Scientific Brief

Topic: Introducing Single-Dose HPV Vaccination in Ghana
Target: Healthcare Workers in Ghana

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Background

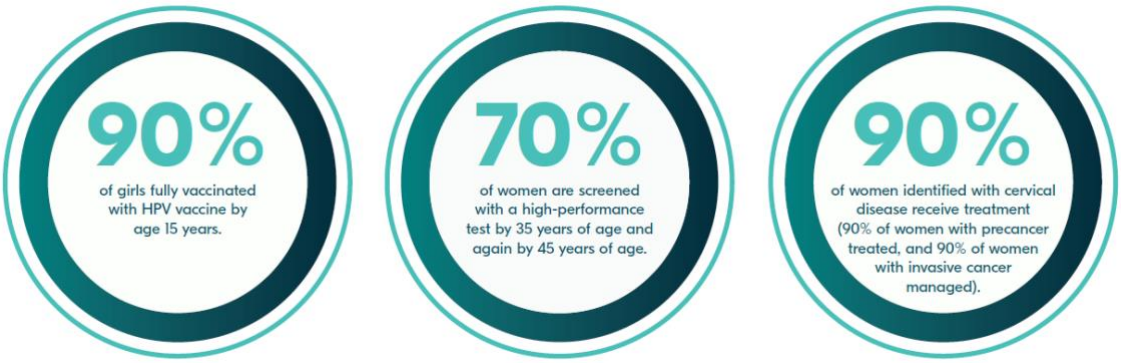
Despite cervical cancer being a preventable disease, it is the fourth most common cancer in terms of both incidence and mortality among women worldwide. 662 301 new cases and 348 874 deaths were reported in 2022 globally, with over 90% of deaths occurring in low- and middle-income countries (LMICs)[1].

In Ghana, 3,072 new cervical cancer cases and 1,815 cervical cancer-related deaths were recorded in 2022, making it the second most common cancer among women in Ghana[1].

Persistent infection with high-risk human papillomavirus (HPV) is linked to the development of >95% of cervical cancer cases[2], with HPV 16 and 18 responsible for about 71% of cases globally[3].

Apart from cervical cancer, high-risk HPV types are responsible for a significant proportion of cancers of the anus, vulva and vagina, penis, head and neck, especially the oropharynx[4].

In 2020, the WHO global strategy for the elimination of cervical cancer as a public health problem was released with three main components that must be met by 2030 for countries to be on track to reduce the incidence of cervical cancer to 4 per 100,000 women-years[4].



World Health Organization (WHO). *Global strategy to accelerate the elimination of cervical cancer as a public health problem*. Geneva: WHO; 2020. https://www.who.int/publications/i/item/9789240014107.

A mathematical model illustrates the following interim benefits of achieving the 90–70–90 targets by 2030 in LMIC:

- a decline of 42% by 2045 of the median cervical cancer incidence rate by 97% by 2120, averting more than 74 million new cases of cervical cancer.
- median cumulative number of cervical cancer deaths averted will be 300 000 by 2030, > 14 million by 2070, and > 62 million by 2120[5].

Why HPV Vaccination Matters

HPV vaccines provide safe, effective, and long-lasting protection against the types of HPV that cause approximately 70-90% of cervical cancers (depending on the vaccine type administered).
They are the cornerstone of primary prevention in the WHO's global strategy to eliminate cervical cancer.

The World Health Organization (WHO) recommends:

- One or two-dose schedule for the primary target of girls aged 9-14 years old
- One or two-dose schedule for young women aged 15-20 years old
- Two doses with a 6-month interval for women over 21 years old
- Immunocompromised individuals, including those with HIV, should receive three doses if feasible, and if not, at least two doses[6,7]

Planned Vaccination Strategy in Ghana

- Single-dose vaccination using the Gardasil 4 HPV vaccine manufactured by Merck & Co., Inc.
-Gardasil 4 protects against the low-risk HPV types 6 and 11, which cause the benign but debilitating conditions of anogenital warts[8] and recurrent respiratory papillomatosis[9], and the high-risk HPV types 16 and 18 which cause up to 71% of cervical cancer cases[3].

-School-based vaccination campaigns will be the primary delivery strategy, reaching girls in the 9–14 age group efficiently.
- Community and health facility-based options will be available for out-of-school girls.
- Health workers are encouraged to proactively engage with parents and teachers, using trusted channels like PTA meetings, church groups, and local radio stations.

Why Target Girls Aged 9–14?

