of generalized others, and (f) quality healthcare systems.⁹ However, due to the limited scope of the included studies, the extracted data were only applicable to two of these categories.

Public Health Impact of 9vHPV Vaccination Strategies

The first category is the goals of interventions specifically with regard to the aspect of health promotion and disease prevention, as well as the promotion of public health benefits. Two (2) out of the twelve (12) studies employed an epidemiological model to evaluate the public health impact of different HPV vaccines and vaccination strategies. Despite utilizing different types of epidemiological models, both studies agreed that vaccination strategies using the 9vHPV led to a greater reduction in cervical cancer cases and HPV-related diseases over a 100-year horizon.

A study by Diakite et al. adapted a dynamic transmission model to the Chinese population, projecting cases and deaths from HPV-related diseases both without vaccination and under four different HPV vaccination strategies: (1) the 2vHPV vaccine targeting high-risk genotypes 16 and 18 referred to as V2 strategy, (2) 2vHPV with assumed cross-protection against additional genotypes (31, 33, and 45) referred to as V2XP strategy, (3) the 4vHPV vaccine covering high-risk types 16 and 18 and low-risk types 6 and 11 referred

to as V4 strategy, and (4) the 9vHPV vaccine protecting against a broader range of high-risk types (16, 18, 31, 33, 45, 52, and 58) as well as low-risk types 6 and 11 referred to as V9 strategy.³¹ Their results showed that 9vHPV (V9 strategy) was the most effective strategy across all vaccination coverage rate scenarios (VCRs), particularly at low to moderate VCRs. In moderate VCRs (those with primary or catch-up VCRs 50–70%), the V9 strategy performed significantly better than the other vaccination strategies, maintaining an above-threshold reduction in cervical and noncervical cancer cases and deaths as well as genital warts and recurrent respiratory papillomatosis (RRP) cases and deaths. While under the low VCRs (those with both primary and catch-up VCRs <50%), the V2, V2XP, and V4 strategies performed poorly regarding HPV-related cancers, while the V9 strategy retained a fraction of its effectiveness.³¹

Although the study focused on cervical cancer caused by high-risk HPV genotypes, the authors suggest that the 9vHPV strategy could enable China to meet the WHO's cervical cancer elimination goal (fewer than 4 cases per 100,000 women) significantly earlier than other strategies.³¹ According to the WHO Global Strategy for cervical cancer elimination, achieving the said goal rests on three key pillars and their corresponding targets, specifically: (1) vaccination wherein 90% of girls fully vaccinated with the HPV vaccine by the age of 15; (2) screening where 70% of women screened using a high-performance test by the age of 35, and again by the age of 45; and (3) treatment, in which 90% of women with pre-cancer are treated and 90% of women with invasive cancer are managed. The vision is for each country to meet the 90–70–90 targets by 2030 to get on the path to eliminate cervical cancer within the next century.²³

On the other hand, Cody et al. adapted a mathematical model of HPV transmission to Japan, accounting for both direct and herd immunity effects of vaccination.³² The study compared several strategies, including cervical cancer screening alone, routine vaccination of 12- to 16-year-old girls with either 4vHPV or 9vHPV, and a combined approach with temporary catch-up vaccination for 17- to 26-year-old women using 9vHPV. Their findings indicated that screening and routine 4vHPV vaccination of 12–16-year-old girls reduced cervical cancer incidence by 77%, while screening and routine 9vHPV vaccination reduced it by 86%, preventing millions of cases of anogenital warts in both men and women. The catch-up program was especially effective, preventing 484,248 cases of cervical cancer and 50,102 cancer-related deaths. Furthermore, this strategy was deemed the most cost-effective, with an incremental cost-effectiveness ratio (ICER) below the ¥500,000/QALY or, to contextualize, at PhP 190,818.05/QALY threshold.³²

Factors influencing HPV vaccination intent

The second category of focus, healthcare patient-centeredness and client-centeredness, emphasizes promoting autonomy, defined as the ability of individuals to make

independent health decisions.³³ In this review, the Health Belief Model (HBM) was employed to examine participants' knowledge and attitudes toward HPV and vaccination. The HBM is a valuable framework for understanding psychological factors that influence health behaviors, such as vaccination decisions. It can help identify barriers and facilitators that help shape public health interventions.³⁴ According to the HBM model, an individual's decisions to engage in health-promoting behaviours, such as receiving the HPV vaccine, are shaped by their perceived risk of contracting the disease, perceived severity, perceived benefits of preventive measures, perceived barriers, and self-efficacy.³⁵ In the context of HPV vaccination, perceived susceptibility pertains to a woman's belief about her risk of contracting HPV, while perceived severity reflects her attitudes toward health risks like cervical cancer. Perceived benefits relate to the vaccine's effectiveness, whereas perceived barriers could involve concerns about vaccine safety, cost, or social stigma.^{12,15,36}

Three (3) of the included studies, all conducted in China, an upper-middle-income country (UMIC), revealed high perceived susceptibility and severity regarding HPV and related diseases, along with strong belief in the benefits of HPV vaccines. However, barriers such as lack of time and fear of side effects were reported, particularly among health sciences students and mothers of primary school children. Perceived self-efficacy and exposure to vaccination information also varied, with different dimensions of the HBM significantly influencing vaccination intent across the studies.^{12,15,36}

Health System Impact

Health system impact assesses the capacity of both public and private sectors to integrate and implement the health technology as part of health service delivery. This encompasses key factors such as the availability, feasibility, and adequacy of human resources, healthcare service capabilities, infrastructure, and the potential influence on the roles and operations of existing healthcare organizations.⁹ However, due to limited data, the information extracted from the included studies was only applicable to the capacity of human resources and feasibility.

HCPs' Knowledge and Experience with the 9vHPV Vaccine

Kasting et al. and Kornides et al. examined healthcare providers' perspectives on the 9vHPV vaccine, focusing on human resource capacity in the United States.^{37,38} Kasting et al. found that out of 22 HCPs interviewed, just over half (n = 12) were aware of the 9vHPV vaccine, but six of these admitted limited knowledge about it. Their primary concerns revolved around efficacy, safety, side effects, cost, and the dosing schedule. Interestingly, half of the HCPs did not anticipate patients or parents asking additional questions about 9vHPV compared to the 4vHPV vaccine.³⁷ However, another U.S. study by Fontenot et al., which is also included in the review, highlighted significant parental

concerns about the vaccine's safety, indicating a disconnect between HCP perceptions and parental expectations, which could be attributed to the differing demographics of the study participants.¹⁴ These findings underscore the need for educational tools to equip HCPs to effectively address patient and parental concerns, especially given that HCP recommendations are critical for vaccine uptake.¹⁴

Kornides et al. examined U.S. primary care clinics' experiences during the introduction of the 9vHPV vaccine.³⁸ While the majority of clinicians and staff expressed no concerns about the vaccine (61%), some raised issues regarding parental hesitancy (29%) and insurance coverage (17%). Despite these concerns, most respondents (66%) were equally or more likely to recommend the 9vHPV vaccine compared to its predecessors. Among clinics stocking the vaccine, 56% of providers supported recommending an additional "booster" dose for adolescents who had completed the three-dose series of earlier vaccines. Overall, healthcare providers generally held positive views of the 9vHPV vaccine, with most expressing confidence in its adoption.³⁴

Feasibility of School-based 9vHPV Vaccination Program

In terms of feasibility, Swift et al. investigated the transition to a 9vHPV vaccination program in Australia's school-based national HPV vaccination initiative. In 2018, the three-dose 4vHPV vaccine was replaced by a two-dose 9vHPV schedule for adolescents under 15, while those aged 15 or older, or with immunocompromised conditions, continue to follow a three-dose regimen. The program remains school-based, with additional community-based catch-up vaccines funded for individuals up to 19 years of age. The study revealed that stakeholders generally accepted the two-dose schedule due to its logistical simplicity and reduced resource requirements. However, completion rates for the second dose remained lower than anticipated, with challenges such as student absenteeism and delayed consent form returns cited as key barriers. Additionally, HPV catch-up vaccinations through primary care were found to be underutilized, largely due to limited coordination between schools and general practitioners, and low community awareness of this option. While vaccine hesitancy is not currently a major issue, it is recognized as a potential future risk. The strong public support for school-based vaccination and its inclusion in Australia's National Immunization Program were identified as critical factors in facilitating parental acceptance.³⁹

Primary Data Collection

A total of twelve (12) stakeholders participated in the FGD, while four (4) participated in the KII. There were three (3) groups who were classified according to the topics relevant to their field of expertise and experiences. The participants for the KII were key opinion leaders representing both public and private sectors.

Ethical Impact

Ethical concerns on 9vHPV vaccine utilization in the DOH National Immunization Program (NIP)

The 9vHPV vaccine is safe and effective and will provide benefits to the target population. Hence, there should be no ethical concerns regarding its use. In the Philippines, cervical cancer accounts for the second highest cause of death among cancers in females, and the 9vHPV vaccine should be considered to be included in the NIP. The vaccination program should be voluntary, and there is a need for information dissemination regarding its value and benefits.

There are several factors contributing to the limited use of the 9vHPV vaccine. Concerns about evidence related to clinical outcomes are cited as one reason, particularly due to the absence of studies that reported cervical cancer as the primary endpoint, since it is unethical to determine the incidence or development of cervical cancer due to the HPV vaccination. As a preventive measure, vaccine efficacy and effectiveness can only be measured by association with the viral load and presence of cervical intraepithelial neoplasia (CIN) or precancer lesions.

In the private sector, the 9vHPV vaccine was deemed to be more expensive than the 2vHPV and 4vHPV vaccines across all brands, but price setting may depend on the ability of the physician to find options for the patient to avail the vaccine. For patients who can afford and are willing to pay out-of-pocket, the 9vHPV vaccine is given as an option by their healthcare provider. Further, respondents also mentioned that if economic evaluation studies suggest the cost-effectiveness or cost-benefit of the 9vHPV vaccine, then this evidence can drive the preference for its use.

Regardless of the effectiveness and safety of the 9vHPV vaccine, the primary concern and reason for the limited access of the vaccine is its cost in the private sector. The government can take into consideration various effectiveness outcomes to prove its benefits and compare this with the cost of the vaccine for consideration of government procurement or subsidy. This would address patient concerns on affordability to ensure equitable access to the 9vHPV vaccine.

