GLOBAL - NITAG - NETWORK

NITAG Resource Center

Downloaded on 26 November 2026

This PDF reflects the content available on the download date. Consult the **web version** for any updates.

HPV vaccines indicators

Table of contents

1. Burden & epidemiology
2. Benefits of the intervention
3. Safety of the intervention
4. Values and preferences
5. Acceptability to stakeholders
6. Financing & funding
7. Market (feasibility)
8. Service delivery (feasibility)
9. Logistics (feasibility)

Burden & epidemiology

Number of new cases per year (last 3-5 years)

Cervical cancer is the fourth most common cancer in terms of incidence in women with an estimated 604,000 new cases in 2024.1

Cervical cancers account for over 90% of Human papillomavirus (HPV)-related cancers in women.[2]

While virtually all cases of cervical cancer are caused by HPV, the attributable fraction of other HPV related cancers ranges between 2% (oral cavity and larynx cancer) and 88% (anal cancer).[3]

For country-level data, please refer to the country reports available from the HPV Centre.[4]

Proportion of the population affected by the disease or infected with the antigen

Most sexually active people will be infected with HPV at some point in their lives.[5, 6]

Cervical cancer is the most common cancer type in 25 countries and the leading cause of cancer death in 37 countries, mainly in sub-Saharan Africa as well as South America and South-East Asia.[7]

The highest prevalence of cervical HPV among women is in sub-Saharan Africa (24%), followed by Latin America and the Caribbean (16%), Eastern Europe (14%), and South-East Asia (14%). Prevalence among men is highly variable based on sexual trends.[6, 8]

A meta-analysis of HPV among men showed a global pooled prevalence of 31% (95% CI: 27–35) for any HPV. Pooled prevalence estimates were similar for the regions of Europe and Northern America, Sub-Saharan Africa, Latin America and Oceania, while estimates for Eastern and South-Eastern Asia were half that of the other regions.[9]

Prevalence estimates vary by sampling frame, age and assay.

Serogroup or serotype distribution (for serogroup- or serotype-specific vaccines)

Currently, 12 HPV types are defined as high-risk (oncogenic) and cause cancer in humans (types 16, 18, 31, 33, 35, 39, 45, 51, 52, 56, 58, and 59); type 68 is classified as probably causing cancer. Oncogenic risk varies by type, with type HPV16 being the most oncogenic.[10]

The most common HPV genotypes found in invasive cervical cancer are HPV16 and HPV18, together accounting for about 77% of cases, globally. Other significant high-risk types include

HPV31, 33, 35, 45, 52, and 58, which raise this share to nearly 95% of cases globally.[11]

The year 2010 data is used as a historical baseline for assessing trends in serotype prevalence. Given that the existing HPV vaccines cover HPV-16 and HPV-18 types, measuring the "natural" seroprevalence burden for these two types (16 and 18) will no longer be possible, as they start to disappear due to vaccination.[12]

Number of deaths from the disease per year

Cervical cancer was the fifth leading cause of cancer deaths in women in 2024, with around 280,000 deaths worldwide.[13]

Case Fatality ratio (number of deaths / number of new cases, in %)

Cervical cancer mortality rates were six times higher in low Human Development Index (HDI) countries versus very high HDI countries.[14]

According to the most recent estimates (2024), the mortality per incident case rate is estimated at 46 deaths per 100. Rates differ by country income level and health system capacity. No single global estimate is available.[13]

Outbreak, epidemic or pandemic risk

HPV is not considered an epidemic or pandemic prone infection.

Contribution of the vaccine to achievement of the national, regional or global disease goals

The HPV vaccine plays a critical role in the global strategy to eliminate cervical cancer. By targeting high-risk HPV types, high-coverage HPV vaccination programs are integral to reducing the incidence of the disease. The World Health Organization’s (WHO) global strategy against cervical cancer sets ambitious goals: vaccinating 90% of girls by age 15, screening 70% of women by ages 35 and 45, and treating 90% of women with pre-cancerous lesions.[15]

Back to table of contents

Benefits of the intervention

Serogroup or serotype coverage by vaccines considered (for serogroup- or serotype-specific vaccines)