- Stronger immune response: Younger girls mount a stronger antibody response than older adolescents or adults[10].
- Pre-exposure protection: The vaccine is most effective before sexual debut, typically before HPV exposure[5].
- Cost-effective timing: Vaccination at this age prevents future disease and treatment costs[11]
-Vaccinating 80% of girls will result in a reduction of the risk of HPV infection in boys[12]

Evidence for Single-Dose HPV Vaccination

Recent evidence from clinical trials and long-term studies confirms that one dose is sufficient to protect against HPV 16 and 18 infections:

- The KEN SHE trial (Kenya) showed ~98% efficacy with a single dose of Gardasil9 or Cervarix[13].
- The IARC trial[14] (India) and CVT trial[15] (Costa Rica) demonstrated durable protection for at least 10 years with one dose.
- Immunogenicity studies (e.g., DoRIS in Tanzania) showed non-inferior immune responses in 9–14-year-olds compared to older trial cohorts[16].
- Based on models evaluating the effectiveness of a single-dose schedule in the primary target group, adding a second dose was not considered cost-effective, assuming the first dose provided protection for at least 20 years[11].

These findings support simplified delivery, cost reductions, and increased coverage, especially in LMICs.

Addressing Misinformation and Concerns

1. Vaccine Safety and Side Effects
- HPV vaccines are extensively studied and safe. Mild local side effects like pain, redness and swelling at injection sites[17] and systemic side effects like headache, dizziness or nausea and vomiting[18] may occur but are temporary.

-Pre-licensure trials of both the quadrivalent (Gardasil) and bivalent (Cervarix) HPV vaccines reported no serious adverse events attributable to vaccination[19]

- Infertility is not a known or reported side effect[20]

2. Cultural Misconceptions
- Some parents may associate HPV vaccination with family planning or sexual activity, but the vaccine is about cancer prevention.
- Highlighting how many girls globally have safely received the vaccine helps build confidence.

3. Role of Health Workers
- As trusted messengers, health workers must:
- Provide clear, accurate, and empathetic counselling
- Dispel myths and respond to concerns about side effects
- Reinforce that this vaccine is part of routine child protection and is neither new nor experimental.

Key Messages for Healthcare Workers

- “One shot protects for years” – A single dose can protect against the most dangerous HPV types that cause cervical cancer.”

- “Your daughter's health, your decision” – Parents protect their daughters' future with one simple action.
- “HPV vaccine is safe and used worldwide” – Over 100 million doses given globally.

-HPV vaccines do not affect fertility; they prevent cancer.

-A single-dose schedule—endorsed by WHO—can accelerate coverage, ease logistics, and reduce cost while maintaining strong protection against cancer-causing HPV types.

Conclusion

The introduction of the single-dose HPV vaccine in Ghana represents a historic opportunity to protect girls from cervical cancer.
With the support of healthcare workers, communities can overcome misinformation and achieve high coverage, ensuring a future free of cervical cancer.

REFERENCES

1. Bray F, Laversanne M, Sung H, Ferlay J, Siegel RL, Soerjomataram I, et al. Global cancer statistics 2022: GLOBOCAN estimates of incidence and mortality worldwide for 36 cancers in 185 countries. CA Cancer J Clin. 2024;74(1):31–54. https://doi.org/10.3322/caac.21834
2. Plummer M, de Martel C, Vignat J, Ferlay J, Bray F, Franceschi S. Global burden of cancers attributable to infections in 2012: a synthetic analysis. Lancet Glob Health. 2016;4(9):e609–e616. https://doi.org/10.1016/S2214-109X(16)30143-7
3. de Sanjosé S, Diaz M, Castellsagué X, Clifford G, Bruni L, Muñoz N, et al. Human papillomavirus genotype attribution in invasive cervical cancer: a retrospective cross-sectional worldwide study. Lancet Oncol. 2010;11(11):1048–1056. https://doi.org/10.1016/S1470-2045(10)70230-8
4. de Martel C, Georges D, Bray F, Ferlay J, Clifford GM. Global burden of cancer attributable to infections in 2018: a worldwide incidence analysis. Lancet Glob Health. 2020 Feb;8(2):e180–90. doi:10.1016/S2214-109X(19)30488-7. Available from: https://www.thelancet.com/journals/langlo/article/PIIS2214-109X(19)30488-7/fulltext
5. World Health Organization. Global strategy to accelerate the elimination of cervical cancer as a public health problem. Geneva: World Health Organization; 2020. Available from: https://www.who.int/publications/i/item/9789240014107
6. World Health Organization. Human papillomavirus vaccines: WHO position paper, December 2022. Wkly Epidemiol Rec. 2022 Dec 16;97(50):645–672. Available from: https://www.who.int/publications/i/item/who-wer9750-645-672
7. World Health Organization. WHO updates recommendations on HPV vaccination schedule [Internet]. Geneva: World Health Organization; 2022 Dec 20 [cited 2025 Aug 7]. Available from: https://www.who.int/news/item/20-12-2022-who-updates-recommendations-on-hpv-vaccination-schedule
8. Patel H, Wagner M, Singhal P, Kothari S, Systematic review of the incidence and prevalence of genital warts. BMC Infect Dis. 2013;13:39. doi:10.1186/1471-2334-13-39. Available from: https://bmcinfectdis.biomedcentral.com/articles/10.1186/1471-2334-13-39
9. Carifi M, Napolitano D, Morandi M, Dall'Olio D. Recurrent respiratory papillomatosis: current and future perspectives. Therapeutics and Clinical Risk Management. 2015;11:21–27. Available from: https://www.dovepress.com/recurrent-respiratory-papillomatosis-current-andnbspfuture-perspective-peer-reviewed-fulltext-article-TCRM
10. Nicoli F, Mantelli B, Gallerani E, Telatin V, Bonazzi I, Marconi P, et al. Effects of the age of vaccination on the humoral responses to a human papillomavirus vaccine. NPJ Vaccines. 2022;7(1):37. Available from: https://doi.org/10.1038/s41541-022-00458-0
11. Prem K, Abbas K, Marks M, Gaythorpe KA, Clark A, Jit M, et al. Global impact and cost-effectiveness of one-dose versus two-dose human papillomavirus vaccination schedules: a comparative modelling analysis. Submitted for publication [Preprint]. 2021 Feb 10 [cited 2022 Aug]. Available from: https://www.medrxiv.org/content/10.1101/2021.02.08.21251186v2