In general, for all HPV vaccines and the current rollout of the DOH HPV vaccination program, it was identified that cultural and religious influence, along with lack of knowledge, contribute to its limited use. Contracting HPV is widely viewed as a result of sexual promiscuity and causes stigma, especially in the Philippines, which is a deeply religious country. Therefore, there is a misconception that giving the vaccine to young girls allows them to be sexually active.

Participants also cited a lack of awareness due to the absence of an official communication plan for HPV vaccination, along with the negative connotation associated with vaccination and its possible risks, which was attributed to the Dengvaxia controversy. In addition, families may not see the urgency of HPV vaccination for the 9-14 female age group, which predisposes them to not allowing their children

to get the vaccine. Furthermore, another cultural issue that promotes vaccine hesitancy is the paternalistic views in Filipino families, which puts the decision-making with regard to important health interventions in the hands of the father. One participant also adds that in the rural health setting, there were mothers who were interested in HPV vaccination but were deemed ineligible for vaccination since only children aged 9–14 years old were eligible.

“...why don't they study what the reason is why there's only a 23% uptake? [pertaining to the low proportion of girls aged 9–14 in the target population who received the first dose of the 4vHPV vaccine] Where is the problem? It is no longer the availability kasi sosolusyonan yan ng gobyerno, is it a question of access? Are people aware where they can get it? Are people aware of how they can get it? Do they just go? Because a lot of people where the interest is high— the interest of the mothers to get themselves protected is high— but when they go to centers, they were told they were not eligible; only their children are. But then how do you translate that interest of the mother in the vaccine transferred to their children, kasi usually pag sinabi mo sa nanay na nagclose na ang door, magtatanong nalang na, bakit?” [...why don't they study the reason why there's only a 23% uptake, where is the problem? It is no longer due to the availability because the government has already provided a solution, but then is it a question of access? Are people aware of where they can get it? Are people aware of how they can get it? Do they just go? Because a lot of people, where the interest is high, where the interest of mothers to get themselves protected is high, but when they go to centers, they were told they were not eligible; only their children are. But then how do you translate that interest of the mother in the vaccine to be transferred to their children, because when the mother closes the opportunity to take the vaccine, the only question left is why?]

Ethical considerations play a key role in HPV vaccine acceptance, particularly in culturally sensitive regions like Bangsamoro Autonomous Region in Muslim Mindanao (BARMM), where religious beliefs influence health decisions—such as the view that death is predetermined by Allah, reducing fear of disease. To address this, the DOH reframed vaccination messaging to emphasize the financial burden of preventable diseases rather than mortality. Clinicians highlighted the ethical duty to inform patients about the broader protection offered by the 9vHPV vaccine, which covers more HPV strains than earlier versions. They also stressed the importance of transparent communication about possible side effects, noting that repeated doses may increase mild adverse events, which should be ethically disclosed during patient counseling.

Access to the 9vHPV Vaccine to Ensure Equity

The NIP is primarily a school-based vaccination program for the target population of girls 9–14 years old. However, due to DepEd Order No. 051 s. 2022, school-based vaccination was halted and was also not in effect during the COVID-19 pandemic, which has affected the utilization of vaccines procured by the government.⁸ Current efforts are being made between the DepEd and DOH to reinstitutionalize vaccination in public schools. However, to adequately cover the target population, community-based and school-based vaccination programs are both needed as they cater to different groups of the young population. School-based vaccination has better coverage for children above 5 years old; however, the local government unit (LGU) identifies two important problems that must be addressed if school-based vaccination will still be implemented: (1) the captured population is only girls in public schools, and (2) it does not cover out-of-school youth.

Possible considerations when deciding to implement a community-based vaccination program include the prevalence of female out-of-school youth who may be more prone to early sexual debut, and the Sangguniang Kabataan (SK) should be tapped for program implementation at the LGU level.

Allocation Priority Rankings

Respondents were requested to rank their priority of how the 9vHPV vaccine should be allocated if it is part of the NIP. The results showed the following (Appendix 2):

1. Local burden of disease due to HPV and cervical cancer
2. Number of cervical cancers and deaths to be averted in the long term
3. Recommendations in the clinical practice guidelines
4. Available resources in the government
5. Target allocation based on cervical cancer elimination agenda
6. Cost of HPV vaccine per dose

The local or regional burden of disease was ranked first, and it was further emphasized that it is important to have quantitative data on the local cervical cancer burden, as this should be the primary driver of the government's decision to procure preventive and curative health technologies. A clinician deepened the discussion on the lived experience of their patients who are screened too late and are diagnosed with cervical cancer:

“...I get a lot of patients from Cotabato (...), those areas. Kasi (they have) many children and many partners (...). So, kaya yung local burden, alam ko, nafifeel ko yun. (...) Yung affluent nakakapagscreen, diba? So, you catch it na CIN palang. Pero yung mga iba na hindi nakakapagscreen, pagdating stage 3 na.” [...I get a lot of patients from Cotabato (...), those areas. Because (they have) many children and many partners

(...). So I can actually feel the local burden. Affluent patients are able to get screened so we can catch it while at CIN. While for others that are not able to get screened, when they come to me, they are already at stage 3.]

The majority also highlighted the importance of the number of cervical cancers and deaths to be averted in the long term, as morbidity and mortality rates are key factors when prioritizing vaccine-preventable diseases. Inclusion of the 9vHPV vaccine in the local clinical practice guidelines (CPG) should also be considered, as these guidelines define the standard of care for cervical cancer prevention.

Potential of Pharmacy-based Vaccination for Catch-up

The utilization of pharmacy-based vaccination services will only be applicable to the adult female population; therefore, it is not covered by the NIP. Due to this, many considerations were tabulated, such as the cost of vaccines, establishing the credibility of registered pharmacists as vaccinators, proper and adequate training of pharmacists, and following facility standards for providing vaccination services. However, respondents also see the benefit of including pharmacies as it increases the access sites, which can improve the uptake of adult vaccine administration.

The DOH may also utilize pharmacies as facilities that provide services under the NIP, provided that government primary care facilities are prioritized for vaccine distribution. This strategy increases access sites and reduces the burden for the local government by exploring private-public partnerships. However, it was emphasized that if a pharmacy offers adult vaccination services, the pharmacist should receive quality standard training, preferably by the DOH, and should be able to address adverse events following immunization (AEFIs). Furthermore, the practice of vaccination by pharmacists should be regulated by a government agency. Currently, the Professional Regulatory Board of Pharmacy (PRBOP), through Resolution No. 65 series of 2025, has officially adopted the Certification Program for Immunizing Pharmacists (CPIP) as the official framework for training, assessment, and certification of pharmacists authorized to administer vaccines to adults.^{40,41} This same resolution superseded previous issuances relevant to immunization training and had terminated the accreditation of the Philippine Pharmacists Association, Inc. (PPhA)'s Immunizing Pharmacist Certification Program (IPCP).

Consideration of Broad-valent HPV vaccine as Standard of Care

All participants reached a consensus suggesting that the 9vHPV vaccine be the standard of care based on its increased coverage of HPV strains. It was further reported that there was minimal difference in AEFIs and pain exposure versus that of the 2vHPV and 4vHPV vaccines. Suggesting that the 9vHPV vaccine should be the standard of care connotes

that there should be increased availability and better affordability to increase uptake and equity across the eligible population.

Prioritizing Special Populations (Age, Sex, Burden of Disease)

Participants emphasized prioritizing HPV vaccination for females starting at age 9, before sexual debut, with catch-up strategies for those aged 10 to 14, aligning with international data and the Philippine Clinical Practice Guidelines for Cervical Cancer and the Treatment of Premalignant Lesions of the Cervix (2023), one of the DOH-commissioned CPGs.⁴² This age group is considered most immunologically responsive, producing stronger antibody responses, and is also among the earliest at risk of sexual activity. While females remain the primary focus due to their higher risk of cervical cancer, participants also recommended considering vaccination for males, given their role as HPV carriers and the rising incidence of HPV-related diseases in men. A gender-neutral approach was suggested to enhance protection and reduce transmission. Additionally, prioritization based on disease burden should include targeting low-income groups to ensure equitable access and improve vaccine uptake in high-risk populations.

Other Ethical Concerns

Emphasis was made that the following ethical concerns must be addressed: (a) availability of human resources such as the healthcare workers who will vaccinate, (b) access to the vaccine including the minority groups, (c) affordability of the vaccine, (d) good surveillance system for HPV-related diseases and cervical cancer, and (e) awareness of parents and the communities through education campaigns on the benefits of HPV vaccination.

Legal Impact

Inclusion of 9vHPV vaccine in the Philippine National Formulary (PNF) and DOH NIP by 2025

Key laws supporting the inclusion of the 9vHPV vaccine in the National Immunization Program include the Data Privacy Act, National Integrated Cancer Control Act (NICCA), Universal Healthcare Act, and the New Government Procurement Act. The Universal Healthcare Act requires new health technologies to undergo Health Technology Assessment (HTA) due to limited government resources, while the Procurement Act updates bidding guidelines beyond just the lowest price.^{25,27} NICCA outlines cancer prevention and treatment strategies but needs supporting local ordinances, especially in high-burden areas.²⁴ Proper data management and disease surveillance must comply with the Data Privacy Act, particularly in handling patient records and inter-agency data sharing.⁴³ A Joint Administrative Order involving the DOH, DILG, and LGUs is recommended to define roles and provide clear

guidelines for cervical cancer programs, as current efforts are fragmented and lack coordination with the DOH.

Participants were confident in the early inclusion of the 9vHPV vaccine in the PNF and NIP because of its broader coverage and protection, as long as it is approved by the FDA and the HTA Council. Earlier inclusion was preferred after considering the possible delays in planning and procurement. Moreover, a negative recommendation from the HTA Council would disallow the 9vHPV vaccine for inclusion in the PNF and would not be allowed for government procurement.

Though there was an expressed hesitancy about whether the inclusion will happen in 2025, as its assessment will undergo a tedious process. For this to happen, LGU involvement and buy-in are needed since they are the end-users, and there should be a legal basis for vaccine procurement. A legal basis should also be put in place because LGUs will simply cascade this through an attachment in their resolutions, especially if the vaccine is free.

There was also an expressed need for visible vaccine advocacy champions (i.e., from the Senate) who can strongly push or lobby for the inclusion of the vaccine in the line-item budget of DOH, according to the FGD participants from the government. It was also clarified in the FGD that inclusion of the 9vHPV vaccine in the PNF does not automatically mean inclusion in the NIP vaccination schedule, as there are other factors and further processes to consider, including sustainability in the provision of the vaccine equitably in geographic areas and from the current year onwards.