As of 2022, authorised HPV vaccines provide protection against HPV types 6, 11, 16, 18, 31, 33, 45, 52, and 58 (types 6 and 11 are responsible for most anogenital warts).[16]

The older bivalent (Cervarix) and quadrivalent (Gardasil) vaccines show partial protection against HPV types not included in the vaccine (cross-protection), when used in multidose schedules. The bivalent vaccine (targeting HPV-16/18) generally provides stronger and more consistent cross-protection, particularly against HPV31, 33 and 45. Some studies also report partial protection against HPV-35, 52 and 58, though the evidence is less robust and more variable.[17], [18], [19]

No data on cross protection is available for the newer vaccines. Less evidence is available on the extent of cross protection provided by HPV vaccine in single-dose schedule.

Efficacy and effectiveness estimates (e.g. against infection, disease, hospitalization, death), including in different populations

Three doses of the bivalent (Cervarix) and quadrivalent (Gardasil) vaccines offered significant protection against cervical adenocarcinoma in situ associated with HPV16 and HPV18 among young women (15–26 years of age): Efficacy 88% (95% CI: 30–98%).[20], [21]

Trials among vaccine recipients not already infected with HPV showed high efficacy against high-grade cervical, vulvar and vaginal lesions: 98% (95% CI: 93–100) for CIN2+ and 100% (95% CI 83–100) for vulvar and vaginal intraepithelial neoplasia grade 2+ caused by the HPV types in the quadrivalent vaccine.[21], [22]

Approval of the two-dose schedule in girls 9 to 14-years of age- was based on demonstration of non-inferiority of the immune response when compared with young adult women (16–26 years of age) in whom 3-dose efficacy has been proven (immunobridging).[21]

A one-dose schedule is supported by WHO in the general population based on evidence from post-hoc analyses of efficacy trials, post-licensure observational studies and an RCT (0 vs 1) among African females 15-20 years of age. These studies demonstrate that a single dose of HPV vaccine is sufficient to elicit a lasting, stable immune response, and provides protection against persistent HPV infection similar to that of multidose regimens.[20], [21]

Head-to-head RCTs comparing one and two-dose schedules of Cervarix and Gardasil-9 showed a non-inferior VE with a single-dose schedule within the specified margins.[23], [24]

Duration of protection and waning of immunity in general and risk groups

With a multidose schedule, antibody titres remain high for up to 16 years following the bivalent (Cervarix) vaccine for girls vaccinated at 16-17 years of age, up to 15 years following the quadrivalent (Gardasil) vaccine, and for at least six years following the more recently licensed nonavalent vaccine (Gardasil-9).[25], [26], [27]

Geometric Mean Titres (GMT) following a single dose remain stable for at least 12-16 years.[28], [29], [24]

Back to table of contents

Safety of the intervention

Type, including severity, consequences and frequency of short- and long-term adverse events following vaccination

As of the end of 2024, more than 700 million doses of HPV vaccine have been distributed since licensure in 2006.[30], [31], [32]

Post-licensure surveillance has detected no serious safety issues to date, aside from rare reports of anaphylaxis. The risk of anaphylaxis has been characterized as approximately 1.7 cases per million doses.[33]

A systematic review of studies on the safety of HPV vaccines found little to no difference in serious adverse events among recipients of bivalent, quadrivalent and nonavalent HPV vaccines.[34]

Back to table of contents

Values and preferences

Perception of the target population on the risk of disease

A variety of studies from countries, including Australia, China, Pakistan, and Italy, across different target populations (medical personnel, girls, MSM, students, general public), show low to moderate knowledge and awareness of HPV- related cancers, though this is not necessarily associated with low uptake of the vaccination.[35], [36], [37], [38], [39]

Back to table of contents

Acceptability to stakeholders

Acceptability of the vaccine and of vaccination against the disease

Based on 86 studies worldwide, parents generally supported HPV vaccinations for their children, with HPV vaccine acceptance rates varying from 12% to 98%. Geographical variations were seen in pooled acceptance rates, highest in Africa (79.6%; 95% CI: 73.5–85.2%) and lowest in North America (56.7%; 95% CI: 49.3–64.0%). Knowledge levels of HPV vaccination varied widely (6.5% to 100%) across world regions.[40]

Back to table of contents

Financing & funding

Estimated financial cost of materials per vaccine dose (syringes, needles, safety box) (in USD)