12. World Health Organization. SAGE evidence to recommendations framework: human papillomavirus (HPV). Geneva: World Health Organization; 2022 [cited 2022 Aug]. Available from: https://cdn.who.int/media/docs/default-source/immunization/position_paper_documents/human-papillomavirus-(hpv)/hpv-gender-recommendation-table.pdf?sfvrsn=40027bd2_2
13. Barnabas RV, Brown ER, Onono MA, Bukusi EA, Njoroge B, Winer RL, et al. Efficacy of single-dose HPV vaccination among young African women. NEJM Evid. 2022;1(4). doi:10.1056/EVIDoa2100056. https://doi.org/10.1056/EVIDoa2100056
14. Basu P, Malvi SG, Joshi S, Bhatla N, Muwonge R, Lucas E, et al. Vaccine efficacy against persistent human papillomavirus (HPV) 16/18 infection at 10 years after one, two, and three doses of quadrivalent HPV vaccine in girls in India: a multicentre, prospective, cohort study. Lancet Oncol. 2021;22(11):1518–1529. https://doi.org/10.1016/S1470-2045(21)00453-8. Published correction in: Lancet Oncol. 2022;23(1):e16.
15. Kreimer AR, Sampson JN, Porras C, Schiller JT, Kemp TJ, Herrero R, et al. Evaluation of durability of a single dose of the bivalent HPV vaccine: the CVT trial. J Natl Cancer Inst. 2020;112(10):1038–1046. doi:10.1093/jnci/djaa011. https://doi.org/10.1093/jnci/djaa011
16. Watson-Jones D, Changalucha J, Whitworth H, Andreasen A, Tibenderana J, Remes P, et al. Immunogenicity and safety results comparing single-dose human papillomavirus vaccine with two or three doses in Tanzanian girls: the DoRIS randomised trial. Lancet [Preprint]. 2022 Mar 11. Available from: https://dx.doi.org/10.2139/ssrn.4055429
17. Einstein MH, Baron M, Levin MJ, Chatterjee A, Edwards RP, Zepp F, et al. Comparative immunogenicity and safety of human papillomavirus (HPV)-16/18 vaccine and HPV-6/11/16/18 vaccine: follow-up from months 12–24 in a phase III randomized study of healthy women aged 18–45 years. Hum Vaccin. 2011;7(12):1343–1358. https://doi.org/10.4161/hv.7.12.18281
18. Henschke N, Butterworth J, Fish R, Neal D, Godfrey C, Lasserson TJ, et al. Effects of human papillomavirus (HPV) vaccination programmes on community rates of HPV-related disease and harms from vaccination. Cochrane Database Syst Rev. 2022;5:CD009069. https://doi.org/10.1002/14651858.CD015363
19. World Health Organization. Safety of HPV vaccination in adolescent girls. Geneva: World Health Organization; 2022 [cited 2022 Aug]. Available from: https://cdn.who.int/media/docs/default-source/immunization/position_paper_documents/human-papillomavirus-(hpv)/hpv-grad-safety.pdf?sfvrsn=b1f4c1b2_2
20. World Health Organization. Human papillomavirus vaccines and infertility. Wkly Epidemiol Rec. 2017;92(28):393–404. https://www.who.int/groups/global-advisory-committee-on-vaccine-safety/topics/human-papillomavirus-vaccines/infertility