Achievement of WHO 90-70-90 Strategy by 2030

Most participants in the FGDs believed the HPV vaccination program is unlikely to meet its 2030 scale-up goal. One noted that past national vaccination efforts have never reached the 95% target, typically achieving only 60-70%, with routine immunizations peaking at 80%. Cervical cancer screening coverage remains very low at 0.9%, and the HPV vaccine is not currently prioritized by the DOH, which focuses more on vaccines for the elderly like influenza and pneumococcal. Barriers to reaching the 2030 target include slow procurement, unreliable vaccination data, data privacy issues, and underreporting from the private sector. Participants emphasized the need to educate parents and communities to boost vaccine uptake.

Cervical cancer is the second leading cause of female cancer deaths. While the government has initiatives for prevention and treatment, HPV vaccination goals are hindered by budget misalignment. A minority believed the 2030 target is achievable if the DOH prioritizes HPV vaccination for the 9-14 age group to drive demand. Training healthcare workers should also account for economic realities and avoid fostering competition.

Other Legal Concerns

Other barriers for successful scale-up include: (a) current remaining legal issues on the Dengvaxia controversy; (b) the

lack of human resources for health which when addressed, has legal implications due to budget appropriations, however, volunteer vaccinators can be of help; (c) lack of ordinances on screening for cancer; (d) equity in the choice of vaccines for public versus private consumption; (e) government procurement process, and (f) availability and affordability concerns especially if the vaccines, whether 2vHPV, 4vHPV or 9vHPV vaccines are known to have undeniable benefits.

Social Impact

Impact on Quality of Life

There are several dimensions as to how cervical cancer affects diagnosed patients' quality of life, and these are psychosocial impact, disease impact, and side effects of treatment. Women who have cervical cancer have diminished productivity, reduced quality of life, and shortened lifespan, while it is also considered a disease of inequity in the context of LMICs due to limited access to preventive interventions, such as HPV vaccines, and treatment. Therefore, increasing access to HPV vaccination programs can reduce the inequities of cervical cancer.

Cervical cancer screening is an important test for women at least 35 years old and is given for free. However, sociocultural concerns such as stigma and fear of screening were considered barriers to access. When diagnosed, patients experienced emotional distress brought about by the stigma associated with any form of cancer and the catastrophic costs of treatment, which affect their quality of life.

One patient considered psychologically destroying the cancer for her survival because she is a solo parent; thus, the effect on her was to gain strength, while physically being active through exercises. Further, spiritually, she has learned to overcome the usual sadness brought about by her sickness. Meanwhile, economic stability was also affected as some patients reported losing their jobs despite being breadwinners to focus on treatment. Tending to their small children was also raised as a problem.

In addition, there are also undesired physical side effects of treatment such as physical limitations (e.g., weakness) due to chemotherapy, while radiation therapy side effects included pain and discomfort in the pelvic region. Other radiation effects include itchiness of the groin area leading to difficulty in sleeping, scratching, causing wounds in the area, and limp walking. For early-stage cervical cancer in young patients, disease management may be as radical as hysterectomy, but for late-stage and elderly patients, chemoradiation is resorted to, and immunotherapy for recurrences. The effect of these therapy regimens has reduced the quality of life of patients and has driven them to resign from their work, which diminished their productivity.

Challenges in Accessing Healthcare Services

Access to healthcare is limited by patient behavior, financial constraints, and systemic challenges. Many avoid

consultations or screenings due to high out-of-pocket costs, especially for conditions like cervical cancer, where treatment involves more than just medication. Diagnostic and follow-up tests are expensive, often forcing patients to prioritize basic needs over health, even when free services are available. This financial strain affects entire families, particularly when patients are breadwinners and unable to work during treatment.

Administrative barriers further complicate access, especially in public facilities. Patients face delays in processing financial aid and receiving diagnostic results, which can create a domino effect of treatment delays. Those with higher education and income typically navigate the system more easily and access care more consistently. Providing the 9-valent HPV vaccine for free was seen as a key solution to improving access and uptake of preventive healthcare.

9vHPV Availability Addressing Vaccination Stigma

Participants stressed that simply making the HPV vaccine available does not reduce stigma, as there's no direct link between availability and public perception. Misconceptions persist, such as the belief that HPV only affects those with multiple partners, even though it can occur in monogamous relationships.

They emphasized the need for thorough patient education, explaining side effects and clarifying that the vaccine prevents HPV infection, not just cervical cancer. Educated and financially stable individuals were seen as less vulnerable to stigma due to better understanding of the vaccine's benefits. To reduce stigma, participants called for widespread education targeting not only patients and parents but also healthcare workers and the broader community. Some remained skeptical that availability alone could change perceptions without strong educational support.

Current Programs and Health Promotion Campaigns on HPV Vaccination

Health promotion programs play a key role in increasing HPV vaccine awareness, with both public and private sectors implementing campaigns to boost disease literacy. The DOH's Health Promotion Bureau (HPB) leads communication strategies aligned with the National Immunization Program, while national and local efforts, along with organizations like POGS, promote cervical cancer education and vaccination.

The DOH collaborates with partners such as Johns Hopkins Program for International Education in Gynecology and Obstetrics (Jhpiego) to strengthen school-based immunization and build stakeholder capacity through training for educators, parents, and healthcare workers. Despite these efforts, vaccine uptake remains low, highlighting the need to enhance campaign effectiveness. Current strategies include mass media outreach, social media campaigns, and health talks at PTA meetings to secure parental consent. POGS runs its annual "Babae, Mahalaga Ka" campaign, and DOH uses Facebook livestreams with influencers to boost engagement.

Incentives like lunch boxes and fans are also used to encourage participation. The discussions emphasized the importance of adolescent-centered approaches, suggesting peer-led sessions and tailored messaging on HPV's role in cancer prevention to make health promotion more impactful.

Access Outside the DOH Program

If the 9vHPV vaccine is included in the NIP, vaccine access outside the program will be mainly through private facilities, e.g., private clinics and pharmacies with vaccination services, and would be paid out-of-pocket. It may be possible to access if there is a separate budget from the LGU, and if manufacturers can provide special pricing to the LGUs once the 9vHPV vaccine is already included in the Philippine National Formulary as stated in RA 9502 (Universally Accessible Cheaper and Quality Medicines Act of 2008).⁴⁴ This emphasizes the need to ensure LGU budget allocation for the procurement of the vaccine to complement the DOH strategy. Other ways to access may be through collaboration with private drugstore chains for catch-up vaccination, which will cater to the adult population based on RA 10918 (Philippine Pharmacy Act).⁴⁵ Less commonly mentioned options include accessing the 9vHPV vaccine through charity or advocacy programs.

Affordability of 9vHPV Vaccine

When paid for out of pocket (OOP) under the current prevailing market price of PhP 6,655.00 to PhP 9,230.00 (cost of vaccine and injection administration) based on prices from the websites of Mercury Drug, Southstar Drug, and Hi-Precision Diagnostics, study participants deemed the 9vHPV vaccine unaffordable, taking into consideration minimum-wage earners and population-based vaccination.⁴⁶⁻⁴⁸ Participants also mentioned that instead of spending on the HPV vaccine for the target population, parents may opt to advise their children to practice sexual abstinence instead, which stresses the cultural arguments on why families opt out of getting the vaccine. Another participant cites that the HPV vaccine may be made accessible only if the government procures it to address the identified unaffordability.

HPV Vaccine Preference

Participants shared views from both government and personal perspectives on HPV vaccine preference. They acknowledged that the 4vHPV vaccine may be more feasible for government use due to its proven efficacy and lower cost. However, from the standpoint of patients and physicians, the 9vHPV vaccine is preferred for its broader protection against more HPV strains, assuming it is provided for free and supported by an effective vaccination program. One participant, however, favored the 4vHPV vaccine if cervical cancer risk factors could be adequately managed.

Other Social Concerns

The current DOH NIP for HPV vaccination is a school-based vaccination program that covers 9- to 14-year-old girls, social concerns revolve around the population not covered by the program, especially the exclusion of special populations such as indigenous communities and high-risk groups, e.g., communities that practice polygamy and migrant workers, who are more prone to sexually transmitted infections are not covered, and therefore, is an equity concern. Additionally, expertise, skills, and sustainable public-private partnerships are essential to reduce social concerns by successfully implementing the NIP.

Health Systems Impact

Current Health System Challenges in Implementation

The successful implementation of the 9vHPV vaccine within the National Immunization Program (NIP) heavily depends on the strength of the health system's building blocks, including governance, financing, service delivery, and human resources. Decentralization, in which local governments are given more powers, authority, and resources in their jurisdiction as described by the Local Government Code of 1991, has placed the burden of vaccine funding on LGUs, many of which lack the resources to sustain the two-dose regimen of the 9vHPV vaccine.⁴⁹ Despite DOH support, LGUs remain hesitant due to fears of needing to cover increased demand, leading many to prefer the more affordable 2vHPV or 4vHPV vaccines. Strengthening health governance through policy-maker education and clear decision-making guidance is critical to supporting vaccine prioritization and financing.

Human resources for health are also vital in ensuring effective vaccine delivery. While the cold chain requirements of the 9vHPV vaccine are like other types, gaps remain in logistics, transport, and inventory management that must be addressed. The pandemic improved LGU cold chain capabilities, but further investment in training frontline workers is needed, especially in HPV-specific education, where urgency remains low due to limited awareness. Community health promotion is essential to increase uptake, regardless of the vaccine used. With the current NIP covering only 23% of the target population for the first dose and just 5% for the second, it is more pressing to strengthen the system's capacity and improve vaccine coverage before shifting to the costlier 9vHPV vaccine.

Challenges in Scaling-up HPV Vaccination by 2030

It was reported that despite the majority seeing vaccination as a priority need, budget allocation for the NIP specific for HPV vaccination has remained a primary concern. Participants cite that procuring fewer doses at the price point of the 9vHPV vaccine would compromise funding for other existing programs. Furthermore, participants also expressed that given the limited resources of the government, both at

the national and local levels, instead of getting an expensive vaccine, it is more economical to promote the cheaper vaccine to increase coverage and to allocate the remaining budget for other needs of the NIP such as training, distribution, and other concerns related to the vaccination strategy.

Another challenge expressed by some participants, particularly from the LGU, was that HPV vaccination and cancer, in general, were not considered a priority program for implementation. Cervical cancer is, likewise, not included in other established public health vertical programs, such as the National Tuberculosis Control Program, which have complete program components, including surveillance, health promotion, and information systems.