Price for one auto-disable (AD) syringe and needle

- As of October 2025, the UNICEF procurement price for 2026 ranges from US$ 0.023 to US$ 0.046, depending on supplier and product. 41
- The 2026 PAHO Revolving Fund for Access to Vaccines price ranges from US$ 0.03 to US$ 0.04, depending on supplier and product.42

Price for one 5-litre safety box

- The UNICEF procurement price for 2026 ranges from US$ 0.375 to US$ 0.86, depending on supplier and product.43
- The 2026 PAHO Revolving Fund for Access to Vaccines prices ranges from US$ 0.41 to US$ 0.47.42

Each 5-litre safety box can hold around 100 syringes.

Estimated vaccine financial cost per dose (in USD)

As of June 2026, the UNICEF price per dose for countries eligible for Gavi pricing ranges from US$ 2.80 for a bivalent vaccine, single dose vial (Walvax) to US$ 5.18 for a bivalent vaccine, two dose vial (GSK), depending on the supplier, valency and presentation.44

For different groupings of Middle Income Countries (MIC), the UNICEF price per dose ranges from US$ 2.90 for a bivalent vaccine, single dose vial (Cecolin) to US$ 33.25 for a nonavalent vaccine, single dose vial (MSD), depending on supplier, valency and presentation.44

UNICEF prices are subject to change. The latest HPV vaccine price information is available from UNICEF Supply Division.44

Users are encouraged to confirm current prices by contacting UNICEF Supply Division.

The 2026 PAHO Revolving Fund for Access to Vaccines pricelist reports a price per dose ranging from US$ 2.90 for the bivalent vaccine to US$ 14.99 for the nonavalent vaccine.[45]

The June 2026 US CDC pricelist reports a price per dose of US$ 275.013-329.090 for the nonavalent HPV vaccine (Merck/MSD) in the United States.[46]

Among self-procuring MICs, county-reported prices for 2025 per dose range from US$ 9.50 to US$ 11.53 for bivalent, US$ 10.55 to US$ 118.83 for the quadrivalent and US$ 32.7 and US$ 119.47 for the nonavalent vaccines.[47]

Estimated financial cost per person vaccinated (in USD)

The cost of vaccine delivery can vary greatly depending on the strategies, financing elements (e.g., vaccine procurement and delivery costs), and the country context.

A six-country study published in November 2023 (Ethiopia, Guyana, Rwanda, Senegal, Sri Lanka, and Uganda) reported the financial cost per dose from approximately US$ 1.50 to US$ 5.50, and economic costs ranging from US$ 2.50 to US$ 7.50 per dose. These differences were influenced by factors such as service delivery strategies, the number of doses administered per health facility, and the intensity of program activities. Health facility activities and associated expenditures accounted for the largest proportion of the economic cost per dose. Health worker and non-health worker time were also substantial cost components, regardless of the operational context.[48]

A 2020 study in Zambia estimated the financial cost of school-based delivery at US$ 12.40 per Fully Immunised Child (cost of vaccine is the co-financing portion only).[49]

A 2024 five country study (Ethiopia, Guyana, Rwanda, Sri Lanka, and Uganda) modelled the financial cost of vaccine procurement and delivery per adolescent receiving the full schedule as ranging from US$ 9.64 (Sri Lanka) to US$ 23.43 (Guyana) using a 2-dose schedule. The cost decreased to US$ 4.84 and US$ 12.34, respectively, under a single-dose schedule, reflecting savings up to 50%. For economic costs, the range for a single-dose schedule was US$ 7.86 (Rwanda) to US$ 28.53 (Guyana).[50]

Cost-effectiveness ratio

Global cost-effectiveness analysis suggests that vaccinating pre-adolescent girls is usually cost-effective for cervical cancer prevention, particularly in resource-constrained settings where screening and other cervical cancer prevention and control measures often have limited coverage. At 2020 prices for the bivalent and quadrivalent vaccines, girls-only vaccination was cost-effective (compared with no vaccination), irrespective of the schedule or vaccine used.[51, 52]

