HPV vaccines indicators

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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 660,000 new cases in 2022 [1, 2]

Cervical cancers account for over 90% of HPV-related cancers in women. [3]

Country-level data: Please refer to the country reports in the HPV Centre. [4]

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

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-Eastern Asia. [2]

The estimated global HPV prevalence between 1995 and 2009 was 11.7% (95% CI 11.6%-11.7%). [5]

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 in men is highly variable based on sexual trends. [6, 7]

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, 59); type 68 is classified as probably causing cancer. Oncogenic risk varies by type, with type HPV16 being the most oncogenic. [8]

The most common HPV genotypes found in invasive cervical cancer are HPV16 and HPV18, together accounting for about 77% of cases. Other significant high-risk types include HPV31, 33, 35, 45, 52, and 58, which collectively contribute to nearly 95% of cases globally. [9]

To note that 2010 data is seen as a historical baseline. 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. [10]

A more recent metaanalysis 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. [11]

Number of deaths from the disease per year

Cervical cancer was the fourth leading cause of cancer deaths in women in 2022, with around 350 000 deaths worldwide. [12]

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

Cervical cancer mortality rates were six times higher in low HDI countries versus very high HDI countries.
CFR differing by country income level and health system capacity. No single global estimate available. [13]

Outbreak, epidemic or pandemic risk

Not applicable for HPV

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 2030. By targeting high-risk HPV types, widespread 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 age 35 and again by 45, and treating 90% of women with pre-cancerous lesions. [14]

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Benefits of the intervention

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

The vaccines currently available provide protection vs. 6, 11, 16, 18, 31, 33, 45, 52, and 58 (type 6 and 11 are responsible for most anogenital warts). [15]
Both Bivalent and Quadrivalent Vaccines show cross-protection, with the bivalent vaccine (targeting HPV-16/18) generally provides stronger and more consistent cross-protection, particularly against HPV-31, HPV-33, and HPV-45. Some studies also report partial protection against HPV-35, HPV-52, and HPV-58, though the evidence is less robust and more variable. [16]

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

Meta-analysis: Three doses of the bivalent (Cervarix) and quadri-valent (Gardasil) vaccines offered significant protection against cervical adenocarcinoma in situ associated with HPV16 and HPV18 among young women (aged 15–26 years): 88% (95%CI 30–98%). 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. Approval of the 2-dose schedule 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). A one-dose schedule is supported by WHO given that post-hoc analyses of efficacy trials, and post-licensure observational studies among African females (15-20 years of age) have demonstrated that a single dose of HPV vaccine is sufficient to elicit an immune response that provides similar protection as a multidose regimen against initial and persistent HPV infection.

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

With a multidose schedule, antibody titres remain high for up to 12 years for the bivalent (Cervarix) vaccine for girls vaccinated at age 16-17, up to 15 years for quadrivalent (Gardasil) vaccine, and for at least 6 years for the more recently licensed nonavalent vaccine (Gardasil-9). [17, 18, 19] GMT following a single dose remain stable through at least 10-16 years. [20, 21]

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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. [22, 23] Post-licensure surveillance has detected no serious safety issues to date except rare reports of anaphylaxis. The risk of anaphylaxis has been characterized as approximately 1.7 cases per million doses. [24] A systematic review of studies on the safety of HPV vaccines found little-to-no difference among recipients of bivalent, quadrivalent and nonavalent HPV vaccines with regard to serious adverse events. [25, 26]

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Values and preferences

Perception of the target population on the risk of disease

A variety of studies from e.g., Australia, China, Pakistan, Italy, and other countries in different target populations (medical personnel, girls, MSM, students, general public) show low to moderate knowledege and awareness of HPV related cancers, partly associated with vaccine uptake. [27], [28], [29], [30], [31]

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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%) between world regions. [32]

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Financing & funding

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

If procuring through UNICEF SD: a box of 100 AD syringes with needles (0.5 ml) is priced at approximately US$ 4.50, equating to US$ 0.045 per syringe with needle; a box of 25 safety boxes (each with a 5-liter capacity) for about $20.26, resulting in approximately US$ 0.81 per safety box. Each 5-liter safety box can hold around 100 syringes, leading to a disposal cost of approximately US$ 0.008 per syringe.