Financing was identified as the main barrier to scaling up the 9vHPV vaccine, requiring an economic assessment to determine its cost-effectiveness. Some participants suggested PhilHealth coverage as a solution, but stakeholders clarified that while inclusion isn't impossible, it's not in the current midterm plan. Moreover, HPV vaccination is currently under the DOH as a public health program, and incorporating it into PhilHealth's coverage raises concerns about jurisdiction and policy requirements. Governance issues also hinder scale-up, including poor inter-agency coordination, lack of leadership education, and inconsistent policy implementation. Strong, knowledgeable, and committed leadership, especially from experienced program managers, is essential, but priorities often shift depending on the appointed Secretary of Health.

Additional challenges include high healthcare worker turnover and a shortage of vaccination volunteers. This can be addressed through accessible training via the DOH Academy and continuing education, especially for those with limited training. Active, rather than passive, patient education should also be encouraged. On the data side, despite mandates for EMRs and EHRs, digital systems remain weak, with poor inventory tracking leading to vaccine wastage and artificial stockouts. Access to private sector data and improved reporting are needed, along with funding for maintaining a centralized, well-functioning database system and ensuring knowledge transfer for long-term sustainability.

Other Health System Impact Concerns

Investing in infrastructure such as generators was mentioned in order to safeguard vaccine integrity and digital records given the possibility of flooding and power outages.

DISCUSSION

Despite being a highly effective prevention method, HPV vaccination faces significant challenges at the national level, largely due to ethical concerns and misconceptions fueled by cultural and religious beliefs.⁵⁰ The findings of the study have many similarities with scoping reviews conducted, such that many concerns by healthcare professionals, patients, and program managers and implementers have also been considered by other countries. Some communities

wrongly associate vaccinating young girls with encouraging early sexual activity, a perception supported by studies showing that mothers fear HPV vaccination may increase their daughters' sexual risk-taking.¹² To counter these beliefs, involving religious leaders in health promotion and focusing communication on cancer prevention rather than sexual behavior are recommended.^{51,52} Gender also plays a role, with calls to vaccinate males due to their role in HPV transmission and rising HPV-related diseases among men, highlighting the need for gender-neutral vaccination policies.²¹ Clinicians report common adverse events following immunization (AEFIs), such as injection-site pain, which are generally mild but have historically caused vaccine hesitancy, as seen in Japan's prolonged suspension of HPV vaccine recommendations due to media-amplified concerns.⁵³⁻⁵⁶ To improve equity and access, community-based vaccination programs targeting both in- and out-of-school youth are advocated, supported by laws allowing pharmacy-based adult vaccination services to expand reach beyond school settings.^{45,57,58,60}

Cost remains a critical barrier, with participants ranking vaccine price as low in priority despite its limiting utilization. Systematic reviews show the 9vHPV vaccine is highly cost-effective, especially in high-income countries, though in middle-income settings like the Philippines, cost and budget impact remain concerns.⁵⁹⁻⁶¹ Currently, the 2vHPV vaccine dominates the Philippine National Formulary due to cost-effectiveness, while the 9vHPV vaccine is preferred internationally, including in high-income countries such as Australia and the US.⁶²⁻⁶⁷ The decentralized Philippine health system grants local government units (LGUs) budget autonomy for vaccine procurement and service delivery, yet coordination challenges persist between LGUs and the DOH, complicating program scale-up.^{61,68} Effective public communication to counter misinformation and educate policymakers, media, and the public is crucial to building confidence and reducing vaccine hesitancy.⁶⁹⁻⁷² Given the high cervical cancer burden—with over 180,000 cases and nearly 80,000 deaths—implementation of 9vHPV vaccination could prevent a substantial number of cases and associated healthcare costs, improving health equity in the Philippines.⁶¹

For widespread use of any vaccine, a clear legal framework is essential. While several laws relevant to HPV vaccination exist—such as the UHC Act, NICCA law, and Government Procurement Reform Act—the inclusion of the 9vHPV vaccine in the Philippine National Formulary (PNF) and its incorporation into the National Immunization Program (NIP) remain pending. Given the country's devolved health system, national policies and guidelines set the foundation for vaccine procurement, while local government units (LGUs) manage logistics and delivery in community health facilities and schools.⁶¹ The New Government Procurement Act (RA 12009) introduced a bidding criterion, the “most economically advantageous responsive bid” (MEARB), which considers both technical and financial factors,

potentially benefiting vaccine procurement.²⁷ FGDs and KIIs highlighted that beyond national mandates like NICCA, local ordinances are necessary to effectively cascade HPV vaccination programs once the 9vHPV vaccine is included in the PNF and NIP, as LGUs hold responsibility for program implementation.^{61,73} Ethical concerns during the COVID-19 pandemic, such as the prohibition of schools as vaccination sites, hindered school-based HPV vaccination, but current efforts by DepEd and DOH aim to restore these programs, emphasizing the need for both community- and school-based approaches to reach the target population. Community acceptance studies showed vaccine affordability as a key factor influencing uptake alongside myths related to age, pain, and sexual behavior, prompting the government's shift to school-based immunization under DepEd Memorandum 173, currently applied to the 4vHPV vaccine in the PNF.^{74,75} Since HPV vaccination's introduction to the NIP in 2013 targeting girls 10-14 years old, coverage initially reached 90% but declined to averages of 64% for the first dose and 27% for the second dose by 2020, largely impacted by the Dengvaxia controversy in 2017.^{42,61,76} Recent legal acquittals related to this controversy may alleviate lingering fears and stigma, encouraging greater vaccine confidence.⁷⁷ Participants expressed hope that with proper legal backing, the 9vHPV vaccine will soon be included in the NIP to enhance access and availability. To ensure equitable access despite cost concerns and some hesitancy about inclusion by 2025, government collaboration with entities like GAVI, which supports low-income countries through price negotiation and financial assistance, could address affordability challenges.⁷⁸

In the Philippines, cervical cancer remains a significant health burden, ranking as the second most common cancer among women in 2023.⁷⁹ Although early-stage survival rates have improved, the disease still negatively impacts patients' quality of life. One study found that pain and financial difficulties were the most reported challenges among young, long-term cervical cancer survivors. Similarly, this study identified physical symptoms like body weakness and groin itchiness, alongside financial strain from diagnostic and treatment costs.⁸⁰ Additionally, a study in Ethiopia highlighted the social consequences of cervical cancer, including discrimination, isolation, and rejection by family and peers.⁸¹

The same study from Ethiopia also highlights how cervical cancer impacts work and income, with patients experiencing reduced work hours, job cessation, income loss, and severe financial distress due to treatment and related costs. Similarly, this study found patients facing financial barriers from initial diagnosis through treatment, including income loss during therapy.⁸¹ HPV vaccination offers a preventive solution, with the 9vHPV vaccine reducing overall cancer incidence by 77% in females aged 12-26.³² While all HPV vaccines (2vHPV, 4vHPV, 9vHPV) target strains 16/18 responsible for 70% of cervical cancers, the 9vHPV provides broader protection against additional high-risk strains causing 18.5% of HPV-positive cancers.⁸² Research shows

that improving public knowledge reduces vaccine hesitancy and stigma, a sentiment echoed by FGD participants who emphasized education and communication.⁸³ This aligns with the scoping review findings where fear of severe side effects was a major barrier, and mass media exposure significantly influenced vaccination intent.^{12,15,36} Higher education correlates with greater HPV awareness and more positive vaccination attitudes.⁸⁴ In the Philippines, immunization rates are being integrated into healthy learning institution standards (Joint Administrative Order No. 2022-0001), with comprehensive education and advocacy cascaded through schools, and parental engagement mandated by DOH DM No. 2024-0250 to improve uptake.^{28,85}

A key access barrier is vaccine cost; at ₱6,655 per dose, the 9vHPV vaccine is unaffordable for minimum wage earners.⁴⁶ This echoes findings that mothers are less willing to pay for the 9vHPV compared to other vaccines, with household income and vaccine price significantly influencing uptake.^{12,13} Participants agreed that government provision via the National Immunization Program (NIP) is essential to improve affordability and access. Cost is a known limitation in low-resource settings, and research supports that inclusion in national programs boosts vaccination rates.⁸⁶⁻⁸⁹ Participants preferred the 9vHPV vaccine for its broader protection, reflecting findings that parents favor it over 2vHPV and 4vHPV vaccines when cost is not a barrier.¹²⁻¹⁴ Equitable access must also consider populations beyond the primary target group, including immunocompromised individuals, LGBTQ+ youth, inadequately vaccinated persons, and those with histories of sexual abuse, as well as high-risk groups like polygamous individuals, migrant workers, and seafarers.^{90,91}

The integration of the 9vHPV vaccine into the Philippines' National Immunization Program (NIP) faces major health system challenges, particularly due to the devolved structure where local government units (LGUs) manage logistics and implementation. LGU prioritization and financial capacity vary widely, affecting vaccine delivery and willingness to cooperate, especially given concerns about vaccine costs and potential demand increases.^{61,73} Knowledge gaps among healthcare workers (HCWs) regarding HPV and the 9vHPV vaccine reduce urgency for vaccination efforts.^{37,92} Financing remains a key barrier, as despite proven cost-effectiveness, budget constraints and ineligibility for GAVI subsidies complicate vaccine scale-up.^{93,94} Governance issues, including fragmented health services, weak monitoring, unclear expenditure responsibilities, and mismatches between LGU fiscal capacity and devolved functions, lead to inefficient fund use.^{95,96} Effective policymaking, guided by health technology assessment (HTA) and budget impact analysis, is critical to ensure sustainable financing and strategic investment in the 9vHPV vaccine.^{9,32,59} The DOH must strengthen leadership by supporting LGUs technically and operationally.^{73,97}

Training for HCWs, teachers, and school leaders is essential but resource-intensive, and the absence of a robust electronic immunization registry hampers data management

and program monitoring.^{23,98} Participants agreed on including the 9vHPV vaccine in the NIP to meet the 90-70-90 cervical cancer elimination goals, with some openness to a one-dose schedule following WHO recommendations, though most still favor two doses due to lack of formal policy.^{99,100} Political factors heavily influence vaccine prioritization at the LGU level, with many local officials deprioritizing HPV vaccination despite disease burden and cost considerations—a pattern seen in other vaccine introductions in the Philippines.⁶⁴ Addressing cost barriers through price negotiations and international partnerships is critical to scaling up HPV vaccination nationwide.⁷¹

CONCLUSION

When prioritizing HPV vaccine allocation within the NIP, the local burden of HPV-related disease and the potential to reduce cervical cancer cases and deaths are the most important factors, followed by clinical guidelines, government resources, elimination targets, and vaccine cost. While the 4vHPV vaccine is preferred for population-wide vaccination due to cost-effectiveness, any valent HPV vaccine is acceptable. Economic evaluations comparing new vaccines like the 9vHPV to the 4vHPV are essential to determine the added value of a higher valent vaccine. However, it is noted that from the perspective of patients, clinicians, and experts, the 9vHPV vaccine is favored for its broader protection. To increase vaccine acceptance, addressing social and cultural concerns through targeted health promotion and education is critical to reducing stigma and fear.