HPV vaccination is generally cost-effective or even cost-saving in both high- and low-income countries, especially when targeting girls 9–14 years of age. The mean incremental cost-effectiveness ratio (ICER) for HPV vaccination globally is estimated at US$ 4 217 per disability-adjusted life year (DALY) averted, with much lower ICERs in regions with high cervical cancer burden, such as Sub-Saharan Africa and South Asia.[53] In Latin America, most studies found HPV vaccination to be cost-saving or cost-effective, with mean ICERs ranging from I$ 358 to I$ 3 804 depending on the vaccine type and study parameters.[54]

Cost-effectiveness varies considerably by several factors, including, the burden of disease, vaccination coverage, vaccine price, delivery costs, delivery approaches, and schedules. Caution is recommended when comparing estimates of cost-effectiveness for different interventions evaluated by different methods and in different contexts (e.g., with different concurrent health interventions and standards of care).

Is there a Gavi programme to support the introduction of this vaccine? If a Gavi programme is available, what support is available to countries?

Gavi opened a funding window for HPV vaccines in 2013.HPV vaccine introduction is supported by the guaranteed vaccine budget. The calculations of the budget amount are based on adoption of a single dose schedule and lower cost products.

All Gavi-eligible and Catalytic Phase countries that have not yet introduced HPV vaccine into their national vaccination schedule are eligible for support. For these countries, that have not yet introduced HPV vaccination into their national EPI schedule, Gavi supports routine HPV vaccine introduction calculated on a single-age cohort of girls aged between 9–14 years.

Introductions can be combined with a one-time multi-age cohort (MAC) catch-up campaign for girls up to age 14 to maximise impact in the first year. As of 2027, co-financing of MAC doses will be required.

For countries with existing HPV vaccination programmes, Gavi provides support for HPV optimisation, which may include switching vaccine product or schedule.

Either a one-dose or two-dose HPV vaccination schedule can be selected, however the guaranteed vaccine budget is calculated based on a single-dose schedule.

Countries in the Catalytic Phase are eligible for vaccine support to cover 50% of the routine immunisation target cohort; these countries are not eligible for MAC catch-up campaign funding.[55]

Back to table of contents

Market (feasibility)

Available vaccines, licensing status, prequalification status, presentation, formulation, dosage and route of administration

As of September 2026, there are eight HPV vaccines with marketing authorisation that are manufactured directly by the authorisation holder: Bivalent: Cecolin ® (Innovax), Cervarix ® (GSK), Walrinvax ® (Walvax) ; Quadrivalent: Gardasil ® (MSD), Cervavac (SII), Tsegardex ® (Nanolek); Nonavalent: Gardasil-9 ® (MSD), Cecolin 9® (Innovax).[56]. Six of those vaccines are WHO-prequalified.[57], [58]

Other HPV vaccines are authorised or commercialised under local brand names through technology-transfer, bulk-transfer, licensing, distribution or localisation arrangements (e.g., Nusagard in Indonesia, Silgard in Argentina, Papilovax in Bangladesh). For these products, the available public evidence indicates local commercialisation and/or partial local manufacturing steps but does not consistently demonstrate full end-to-end production– including drug-substance manufacture – by the local commercialising entity.[56]

Detailed information on the different products can be found in the vaccine comparison table.[59]

Back to table of contents

Service delivery (feasibility)

Number of doses and timing of administrations

WHO recommends that either a single-dose schedule or a two-dose schedule (administered 6–12 months apart, with an interval of up to 3–5 years between doses), may be used for females and males between nine and 20 years of age. For individuals above 20 years of age, a 2-dose schedule is recommended.

Given current evidence of comparable efficacy and duration of protection to a two-dose schedule, a one-dose schedule may offer programmatic advantages, be more efficient and affordable, and contribute to improved coverage.60

As of September 2026, four vaccines have data on single dose schedule: Cervarix, Gardasil, Gardasil-9 and Cecolin.58

Back to table of contents

Logistics (feasibility)

Cold chain volume required per vaccine dose (in cm3)

Depending on vaccine type and presentation: Bivalent - 4.8 cm3 to 57.7cm3 per dose (carton of 1 vial); Quadrivalent: 15 cm3 to 75 cm3 per dose; Nonavalent: 18.4 cm3 per dose.61

This information is limited to vaccines where publicly available information is accessible.