Combining these costs, the estimated material cost per HPV vaccine dose is approximately US$ 0.053 (i.e., US$ 0.045 for the syringe and needle plus US$ 0.008 for the share of the safety box).

Estimated vaccine financial cost per dose (in USD)

UNICEF prices for 2025 for countries assessing GAVI prices, the price ranges between US$ 2.9 and US$ 5.18 per dose, depending on the suppler and presentation.For different groupings of MICs, UNICEF prices range between US$ 2.9 and US$ 33.25 for vaccines ranging from bivalent to nonavalent and depending on supplier. [33]

The PAHO price per dose for bivalent HPV vaccines is US$ 2.9 and for quadrivalent HPV vaccines US$ 10.48,as per 2024 price list. .[34]

Cost per dose in the USA, based on the CDC price list are US$182.79 or US$ 257.071 for nonavalent HPV vaccines depending on adult bs pediatric pricing. [35]

For self-procuring MICs, the price is on average US$ 9.54, US$ 56.38 and US$ 90.31 per dose for bi-, quadri- and nonavalent vaccines respectively, as per 2023 data[36]

Estimated financial cost per person vaccinated (in USD)

Findings from a 6 country study published in November 2023 (Ethiopia, Guyana, Rwanda, Senegal, Sri Lanka, and Uganda) revealed that the financial cost per dose ranged from approximately US$ 1.50 to US$ 5.50, while the economic cost per dose varied between US$ 2.50 and US$ 7.50. 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. Activities and expenditures at health facilities constituted the largest proportion of the economic cost per dose. Health worker and non-health worker time were substantial cost components, regardless of the operational context. [37]

A study in Zambia performed in 2020 estimated the financial costs for school based delivery were at US$ 12.4 per FIC (cost of vaccine is the co-financing portion only). [38]

An older study in Tanzania and Uganda performed in 2011-2013 estimated the average introduction costs per fully immunized girl ranged from US$ 1.49 to US$ 18.94 while recurrent costs per girl ranged from US$ 1.00 to US$ 15.69. [39]

The cost of delivery can vary greatly depending on the strategies and the country context. For L&MICs, a study in Zimbabwe indicate a financial cost between US$ 3.31 per dose with school-only and US$ 48.69 per dose for routine delivery with multiple strategies in Zimbabwe. [40]

A study across six countries (Ethiopia, Guyana, Rwanda, Senegal, Sri Lanka) performed between 2015 and 2018 estimated the mean financial cost between US$ 0.27 to US$ 3.32/dose.[41]

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. [42, 43]

HPV vaccination is generally cost-effective or even cost-saving in both high- and low-income countries, especially when targeting girls aged 9–14 years. 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. [44]
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. [45]

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

Yes, there is a Gavi programme to support the introduction of the HPV vaccine. Gavi opened a funding window for HPV vaccines in 2013 and in 2023, it launched an HPV vaccination revitalisation effort to make additional resources and technical assistance available to countries. Gavi currently supports the introduction of HPV vaccines in routine immunization as well as Multi Age Cohort (MAC) campaigns. [46, 47]

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Market (feasibility)

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

Thre are currently 7 HPV vaccines with marketing authorisation include Bivalent: Cecolin ®, Cervarix ®, Walrinvax ®; Quadrivalent: Gardasil ® , Cervavac; Nonavalent: Gardasil-9 ®, Cecolin 9® of which 5 prequalified. [48]

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Service delivery (feasibility)

Number of doses and timing of administrations

2-dose schedule (6 - 12 months and up to 3 - 5 years interval between doses) or single-dose schedule in females and males as of 9 years of age. Given current evidence of comparable efficacy and duration of protection to a two-dose schedule, a one-dose schedule may offer programme advantages, be more efficient and affordable, and contribute to improved coverage. [49]

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Logistics (feasibility)

Cold chain volume required per vaccine dose (in cm3)

Depending on vaccine type and presentation: Bivalent - 4.8 cm3 to 28.8cm3 per dose (carton of 1 vial); Quadrivalent: 15cm3 to 75cm3 per dose; Nonavalent: 18.4 cm3 per dose

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