Health system improvements are necessary for successful integration of the 9vHPV vaccine, including enhanced training of healthcare workers, strengthened supply and cold chain management, and better data tracking through information technology. Effective implementation of the existing HPV vaccination program must be prioritized to ensure high uptake before investing in broader-valent vaccines to prevent wastage. To expand access to older populations, certified pharmacists could provide HPV vaccination services through pharmacies, complementing primary healthcare facilities as outlined in the Philippine Pharmacy Act (RA 10918).⁴⁴

The 9vHPV vaccine should be reviewed for inclusion in the NIP to support the WHO's 90-70-90 cervical cancer elimination goals, after a careful cost-effectiveness evaluation and budget impact analysis. If found cost-effective, the availability of the vaccine through the government will highly offset private sector costs. The one-dose strategy recommended in the Philippine clinical guidelines could further improve vaccine accessibility in resource-limited settings. Finally, it is important to recognize that vaccination is only one pillar of cervical cancer elimination; equal government focus is needed on screening and treatment to effectively reduce HPV infection and cervical cancer incidence nationwide.

Statement of Authorship

All authors certified fulfillment of ICMJE authorship criteria.

Author Declaration

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REFERENCES

- World Health Organization, Cervical cancer [Internet]. 2024 [cited 2024 Sep]. Available from: <https://www.who.int/news-room/fact-sheets/detail/cervical-cancer>.
- Williamson AL. Recent developments in human papillomavirus (HPV) vaccinology. *Viruses*. 2023 Jun;15(7):1440. doi: 10.3390/v15071440. PMID: 37515128. PMCID: PMC10384715.
- Global Alliance for Vaccines and Immunization, Everything you need to know about the HPV vaccine [Internet]. 2023 [cited 2024 Sep]. Available from: https://www.gavi.org/vaccineswork/everything-you-need-know-about-hpv-vaccine?gad_source=1&gclid=Cj0KCQ-jw9Km3BhDjARIsAGUb4nxabyQeJBvg5FxFH3fEssjlhds8tnbeSCODiNHJQNzernN7wNgvO4ZQaAsPbEALw_wcB.
- Cordero DA Jr. Improving the human papillomavirus vaccination in the Philippines. *Ther Adv Vaccines Immunother*. 2025 Mar;13:25151355251326783. doi: 10.1177/25151355251326783. PMID: 40104155; PMCID: PMC11915295.
- Munn Z, Peters MDJ, Stern C, Tufanaru C, McArthur A, Aromataris E. Systematic review or scoping review? Guidance for authors when choosing between a systematic or scoping review approach. *BMC Med Res Methodol*. 2018;18(1):143. doi: 10.1186/s12874-018-0611-x.
- Smith SA, Duncan AA. Systematic and scoping reviews: A comparison and overview. *Semin Vasc Surg*. 2022;35(4):464-9. doi: 10.1053/j.semvascsurg.2022.09.001.
- Health Technology Assessment Division. Guidelines on the application of Philippine social values on HTA. 1st edition. Quezon City: Health Technology Assessment Division; 2022 Nov. pp. 5-14.
- Department of Education. DepEd Order No. 051, s. 2022: An order to support the Department of Health Bakunahang Bayan from December 5 to 7, 2022 [Internet]. 2022 [cited 2024 Sep]. Available from: https://www.deped.gov.ph/wp-content/uploads/2022/11/DO_s2022_051.pdf.
- Health Technology Assessment Division. Philippine HTA methods guide: methodological standards in evaluation of health technologies in the Philippines. 2nd edition draft. Quezon City: Health Technology Assessment Division; 2023.
- World Health Organization, Health equity [Internet]. n.d. [cited 2024 Sep]. Available from: https://www.who.int/health-topics/health-equity#tab=tab_1.
- Swift JK, Mullins RH, Penix EA, Roth KL, Trusty WT. The importance of listening to patient preferences when making mental health care decisions. *World Psychiatry*. 2021 Sep;20(3):316-7. doi: 10.1002/wps.20912. PMID: 34505382; PMCID: PMC8429341.
- Lin Y, Su Z, Chen F, Zhao Q, Zimet GD, Alias H, et al. Chinese mothers' intention to vaccinate daughters against human papillomavirus (HPV), and their vaccine preferences: a study in Fujian Province. *Hum Vaccin Immunother*. 2021 Jan 2;17(1):304-315. doi: 10.1080/21645515.2020.1756152. PMID: 32401617; PMCID: PMC7872083.
- Xie P, Zhao J, Li X, Zou X, Liu G, Han X. Preference for human papillomavirus vaccine type and vaccination strategy among parents of school-age girls in Guangdong province, China. *Prev Med Rep*. 2023 Oct;36:102463. doi: 10.1016/j.pmedr.2023.102463. PMID: 37854667; PMCID: PMC10580040.
- Fontenot HB, Domush V, Zimet GD. Parental attitudes and beliefs regarding the nine-valent human papillomavirus vaccine. *J Adolesc Health*. 2015 Dec;57(6):595-600. doi: 10.1016/j.jadohealth.2015.09.003. PMID: 26592327.
- Lin Y, Lin Z, He F, Chen H, Lin X, Zimet GD, et al. HPV vaccination intent and willingness to pay for 2-, 4-, and 9-valent HPV vaccines: A study of adult women aged 27-45 years in China. *Vaccine*. 2020 Mar 23;38(14):3021-3030. doi: 10.1016/j.vaccine.2020.02.042. PMID: 32127227.
- Trogon JG, Shafer P, Lindsay B, Coyne-Beasley T. Determinants of the receipt of the 9-valent human papillomavirus vaccine in the first year after introduction in North Carolina. *Vaccine*. 2018 Feb;36(10):1310-15. doi: 10.1016/j.vaccine.2018.01.014. PMID: 29366705.
- Trogon JG, Ahn T. Geospatial patterns in human papillomavirus vaccination uptake: evidence from uninsured and publicly insured children in North Carolina. *Cancer Epidemiol Biomarkers Prev*. 2015 Mar;24(3):595-602. doi: 10.1158/1055-9965.EPI-14-1231. PMID: 25576528.
- World Health Organization, Human papillomavirus vaccines: WHO position paper [Internet]. 2022 [cited 2024 Sep]. Available from: <https://www.who.int/publications/i/item/who-wer9750-645-672>.
- Garland SM. Prevention strategies against human papillomavirus in males. *Gynecol Oncol*. 2010 May;117(2 Suppl):S20-S25. doi: 10.1016/j.ygyno.2010.01.027. PMID: 20138347.
- Harder T, Wichmann O, Klug SJ, van der Sande MAB, Wiese-Posselt M. Efficacy, effectiveness and safety of vaccination against human papillomavirus in males: a systematic review. *BMC Med*. 2018 Jul;16(1):110. doi: 10.1186/s12916-018-1098-3. PMID: 30016957; PMCID: PMC6050686.
- Jia S, Pan B, Hong D, Zhang Q, Jiang H, Hong Y, et al. A survey of potential acceptance of 9-valent HPV vaccine among Chinese male college students. *Hum Vaccin Immunother*. 2023 Dec 15;19(3):2272533. doi: 10.1080/21645515.2023.2272533. PMID: 37969075; PMCID: PMC10760362.
- Widrig D, Tag B. HTA and its legal issues: a framework for identifying legal issues in health technology assessment. *Int J Technol Assess Health Care*. 2014 Dec;30(6):587-94. doi: 10.1017/S0266462314000683. PMID: 25816824.
- World Health Organization, Global strategy to accelerate the elimination of cervical cancer as a public health problem [Internet]. 2020 [cited 2024 Sep]. Available from: <https://www.who.int/publications/i/item/9789240014107>.
- Congress of the Republic of the Philippines. Republic Act No. 11215: An act institutionalizing a national integrated cancer control program and appropriating funds therefor [Internet]. 2019 [cited 2024 Sep]. Available from: <https://elibrary.judiciary.gov.ph/thebookshelf/showdocs/2/86444>.
- Congress of the Republic of the Philippines. Republic Act No. 11223: An act instituting Universal Health Care for all Filipinos, prescribing reforms in the health care system, and appropriating funds therefor [Internet]. 2019 [cited 2024 Sep]. Available from: <https://www.officialgazette.gov.ph/downloads/2019/02feb/20190220-RA-11223-RRD.pdf>.
- Congress of the Republic of the Philippines. Republic Act No. 9184: An act providing for the modernization, standardization and regulation of the procurement activities of the government and for other purposes [Internet]. 2003 [cited 2024 Sep]. Available from: <https://www.gppb.gov.ph/wp-content/uploads/2023/06/Republic-Act-No.-9184.pdf>.
- Congress of the Republic of the Philippines. Republic Act No. 12009: An act revising Republic Act No. 9184, otherwise known as the "government procurement reform act", and for other purposes [Internet]. 2024 [cited 2024 Sep]. Available from: <https://elibrary.judiciary.gov.ph/thebookshelf/showdocs/2/97750>.