For specific product characteristics see the comparison table.59

Back to table of contents

Sources

1.

Global Cancer Observatory. Lyon: International Agency for Research on Cancer (IARC); 2024 (https://gco.iarc.who.int/today/en/dataviz/tables?mode=population&cancers=23, accessed July 17 2026).

2.
World Health Organization (2024). Human papillomavirus (HPV) and cancer. (https://www.who.int/news-room/fact-sheets/detail/human-papilloma-virus-and-cancer, accessed June 24 2026).

3.
De Martell C., Plummer M, Vignat J, Franceschi S.. Worldwide burden of cancer attributable to HPV by site, country and HPV type. Cancer epidemiology. 2017. doi:10.1002/ijc.30716.

4.
Country-level data: Country Reports, HPV Centre, (https://hpvcentre.net/datastatistics.php, accessed June 24 2026)

5.
U.S. Centres for Disease Control and Prevention, Clinical Overview of HPV, (https://www.cdc.gov/hpv/hcp/clinical-overview/index.html, accessed on July 17 2026)

6.
Bray F, Laversanne M, Weiderpass E, Soerjomataram I (2024). Global cancer statistics 2022: GLOBOCAN estimates of incidence and mortality worldwide for 36 cancers in 185 countries. CA Cancer J Clin. 74(3):229–263. doi:10.3322/caac.21834.

7.
World Health Organization (2024). Human papillomavirus (HPV) and cancer. (https://www.who.int/news-room/fact-sheets/detail/human-papilloma-virus-and-cancer, accessed June 24 2026).

8.
World Health Organization (2025). Cervical cancer. (https://www.who.int/news-room/fact-sheets/detail/cervical-cancer, accessed June 24 2026).

9.

Bruni L, Albero G, Rowley J, Alemany L, Arbyn M, et al. (2023). Global and regional estimates of genital human papillomavirus prevalence among men: a systematic review and meta-analysis. Lancet Glob Health. 11(9):e1403–e1414. doi:10.1016/S2214-109X(23)00305-4

10.
Bruni L, Diaz M, Castellsagué X, et al. (2010). Cervical human papillomavirus prevalence in 5 continents: meta-analysis of 1 million women with normal cytological findings. J Infect Dis. 202(12):1789–1799. doi:10.1086/657321.

11.
Wei F, Georges D, Man I, Baussano I, Clifford GM (2024). Causal attribution of human papillomavirus genotypes to invasive cervical cancer worldwide: a systematic analysis of the global literature. Lancet. 404(10451):435–444. doi:10.1016/S0140-6736(24)01097-3.

12.
Gray P, Kann H, Pimenoff V, Adhikari I, Eriksson T, et al. (2020). Long-term follow-up of human papillomavirus type replacement among young pregnant Finnish females before and after a community-randomised HPV vaccination trial with moderate coverage. Int J Cancer. 147:3511–3522. doi:10.1002/ijc.33169

13.
Global Cancer Observatory. Lyon: International Agency for Research on Cancer (IARC); 2024 (https://gco.iarc.who.int/today/en/dataviz/tables?mode=population&cancers=23, accessed July 17 2026).

14.
Singh D, Vignat J, Lorenzoni V, Eslahi M, Ginsburg O, et al. (2023). Global estimates of incidence and mortality of cervical cancer in 2020: a baseline analysis of the WHO Global Cervical Cancer Elimination Initiative. Lancet Glob Health. 11(2):e197–e206. doi:10.1016/S2214-109X(22)00501-0

15.
World Health Organization (2020). Global strategy to accelerate the elimination of cervical cancer as a public health problem. Geneva: World Health Organization (https://www.who.int/publications/i/item/9789240014107, accessed June 24 2026).

16.