28. Department of Health and other agencies. Joint Administrative Order No. 2022-0001: Guidelines on healthy settings framework in learning institutions [Internet]. 2022 [cited 2024 Sep]. Available from: <https://drive.google.com/file/d/12NnjU8D63r5-7iibTrPQ6fFVnsobo5Cs/view>.
29. Department of Education. Division Memorandum No. 556, s. 2024: Interim guidelines on the resumption of School-Based Immunization (SBI) program after the COVID-19 pandemic [Internet]. 2024 [cited 2024 Oct]. Available from: <https://drive.google.com/file/d/1nlzQDPgLfupafZO7cdjuSY-VwdagOwXH/view>.
30. World Bank, World bank income groups [Internet]. 2024 [cited 2024 Sep]. Available from: <https://ourworldindata.org/grapher/world-bank-income-groups?tab=table>.
31. Diakite I, Kyle J, Situ S, Bai P, Zhang X, Wang W, et al. Public health impact of 2-, 4-, and 9-valent HPV vaccination in females on cervical and noncervical diseases in men and women under different coverage scenarios in China: A simulation study. *Hum Vaccin Immunother*. 2023 Aug;19(2):2258569. doi: 10.1080/21645515.2023.2258569. PMID: 37787054; PMCID: PMC10549189.
32. Cody P, Tobe K, Abe M, Elbasha EH. Public health impact and cost effectiveness of routine and catch-up vaccination of girls and women with a nine-valent HPV vaccine in Japan: a model-based study. *BMC Infect Dis*. 2021 Jan;21(1):11. doi: 10.1186/s12879-020-05632-0. PMID: 33407188; PMCID: PMC7789539.
33. Philippine Medical Association, Code of ethics of the medical profession [Internet]. 2019 [cited 2024 Sep]. Available from: <https://www.philippinemedicalassociation.org/wp-content/uploads/2019/11/Code-of-Ethics-of-the-Medical-Profession-1.pdf>.
34. Alyafei A, Easton-Carr R. The Health Belief Model of Behavior Change. In: *StatPearls* [Internet]. 2024 [cited 2026 Feb]. Available from: <https://www.ncbi.nlm.nih.gov/books/NBK606120/>.
35. Rosenstock IM, Strecher V, Becker J. Social learning theory and the health belief model. *Health Education Quarterly*. 1988;15:175-83. doi: 10.1177/109019818801500203.
36. Lin Y, Lin Z, He F, Hu Z, Zimet GD, Alias H, et al. Factors influencing intention to obtain the HPV vaccine and acceptability of 2-, 4- and 9-valent HPV vaccines: A study of undergraduate female health sciences students in Fujian, China. *Vaccine*. 2019 Oct 16;37(44):6714-6723. doi: 10.1016/j.vaccine.2019.09.026. PMID: 31548016.
37. Kasting ML, Wilson S, Dixon BE, Downs SM, Kulkarni A, Zimet GD. A qualitative study of healthcare provider awareness and informational needs regarding the nine-valent HPV vaccine. *Vaccine*. 2016 Mar;34(11):1331-4. doi: 10.1016/j.vaccine.2016.01.050. PMID: 26859240; PMCID: PMC4995443.
38. Kornides ML, Calo WA, Heisler-MacKinnon JA, Gilkey MB. U.S. Primary care clinics' experiences during introduction of the 9-valent HPV vaccine. *J Community Health*. 2018 Apr;43(2):291-6. doi: 10.1007/s10900-017-0420-x. PMID: 28856551; PMCID: PMC5832505.
39. Swift C, Dey A, Rashid H, Clark K, Manocha R, Brotherton J, et al. Stakeholder Perspectives of Australia's National HPV Vaccination Program. *Vaccines (Basel)*. 2022 Nov 21;10(11):1976. doi: 10.3390/vaccines10111976. PMID: 36423072; PMCID: PMC9692920.
40. Professional Regulatory Board of Pharmacy. Resolution No. 65 s. 2025: Adopting and promulgating the accreditation guidelines for the certification program for immunizing pharmacists and recognizing the competency development group for immunizing pharmacists [Internet]. 2025 [cited 2026 Feb]. Available from: <https://www.prc.gov.ph/sites/default/files/2025-65%20publishedCertification%20Program%20for%20Immunizing%20Pharmacists%20Guidelines.PDF>.
41. Professional Regulatory Board of Pharmacy. Resolution No. 65 s. 2021: Accrediting Philippine Pharmacists Association, Inc (PPhA) as the training provider to conduct the "Immunizing pharmacist certification program" [Internet]. 2021 [cited 2026 Feb]. Available from: <https://www.prc.gov.ph/sites/default/files/pharma2021-05%20published.PDF>.
42. Department of Health, Philippine CPG for cervical cancer prevention and the treatment of premalignant lesions of the cervix. Manila: Department of Health; 2023.
43. Congress of the Republic of the Philippines. Republic Act No.10173: An act protecting individual personal information in information and communications systems in the government and the private sector, creating for this purpose a national privacy commission, and for other purposes [Internet]. 2012 [cited 2024 Sep]. Available from: <https://privacy.gov.ph/data-privacy-act/>.
44. Congress of the Republic of the Philippines. Republic Act No.9502: An act providing for cheaper and quality medicines, amending for the purpose Republic Act No. 8293 or the Intellectual Property Code, Republic Act No. 6675 or the Generics Act of 1988, and Republic Act No. 5921 or the Pharmacy Law, and for other purposes [Internet] 2008 [cited 2024 Sep]. Available from: <https://www.fda.gov.ph/wp-content/uploads/2021/03/RA-9502-Cheaper-Medicines-Act.pdf>.
45. Congress of the Republic of the Philippines. Republic Act No.10918: An act regulating and modernizing the practice of pharmacy in the Philippines, repealing for the purpose republic act numbered five thousand nine hundred twenty-one (R.A. No. 5921), otherwise known as the Pharmacy Law [Internet]. 2016 [cited 2024 Sep]. Available from: <https://elibrary.judiciary.gov.ph/thebookshelf/showdocs/2/70354>.
46. Mercury Drug Corporation, Vaccination services [Internet]. n.d. [cited 2024 Oct]. Available from: https://www.mercurydrug.com/vaccination_terms-and-conditions.html.
47. Southstar Drug, Rx: Gardasil 9 Suspension for Injection 0.5ml [Internet]. 2024 [cited 2024 Oct]. Available from: <https://southstardrug.com.ph/products/gardasil-9-suspension-for-inj-0-5ml-1>.
48. Hi-Precision Diagnostics, HPV / Human Papillomavirus (9 Strains) [Internet]. 2024 [cited 2024 Oct]. Available from: <https://store.hi-precision.com.ph/products/hpv-human-papillomavirus-9-strains>.
49. Department of the Interior and Local Government of the Philippines. The local government code of the Philippines [Internet]. 1991 [cited 2026 Feb]. Available from: https://www.dilg.gov.ph/PDF_File/reports_resources/dilg-reports-resources-2016120_fce005a61a.pdf.
50. Escoffery C, Petagna C, Agnone C, Perez S, Saber LB, Ryan G, et al. A systematic review of interventions to promote HPV vaccination globally. *BMC Public Health*. 2023 Jun 29;23(1):1262. doi: 10.1186/s12889-023-15876-5. PMID: 37386430; PMCID: PMC10308645.
51. Olagoke AA, Floyd B, Caskey R, Hebert-Beirne J, Boyd AD, Molina Y. Disentangling the role of religiosity in human papillomavirus vaccination amidst COVID-19 pandemic. *J Relig Health*. 2022 Apr;61(2):1734-49. doi: 10.1007/s10943-021-01490-5. PMID: 35112233; PMCID: PMC8810213.
52. Navarro-Illana P, Aznar J, Diez-Domingo J. Ethical considerations of universal vaccination against human papilloma virus. *BMC Med Ethics*. 2014 Apr;15:29. doi: 10.1186/1472-6939-15-29. PMID: 24708813; PMCID: PMC3996512.
53. Takeuchi J, Noma H, Sakanishi Y, Kawamura T. Adverse events associated with human papillomavirus vaccines: a protocol for systematic review with network meta-analysis incorporating all randomised controlled trials comparing with placebo, adjuvants and other vaccines. *BMJ Open*. 2019 Aug;9(8):e026924. doi: 10.1136/bmjopen-2018-026924. PMID: 31439596; PMCID: PMC6707669.
54. Haruyama R, Obara H, Fujita N. Japan resumes active recommendations of HPV vaccine after 8-5 years of suspension. *Lancet Oncol*. 2022 Feb;23(2):197-198. doi: 10.1016/S1470-2045(22)00002-X. PMID: 35114115.
55. Chen F, Pan X, Liang H, Shen L, Wang Y, Chen Y, et al. Real-world safety profile of the 9-valent human papillomavirus vaccine: A study in Zhejiang, China from 2019 to 2021. *Hum Vaccin Immunother*. 2022 Dec 30;18(7):2152256. doi: 10.1080/21645515.2022.2152256. PMID: 36484114; PMCID: PMC9762803.
56. Jiang M, Lin Z. Listing and comparing the immunogenicity, safety, and effectiveness of 9vHPV vaccinations for different age groups: 9-15 years old, 16-26 years old, 27-45 years old. *Highlights in Science, Engineering and Technology*. 2023 Dec; 74:275-82. doi: 10.54097/6t2wrp46.

57. Australian Government Department of Health, Exploratory research on school-based immunisation [Internet]. 2023 [cited 2024 Oct]. Available from: <https://www.health.gov.au/sites/default/files/exploratory-research-on-school-based-immunisation-qualitative-research-report.pdf>.
58. Philippine Statistics Authority, Four out of five children aged 5 to 24 years were attending school for school year 2022 to 2023 [Internet]. 2023 [cited 2024 Oct]. Available from: https://psa.gov.ph/system/files/dhsd/Press%20Release_0.pdf.
59. Mahumud RA, Alam K, Afroz S, Ormsby GM, Dunn J, Gow J. Correction: Cost-effectiveness evaluations of the 9-Valent human papillomavirus (HPV) vaccine: Evidence from a systematic review. *PLoS One*. 2023 Nov;18(11):e0294379. doi: 10.1371/journal.pone.0294379. PMID: 37943757; PMCID: PMC10635459.
60. Mongan SP, Byrnes J, Kim H. The cost-effectiveness of the human papilloma virus vaccination in Asia Pacific countries: What lessons can Indonesia learn?—A systematic review. *Vaccines*. 2025 May 30;13(6):593. doi: 10.3390/vaccines13060593.
61. Llave CL, Uy MEV, Lam HY, Aldaba JG, Yacapin CC, Miranda MB, et al. The cost-effectiveness of human papillomavirus vaccination in the Philippines. *Vaccine*. 2022 Jun 15;40(27):3802–3811. doi: 10.1016/j.vaccine.2022.05.025. PMID: 35606237.
62. Brotherton JM. Human papillomavirus vaccination update: Nonavalent vaccine and the two-dose schedule. *Aust J Gen Pract*. 2018 Jul;47(7):417–21. doi: 10.31128/AJGP-01-18-4462. PMID: 30114867.
63. Centers for Disease Control and Prevention, HPV vaccination recommendations [Internet]. 2021 [cited 2024 Oct]. Available from: <https://www.cdc.gov/vaccines/vpd/hpv/hcp/recommendations.html>.
64. Garon J, Wuddhika IV, Sreenivasan N, Wannemuehler K, Vutthikol Y, Chhorvann C, et al. Community-based household assessment of human papillomavirus (HPV) vaccination coverage and acceptability - HPV vaccine demonstration program, Cambodia - 2017. *Vaccine*. 2019 Feb 21;37(9):1202–1208. doi: 10.1016/j.vaccine.2018.12.052. PMID: 30686637; PMCID: PMC6372342.
65. Mahumud RA, Gow J, Alam K, Keramat SA, Hossain MG, Sultana M, et al. Cost-effectiveness of the introduction of two-dose bivalent (Cervarix) and quadrivalent (Gardasil) HPV vaccination for adolescent girls in Bangladesh. *Vaccine*. 2020 Jan 10;38(2):165–172. doi: 10.1016/j.vaccine.2019.10.037. PMID: 31668820.
66. Satari HI, Sundoro J, Andrijono A, Hadinegoro SR, Syafriyati S, Tandy G, et al. Post Marketing Surveillance Study of 2nd Dose Quadrivalent Human Papilloma Virus Vaccine in Elementary School Children in Jakarta, Indonesia: Safety Result and Implementation of School-Based HPV Immunization Program. *Asian Pac J Cancer Prev*. 2019 Mar 26;20(3):869–875. doi: 10.31557/APJCP.2019.20.3.869. PMID: 30912406; PMCID: PMC6825787.
67. Termrungruanglert W, Khemapech N, Vasuratna A, Havanond P, Deebukham P, Kulkarni AS, et al. The epidemiologic and economic impact of a quadrivalent human papillomavirus vaccine in Thailand. *PLoS One*. 2021 Feb 11;16(2):e0245894. doi: 10.1371/journal.pone.0245894. PMID: 33571186; PMCID: PMC7877776.
68. Nisperos GA, Cabanizas TGG, Bulario JS, Cadiz JMS, Lastino JBP, Siscar JAA. Implications of the Mandanas-Garcia Ruling on local health systems. *Acta Med Philipp*. 2024 Jul;58(13):8–14. doi: 10.47895/amp.v58i13.8131. PMID: 39166230; PMCID: PMC11330989.
69. Goje O, Kapoor A. Meeting the challenge of vaccine hesitancy. *Cleve Clin J Med*. 2024 Sep;91(9 suppl 1):S50–S56. doi: 10.3949/ccjm.91.s1.08. PMID: 39231603.
70. UNFPA Asia-Pacific Regional Office, Philippines: Country review and roadmap for action [Internet]. 2021 [cited 2024 Oct]. Available from: https://asiapacific.unfpa.org/sites/default/files/pub-pdf/philippines_final_16_12_21.pdf.
71. Guillaume D, Meyer D, Waheed DE, Schlieff M, Muralidharan K, Chou VB, et al. Factors influencing the prioritization of vaccines by policymakers in low- and middle-income countries: a scoping review. *Health Policy Plan*. 2023 Mar 16;38(3):363–376. doi: 10.1093/heapol/czac092. PMID: 36315461.
72. Wallace L, Kapirir L. How are new vaccines prioritized in low-income countries? A case study of human papilloma virus vaccine and pneumococcal conjugate vaccine in Uganda. *Int J Health Policy Manag*. 2017 Dec;6(12):707–20. doi: 10.15171/ijhpm.2017.37. PMID: 29172378; PMCID: PMC5726321.
73. Cuenca JS, Health devolution in the Philippines: Lessons and insights [Internet]. 2018 [cited 2024 Oct]. Available from: <https://pidswebs.pids.gov.ph/CDN/PUBLICATIONS/pidsdps1836.pdf>.
74. Lintao RCV, Cando LFT, Perias GAS, Tantengco OAG, Tabios IKB, Velayo CL, et al. Current Status of Human Papillomavirus Infection and Cervical Cancer in the Philippines. *Front Med (Lausanne)*. 2022 Jun 20;9:929062. doi: 10.3389/fmed.2022.929062. PMID: 35795639; PMCID: PMC9251542.
75. Visaya V, DOH leads school-based immunization drive vs. cervical cancer [Internet]. 2023 [cited 2024 Oct]. Available from: <https://www.pna.gov.ph/articles/1195526>.
76. Fatima K, Syed NI. Dengvaxia controversy: impact on vaccine hesitancy. *J Glob Health*. 2018 Dec;8(2):010312. doi: 10.7189/jogh.08.020312. PMID: 30410732; PMCID: PMC6214489.
77. Calalo AO, The Manila Times: Court acquits Garin et al in Dengvaxia case [Internet]. 2024 [cited 2024 Oct]. Available from: <https://www.manilatimes.net/2024/09/02/news/national/court-acquits-garin-et-al-in-dengvaxia-case/1968301>.
78. Nakalembe M, Mirembe FM, Banura C. Vaccines against human papillomavirus in low and middle income countries: a review of safety, immunogenicity and efficacy. *Infect Agent Cancer*. 2015 Jun;10:17. doi: 10.1186/s13027-015-0012-2. PMID: 26075018; PMCID: PMC4465311.
79. ICO/IARC Information Centre on HPV and Cancer, Philippines: Human papillomavirus and related cancers, fact sheet 2023 [Internet]. 2023 [cited 2024 Oct]. Available from: https://hpvcentre.net/statistics/reports/PHL_FS.pdf.
80. Khalil J, Bellefqih S, Sahli N, Afif M, Elkacemi H, Elmajjaoui S, et al. Impact of cervical cancer on quality of life: beyond the short term (Results from a single institution) Quality of life in long-term cervical cancer survivors: results from a single institution. *Gynecol Oncol Res Pract*. 2015 May;2:1–6. doi: 10.1186/s40661-015-0011-4.
81. Endale H, Mulugeta T, Habte T. The socioeconomic impact of cervical cancer on patients in Ethiopia: Evidence from Tikur Anbessa Specialized Hospital. *Cancer Manag Res*. 2022 May;14:1615–25. doi: 10.2147/CMAR.S352389. PMID: 35535268; PMCID: PMC9078746.
82. Abbas K, Yoo KJ, Prem K, Jit M. Equity impact of HPV vaccination on lifetime projections of cervical cancer burden among cohorts in 84 countries by global, regional, and income levels, 2010–22: a modelling study. *EClinicalMedicine*. 2024 Mar;70:102524. doi: 10.1016/j.eclinm.2024.102524. PMID: 38685933; PMCID: PMC11056390.
83. Chen X, Wang L, Huang Y, Zhang L. Risk perception and trust in the relationship between knowledge and HPV vaccine hesitancy among female university students in China: a cross-sectional study. *BMC Public Health*. 2024 Mar;24(1):667. doi: 10.1186/s12889-024-18166-w. PMID: 38429644; PMCID: PMC10908003.
84. Stephens ES, Dema E, McGee-Avila JK, Shiels MS, Kreimer AR, Shing JZ. Human papillomavirus awareness by educational level and by race and ethnicity. *JAMA Netw Open*. 2023 Nov;6(11):e2343325. doi: 10.1001/jamanetworkopen.2023.43325. PMID: 37962885; PMCID: PMC10646733.
85. Department of Health. Department Memorandum No. 2024-0250: Interim guidelines on the resumption of School-Based Immunization (SBI) after the COVID-19 pandemic [Internet]. 2024 [cited 2024 Oct]. Available from: <https://www.scribd.com/document/800866834/DM-2024-0250-Interim-Guideline-1>.
86. Brisson M, Jit M, Boily MC, Laprise J, Martin D, Drolet M, et al. Modelling estimates of the incremental effectiveness & cost-effectiveness of HPV vaccination. World Health Organization Strategic Advisory Group of Experts (SAGE) on immunization meeting. Geneva, Switzerland [Internet]. 2016 [cited 2024 Oct]. Available from: <https://terrace.who.int/mediacentre/data/sage/>

SAGE_Docs_Ppt_Oct2016/10_session_HPVOct2016_session10_HPVC EA-ICER.pdf.

87. Mahumud RA, Alam K, Dunn J, Gow J. The cost-effectiveness of controlling cervical cancer using a new 9-valent human papillomavirus vaccine among school-aged girls in Australia [published correction appears in PLoS One. 2023 Dec 5;18(12):e0295688. doi: 10.1371/journal.pone.0295688]. PLoS One. 2019 Oct;14(10):e0223658. doi: 10.1371/journal.pone.0223658. PMID: 31596899; PMCID: PMC6785120.

88. Brandt HM, Pierce JY, Crary A. Increasing HPV vaccination through policy for public health benefit. Hum Vaccin Immunother. 2015 Dec;12(6):1623-25. doi: 10.1080/21645515.2015.1122145. PMID: 26669416; PMCID: PMC4964717.

89. Zhao C, Zhao Y, Li J, Li M, Shi Y, Wei L. Opportunities and challenges for human papillomavirus vaccination in China. Hum Vaccin Immunother. 2024 Dec;20(1):2329450. doi: 10.1080/21645515.2024.2329450. PMID: 38575524; PMCID: PMC10996835.

90. Amboree TL, Paguio J, Sonawane K. HPV vaccine: the key to eliminating cervical cancer inequities. BMJ. 2024 May;385:q996. doi: 10.1136/bmj.q996. PMID: 38749555.

91. Martínez-Gómez X, Curran A, Campins M, Alemany L, Rodrigo-Pendás JA, Borruel N, et al. Multidisciplinary, evidence-based consensus guidelines for human papillomavirus (HPV) vaccination in high-risk populations, Spain, 2016. Euro Surveill. 2019 Feb;24(7):1700857. doi: 10.2807/1560-7917.ES.2019.24.7.1700857. PMID: 30782268; PMCID: PMC6381660.

92. Decena KI, Benavides DR. Knowledge, attitude, and practice on human papillomavirus vaccination among obstetrics and gynecology residents in Metro Manila. Philippine Journal of Obstetrics and Gynecology. 2017 Jan 1;41(1):1-1.

93. Germar MJ, Purugganan C, Bernardino MS, Cuenca B, Chen YC, Li X, et al. Cost-effectiveness analysis of AS04-adjuvanted human papillomavirus 16/18 vaccine compared with human papillomavirus 6/11/16/18 vaccine in the Philippines, with the new 2-dose schedule. Hum Vaccin Immunother. 2017 May 4;13(5):1158-1166. doi: 10.1080/21645515.2016.1269991. PMID: 28075249; PMCID: PMC5443386.