World Health Organization. Human papillomavirus vaccines: WHO position paper, December 2022. Wkly Epidemiol Rec. 2022;97(50):645–672 (https://www.who.int/publications/i/item/who-wer9750-645-672, accessed 21 September 2026)

17.
Tsang, S., Sampson, J., Schussler, J., Porras, C., Wagner, S., et al. (2020). Durability of Cross-Protection by Different Schedules of the Bivalent HPV Vaccine: the CVT Trial. Journal of the National Cancer Institute. doi:10.1093/jnci/djaa010

18.
Brown, D., Joura, E., Yen, G., Kothari, S., Luxembourg, A., et al. (2021). Systematic literature review of cross-protective effect of HPV vaccines based on data from randomized clinical trials and real-world evidence. Vaccine. doi:10.1016/j.vaccine.2020.11.076

19.
Shing, J., Porras, C., Pinheiro, M., Herrero, R., Hildesheim, A., et al. (2024). Differential long-term bivalent HPV vaccine cross-protection by variants in the Costa Rica HPV vaccine trial. NPJ Vaccines, 9. doi:10.1038/s41541-024-00896-y

20.
Cochrane (2022) Systematic review of one-dose HPV vaccine efficacy [report for WHO SAGE Meeting of March 2022]. (https://cdn.who.int/media/docs/default-source/immunization/position_paper_documents/human-papillomavirus-(hpv)/systematic-review-of-1-dose-of-hpv-vaccinec14d7ee3-e409-4a1a-afd9-c3e7e0dd2bd9.pdf?sfvrsn=174858f6_1, accessed June 24 2026).

21.
World Health Organization. Human papillomavirus vaccines: WHO position paper – December 2022. Wkly Epidemiol Rec. 2022;97(50):645–672 (https://www.who.int/publications/i/item/who-wer9750-645-672, accessed 24 June 2026).

22.
Kjaer SK, Sigurdsson K, Iversen OE, Hernandez-Avila M, Wheeler CM, et al. (2009). A pooled analysis of continued prophylactic efficacy of quadrivalent human papillomavirus (Types 6/11/16/18) vaccine against high-grade cervical and external genital lesions. Cancer Prev Res

(Phila). 2(10):868–878. doi:10.1158/1940-6207.CAPR-08-0194

23.

Barnabas RV, Brown ER, Onono M, Bukusi EA, Baggaley RF, et al. (2022). Efficacy of single-dose HPV vaccination among young African women. NEJM Evid. 1(5):EVIDoa2100056. doi:1056/EVIDoa2100056.

24.

Kreimer AR, Porras C, Liu D, Hildesheim A, Carvajal LJ, et al. Noninferiority of One HPV Vaccine Dose to Two Doses. N Engl J Med. 2025 Dec 18;393(24):2421–2433. doi:10.1056/NEJMoa2506765.

25.

World Health Organization (2022). Human papillomavirus vaccines: WHO position paper – December 2022. Wkly Epidemiol Rec. 97(50):645–672 (https://www.who.int/publications/i/item/who-wer9750-645-672, accessed 24 June 2026).

26.

Olsson S-E, Van Damme P, Block SL, Castellsagué X, Gray GE, et al. (2020). Long-term immunogenicity, effectiveness, and safety of nine-valent human papillomavirus vaccine in girls and boys 9 to 15 years of age: interim analysis after 8 years of follow-up. Papillomavirus Res. 10:100203. h doi:10.1016/j.pvr.2020.100203.

27.

Malvi, S.G., Esmy, P.O., Muwonge, R., Joshi, S., Poli, U.R.R., et al, 2024. A prospective cohort study comparing efficacy of 1 dose of quadrivalent human papillomavirus vaccine to 2 and 3 doses at an average follow up of 12 years postvaccination. J Natl Cancer Inst Monogr 2024, 317–328. doi:/10.1093/jncimonographs/lgae042

28.

Restrepo J, Scherer EM, Smith RA, Gallego DF, Carter JJ, et al. (2023). Ten-year follow-up of 9-valent human papillomavirus vaccine: immunogenicity, effectiveness, and safety. Pediatrics. 152:e2022060993. doi:10.1542/peds.2022-060993.

29.

Porras, C., Romero, B., Kemp, T., Fantin, R., Herrero, R., et al. Costa Rica HPV Vaccine Trial Study Group, 2024. HPV16/18 antibodies 16-years after single dose of bivalent HPV vaccination: Costa Rica HPV vaccine trial. J Natl Cancer Inst Monogr 2024, 329–336. doi:10.1093/jncimonographs/lgae032.

30.
World Health Organization. Global Advisory Committee on Vaccine Safety: human papillomavirus vaccines. Geneva: World Health Organization (https://www.who.int/groups/global-advisory-committee-on-vaccine-safety/topics/human-papillomavirus-vaccines, accessed 24 June 2026).