94. Guerrero AM, Genuino AJ, Santillan M, Praditsithikorn N, Chantarastapornchit V, Teerawattananon Y, et al. A cost-utility analysis of cervical cancer screening and human papillomavirus vaccination in the Philippines. BMC Public Health. 2015 Jul 30;15:730. doi: 10.1186/s12889-015-2046-1. PMID: 26223975; PMCID: PMC4520072.

95. Cuenca JS, Efficiency of local governments in health service delivery: A stochastic frontier analysis [Internet]. 2020 [cited 2024 Oct]. Available from: <https://www.pids.gov.ph/publication/discussion-papers/efficiency-of-local-governments-in-health-service-delivery-a-stochastic-frontier-analysis>.

96. Diokno-Sicat CJ, Castillo AFG, Maddawin RB, Philippine local government public expenditure review: A survey of national government local government support programs [Internet]. 2020 [cited 2024 Oct]. Available from: <https://pidswebs.pids.gov.ph/CDN/PUBLICATIONS/pidsdps2048.pdf>.

97. Liwanag HJ, Wyss K. What conditions enable decentralization to improve the health system? Qualitative analysis of perspectives on decision space after 25 years of devolution in the Philippines. PLoS One. 2018 Nov;13(11):e0206809. doi: 10.1371/journal.pone.0206809. PMID: 30395625; PMCID: PMC6218067.

98. Tsu VD, LaMontagne DS, Atuhebwe P, Bloem PN, Ndiaye C. National implementation of HPV vaccination programs in low-resource countries: Lessons, challenges, and future prospects. Prev Med. 2021 Mar;144:106335. doi: 10.1016/j.jypmed.2020.106335. PMID: 33678232; PMCID: PMC7957340.

99. World Health Organization, One-dose Human Papillomavirus (HPV) vaccine offers solid protection against cervical cancer [Internet]. 2022 [cited 2024 Oct]. Available from: [https://www.who.int/news/item/11-04-2022-one-dose-human-papillomavirus-\(hpv\)-vaccine-offers-solid-protection-against-cervical-cancer](https://www.who.int/news/item/11-04-2022-one-dose-human-papillomavirus-(hpv)-vaccine-offers-solid-protection-against-cervical-cancer).

100. Aldaba JG, Llave CL, Uy MEV, Tejano KP, Aquino MRC, Catalig M, et al. The cost of human papillomavirus vaccination delivery at the administrative and health facility levels in the Philippines. Vaccine X. 2024 Feb 18;17:100459. doi: 10.1016/j.jvacx.2024.100459. PMID: 38420134; PMCID: PMC10900773.

APPENDICES

Appendix 1. Characteristics of Included Studies in the Scoping Review

Category/ies	Title	First Author (Year)	Country	Study Design	Population	Sample Size	Intervention	Comparator	Issues raised
Social impact	Public health impact of 2-, 4-, and 9-valent HPV vaccination in females on cervical and noncervical diseases in men and women under different coverage scenarios in China: A simulation study	Diakite (2023)	China	Epidemiological model (dynamic transition model)	All age groups and all sexes, with assumed sexual debut at 15 years old	Epidemiologic	2vHPV	No vaccination	The 9vHPV vaccine is superior compared to other vaccine types across all vaccine coverage rate (VCR) scenarios. Cost-effectiveness of the 9-valent vaccine for cervical cancer is highly dependent on the cost.
							2vHPV with assumed cross-protection against high-risk genotypes 31, 33, and 45		
							4vHPV		
							9vHPV		
Social impact	Public health impact and cost effectiveness of routine and catch-up vaccination of girls and women with a nine-valent HPV vaccine in Japan: a model-based study	Cody (2021)	Japan	Epidemiological model (continuous-time transmission model)	All age groups, all sexes, sexual activity (low, medium, high), excluding same sex partnerships	Epidemiologic	Screening only	None	The 9vHPV vaccine with catch-up strategy up to 26 years old with screening is most cost-effective for cervical cancer and anogenital warts prevention in Japan.
							Screening and routine 4vHPV vaccination		
							Screening and routine 9vHPV vaccination		
							Screening and routine 9vHPV vaccination with temporary catch-up vaccination		

Appendix 1. Characteristics of Included Studies in the Scoping Review (*continued*)

Category/ ies	Title	First Author (Year)	Country	Study Design	Population	Sample Size	Intervention	Comparator	Issues raised
Health systems impact	A qualitative study of healthcare provider awareness and informational needs regarding the nine-valent HPV vaccine	Kasting (2016)	United States	Qualitative (semi-structured in-person interviews)	21 pediatricians; 1 pediatric nurse practitioner	22	9vHPV vaccine	None	Healthcare professional (HCP) recommendation is one of the strongest predictors of HPV vaccine uptake; hence, HCP awareness is pivotal in increasing vaccine uptake.
Ethical impact	A survey of potential acceptance of 9-valent HPV vaccine among Chinese male college students	Jia (2023)	China	Quantitative (cross-sectional)	Male college students	1547	9vHPV vaccine	None	Willingness of men who have romantic partners may be attributed to their sense of responsibility towards their partner from infection. People with relatives and friends with HPV-related cancer were more likely to gain more HPV-related knowledge and thus closely focus on HPV protection. Male college students with vaccinated relatives and friends were more likely to appreciate the importance of the 9vHPV vaccine and hold a more inclusive attitude toward vaccination.
Ethical impact Social impact	Chinese mothers' intention to vaccinate daughters against human papillomavirus (HPV), and their vaccine preferences: a study in Fujian Province	Lin (2020)	China	Online cross-sectional survey	Mothers of primary school children in Yongding district of Longyan City	3586	9vHPV	2vHPV 4vHPV	Intention to vaccinate their daughters is affected by the perceived benefits of mothers (e.g., effectiveness). Vaccination schedules (e.g., 2-dose or 3-dose) affect uptake due to the need to be absent from work/class; thus, school-based vaccination was suggested. The safety of the vaccine was a primary concern of mothers.
Health systems impact	U.S. Primary Care Clinics' Experiences During Introduction of the 9-Valent HPV Vaccine	Kornides (2018)	United States	Cross-sectional survey	Clinicians and staff from high- to medium-volume pediatric and family practice clinics in Illinois, Michigan, and Washington	211	9vHPV	None	Increased parental hesitancy was the most common concern regarding the 9vHPV vaccine.
Health systems impact	Stakeholder Perspectives of Australia's National HPV Vaccination Program	Swift (2022)	Australia	Mixed methods (Key informant interviews and online cross-sectional survey)	Key stakeholders of the National HPV Vaccination Program	42	2-dose schedule of 9vHPV	3-dose schedule of 4vHPV	Consent form return and student absenteeism were the major perceived barriers to HPV vaccination in Australian schools. Inclusion in Australia's National Immunization Program (NIP) and the school-based delivery model were crucial factors to parental acceptance and decision making on HPV vaccination.
Ethical impact	Preference for human papillomavirus vaccine type and vaccination strategy among parents of school-age girls in Guangdong province, China	Xie (2023)	China	Cross-sectional survey	Parents of children aged 9-15 years old	5281	9vHPV	2vHPV 4vHPV	The top three reasons why parents have not yet vaccinated their children are that the children's age is not qualified for vaccination, shortage of HPV vaccine supply, and HPV vaccines are too expensive.

Appendix 1. Characteristics of Included Studies in the Scoping Review (continued)

Category/ies	Title	First Author (Year)	Country	Study Design	Population	Sample Size	Intervention	Comparator	Issues raised
Ethical impact Social impact	HPV vaccination intent and willingness to pay for 2-, 4-, and 9-valent HPV vaccines: A study of adult women aged 27–45 years in China	Lin (2020)	China	Cross-sectional survey	Mothers of primary school children	2339	9vHPV	2vHPV 4vHPV	Knowledge deficits on the sexual transmission of HPV infection, that there is no cure for HPV, and that HPV infection can be asymptomatic should be the target of awareness-raising education programmes for adult women. Older-aged women who were less educated and had lower income have lower HPV-related knowledge, implying a need for targeted HPV-related health information.
Ethical impact Social impact	Factors influencing intention to obtain the HPV vaccine and acceptability of 2-, 4- and 9-valent HPV vaccines: A study of undergraduate female health sciences students in Fujian, China	Lin (2019)	China	Online cross-sectional survey	Female health sciences undergraduate students in years 1 to 5 enrolled in Fujian Medical University, Fuzhou, China	997	9vHPV	2vHPV 4vHPV	Undergraduate students from years 1 and 2 from lower socioeconomic groups exhibit lower levels of HPV-related knowledge. Perceived barriers to HPV vaccination are inability to take time off for vaccination and perceived severe side effects from receiving HPV vaccination.
Ethical impact	Determinants of the receipt of the 9-valent human papillomavirus vaccine in the first year after introduction in North Carolina	Trogdon (2018)	United States	Retrospective cohort	Adolescents aged 9-17 who received the HPV vaccine after 9vHPV vaccine was distributed	297164	9vHPV	2vHPV 4vHPV	There are disparities in 9vHPV vaccine utilization in lower population areas and areas with lower levels of education.
Ethical impact Health systems impact	Parental Attitudes and Beliefs Regarding the Nine-Valent Human Papillomavirus Vaccine	Fontenot (2015)	United States	Exploratory study (Focus group discussion)	Parents of HPV unvaccinated daughters aged 9-12 years and parents of fully vaccinated daughters aged 11-17 years	81	9vHPV	None	Concerns of parents focused on vaccine adverse reactions, side effects, cost and insurance coverage, and length of time HPV9 has been on the market or studied. Another concern is the perception that the vaccine directly correlates to the onset of sexual activity.

Appendix 2. Rankings and mean score from FGD and KII participants for allocation priority

Criteria	FGD Participants				KII Participants		
	A	B	C	D	A	B	C
<i>Local burden of disease of HPV and cervical cancer</i>	2	1	1	1	1	1	1
<i>Cost of HPV vaccine per dose</i>	6	5	5	5	4	3	4
<i>Recommendations in clinical practice guidelines</i>	3	6	2	3	*	6	5
<i>Available resources in the government</i>	5	4	3	4	5	5	3
<i>Target allocation based on cervical cancer elimination agenda</i>	4	3	4	6	2	4	6
<i>Number of cervical cancers and deaths to be averted in the long term</i>	1	2	6	2	3	2	2

Note: KII Participant A did not explicitly rank the criterion 'Recommendations in clinical practice guidelines'; however, the participant explained that it is important to follow the CPG to inform decisions of clinicians.

FGD participants composition: Two (2) from the private sector, two (2) from the government sector.

KII participants composition: Two (2) from the private sector, one (1) from the government sector.