31.
World Health Organization (2025). Global vaccine market report 2025. Geneva: World Health Organization (https://www.who.int/publications/m/item/2025-who-global-vaccine-market-report, accessed 17 July 2025).

32.
Henschke N, Bergman H, Buckley BS, Crosbie EJ, Dwan K, et al. Effects of human papillomavirus (HPV) vaccination programmes on community rates of HPV-related disease and harms from vaccination. Cochrane Database of Systematic Reviews. 2025; Issue 11. Art. No.: CD015363. doi:10.1002/14651858.CD015363.pub2

33.
World Health Organization (2017). HPV vaccine: rates of adverse events following immunization. Geneva: World Health Organization (https://www.who.int/publications/m/item/hpv-vaccine-rates-information-sheet , accessed 24 June 2026)

34.
Human papillomavirus vaccines: Safety topic page. Geneva: World Health Organization; 2022 (https://www.who.int/groups/global-advisory-committee-on-vaccine-safety/topics/human-papillomavirus-vaccines/safety, accessed 24 June 2026).

35.
Xie L, Ren J, Min S, Zhu X, Xu D, Qiao K, Chen X, Xiao Z, Tan Y (2023). Knowledge, attitude, and perception regarding HPV-related diseases and vaccination among the general public in Guizhou Province of China. Vaccine. 41(5):1119–1131. doi:10.1016/j.vaccine.2022.12.027.

36.
Paduano G, Vaienna S, Maisto G, Di Giuseppe G, Pavia M (2023). Investigating women's awareness and perceptions on human papillomavirus infection and oropharyngeal cancer in Italy. Front Public Health. 11:1195588. doi:10.3389/fpubh.2023.1195588.

37.
McNair R, Power J, Carr S (2009). Comparing knowledge and perceived risk related to the human papilloma virus among Australian women of diverse sexual orientations. Aust N Z J Public Health. 33:87–93. doi:10.1111/j.1753-6405.2009.00345.x.

38.
Khan TM, Buksh MA, Rehman IU, Saleem A (2016). Knowledge, attitudes, and perception towards human papillomavirus among university students in Pakistan. Papillomavirus Res. 2:122–127. doi:10.1186/s12905-024-03377-5.

39.
Kim HW, Lee EJ, Lee YJ, Kim SY, Jin YJ, et al. (2022). Knowledge, attitudes, and perceptions associated with HPV vaccination among female Korean and Chinese university students. BMC Womens Health. 22:51. doi:10.1186/s12905-022-01694-3.

40.
Heyde S, Osmani V, Schauberger G, Cooney C, Klug SJ (2024). Global parental acceptance, attitudes, and knowledge regarding human papillomavirus vaccinations for their children: a systematic literature review and meta-analysis. BMC Womens Health. 24:537. doi:10.1186/s12905-024-03377-5

41.
UNICEF Supply Division (2025). Auto-disable (AD) syringe price data . Copenhagen: United Nations Children's Fund (https://www.unicef.org/supply/media/24391/file/Auto-Disable-AD-syringes-pricing-data-2011-2027.pdf , accessed 24 June 2026).

42.
Pan American Health Organization (2026). Revolving fund: Syringe and Safety Boxes – Price List for the Calendar Year 2026 (https://www.paho.org/en/documents/syringes-and-safety-boxes-2026-prices, accessed 24 June 2026).

43.
UNICEF Supply Division (2025). Safety boxes price data (https://www.unicef.org/supply/media/24401/file/Safety-Boxes-SB-pricing-data-2011-2027.pdf, accessed 24 June 2026).

44.
United Nations Children's Fund (2026). Human papilloma virus vaccine price data (https://www.unicef.org/supply/documents/human-papilloma-virus-hpv-vaccine-price-data accessed 24 June 2026)

45.
Pan American Health Organization (2026). Vaccine prices list for the Calendar Year 2026. (https://www.paho.org/en/documents/vaccine-prices-revolving-fund-2026 , accessed 17 July 2026)

46.
Centers for Disease Control and Prevention (2026). Current CDC vaccine price list. VFC Program. Atlanta, GA (https://www.cdc.gov/vaccines-for-children/media/pdfs/2026/06/Pediatric-VFC-Vaccine-Price-List-06-16-26.pdf, accessed 24 June 2026)

47.
World Health Organization (2026). 2025 MI4A public vaccine purchase dataset. Geneva: WHO (https://www.who.int/teams/immunization-vaccines-and-biologicals/vaccine-access/mi4a/mi4a-vaccine-purchase-data, accessed 25 September 2026)

48.
PATH (2023). Cost and operational context of HPV vaccine delivery in six countries. (https://www.path.org/our-impact/resources/cost-and-operational-context-of-hpv-vaccine-delivery-in-six-countries/, accessed 24 June 2026).

49.
Simuyemba MC, Chama-Chiliba CM, Chompolola A, Sinyangwe A, Bchir A, et al. (2024). An evaluation of the cost of human papilloma virus (HPV) vaccine delivery in Zambia. BMC Infect Dis. 24:369. doi:10.1186/s12879-024-09222-2.

50.

Slavkovsky R, Mvundura M, Debellut F, Naddumba T. (2024) Evaluating potential program cost savings with a single-dose HPV vaccination schedule: a modeling study. J Natl Cancer Inst Monogr;2024(67):371–378. doi:10.1093/jncimonographs/lgae037.

51.
Abbas KM, van Zandvoort K, Brisson M, Jit M (2020). Effects of updated demography, disability weights, and cervical cancer burden on estimates of human papillomavirus vaccination impact at the global, regional, and national levels: a PRIME modelling study. Lancet Glob Health. 8(4):e536–e544. doi:10.1016/S2214-109X(20)30022-X.

52.
Brisson M, Jit M, Boily MC, Laprise JF, Martin D, et al. (2016). Modelling estimates of the incremental effectiveness & cost effectiveness of HPV vaccination (https://terrance.who.int/mediacentre/data/sage/SAGE_Docs_Ppt_Oct2016/10_session_HPV/Oct2016_session1
ICER.pdf, accessed 24 June 2026).

53.
Rosettie K, Joffe J, Sparks G, Aravkin A, Chen S, Compton K, et al. (2021). Cost-effectiveness of HPV vaccination in 195 countries: a meta-regression analysis. PLoS One. 16:e0260808. doi:10.1371/journal.pone.0260808.

54.
Tejada R, Malagón T, Franco E (2022). Cost-effectiveness of human papillomavirus vaccination in girls living in Latin American countries: a systematic review and meta-analysis. Vaccine. 40(18):2525–2535. doi:10.1016/j.vaccine.2022.03.046.

55.
Gavi, the Vaccine Alliance (2026). Gavi 6.0 Funding Guidelines v1.0 April 2026 (https://www.gavi.org/sites/default/files/support/guidelines-2026/gavi-60-funding-guidelines-annexes.pdf accessed 24 June 2026).

56.
World Health Organization (2026) Full vaccine product list (https://www.who.int/teams/immunization-vaccines-and-biologicals/vaccine-access/mi4a/mi4a-vaccine-purchase-data, accessed 24 June 2026).

57.
World Health Organization (2026) Prequalified Vaccines (https://extranet.who.int/prequal/vaccines/prequalified-vaccines, accessed 24 June 2026).

58.
World Health Organization (2024). Considerations for human papillomavirus (HPV) vaccine product choice, second edition. Geneva: World Health Organization (https://iris.who.int/bitstream/handle/10665/379113/9789240100930-eng.pdf, accessed 24 June 2026).

59.
NITAG Resource Centre (2026). Vaccine Evidence Compendium – HPV vaccines - HPV vaccines comparison (https://www.nitag-resource.org/compendium/hpv/vaccines, accessed 14 August 2026).

60.
World Health Organization (2022). Human papillomavirus vaccines: WHO position paper, December 2022. Wkly Epidemiol Rec. 97(50):645–672 (https://www.who.int/publications/i/item/who-wer9750-645-672, accessed 24 June 2026).

61.
World Health Organization (2024). Considerations for human papillomavirus (HPV) vaccine product choice, second edition. Geneva: World Health Organization (https://iris.who.int/bitstream/handle/10665/379113/9789240100930-eng.pdf?sequence=1, accessed 24 June 2026).