

Editorial

India's First Nationwide HPV Immunization Campaign: Accelerating Progress toward Cervical Cancer Elimination

Running Title: HPV Campaign toward Cervical Cancer Elimination

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Abstract

India's nationwide HPV immunization campaign, launched on 28 February 2026, is a pivotal public health intervention aimed at accelerating cervical cancer elimination. The manuscript outlines the high cervical cancer burden in India, the epidemiologic rationale for vaccinating adolescent girls, and the program's single-dose delivery through the Universal Immunization Programme. It emphasizes that high vaccination coverage, combined with equitable access, strong community engagement, and strengthened screening and treatment services, could markedly reduce HPV transmission, precancerous lesions, and cervical cancer deaths over time. This initiative positions India to advance toward the WHO 90–70–90 elimination targets.

Keywords: Adolescent girls, Cervical cancer elimination, Human papillomavirus, India, Public health campaign, Single-dose vaccination

Introduction

India's nationwide HPV immunization campaign, launched on 28 February 2026, marks a transformative milestone in the country's public health agenda and represents a major step toward the cervical cancer elimination goal [1]. In this Perspective, we outline the epidemiological rationale, programmatic design, and long-term implications of this initiative, emphasizing how India can translate high-coverage vaccination into measurable reductions in cervical cancer incidence and mortality over the coming decades [3].

Epidemiological Context and Disease Burden

Cervical cancer, driven by persistent infection with high-risk human papillomavirus (HPV) types, remains a leading cause of cervical cancer-related morbidity and mortality among women in India [5]. Globally, cervical cancer accounts for an estimated 662,301 new cases and 348,709 deaths annually, with India bearing a disproportionately high burden - approximately one-quarter of global cervical cancer deaths occur in the country [3,5]. Within India, cervical cancer is the second most common cancer among women and the leading cause of cancer death in several states have the highest

mortality rate like Punjab, Himachal Pradesh, Maharashtra, Karnataka, Tamil Nadu etc, as per the Global Burden of disease 2016-2019, reflecting limited access to early-detection services and persistent exposure to high-risk HPV types, particularly HPV-16 and HPV-18 [5,6]. India has an approximately 18.0 age-standardized mortality ratio per 100000 women.

These high-risk HPV types are responsible for approximately 70% of cervical cancer cases worldwide, and India exhibits similarly high HPV-16/18 prevalence in both clinical and population-based studies [3,5]. With an estimated total fertility rate of 2.0 and life expectancy exceeding 70 years, the Indian population is undergoing a demographic transition that increases the number of women at risk for HPV-related disease over their reproductive lifespan [9]. In this context, primary prevention through HPV vaccination emerges as a cost-effective and epidemiologically rational strategy, particularly in settings where organized, population-based screening remains underdeveloped [3,6].

Design and Implementation of the national HPV campaign

The national HPV immunization programme, formally launched on 28 February 2026 by the Government of

India, targets approximately 1.15–1.2 crore girls aged 14 years annually, to achieve high-coverage vaccination across all states and Union Territories [1,2]. The campaign builds upon the existing Universal Immunization Programme (UIP) infrastructure and delivers a single dose of the quadrivalent HPV vaccine Gardasil-4 at government health facilities, including Ayushman Arogya Mandirs, primary health centres, community health centres, and government medical colleges [1,2].

The choice of a single-dose regimen reflects updated World Health Organization (WHO) guidance and long-term immunogenicity data demonstrating robust and sustained antibody responses and high vaccine efficacy against HPV-16/18-associated disease following a single dose [5,7]. HPV vaccines are 95–100% effective against vaccine-type HPV infections and related precancerous lesions, with protection lasting at least 5–7 years in follow-up investigations, according to randomized trials and pooled analyses [5,9]. The Indian program's single-dose schedule increases feasibility, lowers cold chain and logistical needs, and enables greater coverage in a populous and diverse nation [3,9]. Moreover, compared with no vaccination, vaccinating girls against HPV is also a cost-effective strategy to reduce the

incidence of cervical cancer and mortality due to cervical cancer in India [10].

The initial rollout is girl-focused, consistent with WHO's global cervical cancer elimination strategy, which emphasizes high-coverage vaccination of girls aged 9–14 years as a key pillar alongside scaling up screening and treatment [3,6]. India's approach is in line with the 90–70–90 targets for the eradication of cervical cancer by 2030: 90% of girls must receive a full vaccination by the age of 15, 70% of women must be screened by a high-performance test by the age of 35 and again by the age of 45, and 90% of women who are diagnosed with precancer or cancer must receive the necessary care [6,8]. Integrating HPV vaccination with the UIP and current school-based health check-up platforms increases reach and may increase adolescent health service uptake, including vaccines and anaemia screening [3,9].

Evidence base for Effectiveness and Public Health Impact

High-coverage HPV vaccination programs have the potential to significantly lower HPV prevalence and cervical cancer incidence over time, according to mathematical modelling and country-specific scenario studies [3,9]. Modelling

studies from India also indicate that routine vaccination of adolescent girls at coverage between 70%–90% could avert hundreds of thousands of cervical cancer cases and deaths over the next 30–40 years, particularly when integrated with strengthened screening and treatment services [3,6]. Evidence from several countries with well-established HPV vaccination programs, including Tanzania, Bhutan, and Rwanda, shows significant drops in precancerous cervical lesions, genital warts, and high-risk HPV prevalence within ten years of program start [3,5].

Available immunogenicity studies show that HPV antibody responses in children and adolescents aged 9–15 years are similar to, and often higher than, those observed in older recipients, supporting the use of a single dose in this age group.[5,7] Although long-term follow-up studies continue to monitor long-term protection and the need for potential booster doses, but current evidence indicates that early vaccination in adolescence provides long-term protection into mid-and-late adulthood, when women face the highest risk of HPV-related disease [5,9].

Programmatic Strengths and Remaining Challenges

India's national HPV immunization campaign benefits from national immunization infrastructure, extensive experience with large-scale vaccine campaigns, and a growing digital health ecosystem [1,2]. Lessons from previous UIP campaigns - polio eradication, measles-rubella campaigns, and the COVID-19 mass vaccination drive - have demonstrated India's ability to achieve high coverage rapidly, even in geographically diverse and resource-constrained settings [1,6]. The integration of HPV vaccination into existing health facilities and the use of digital platforms for appointment scheduling, consent documentation, and coverage monitoring further strengthen program efficiency and accountability [2,9].

Despite these strengths, there are several challenges that require careful attention. Vaccine hesitancy, particularly among parents of adolescent girls, remains a concern, fuelled in part by historical controversies surrounding earlier HPV vaccination pilots in India [3,5]. Community engagement, transparent communication about vaccine safety and efficacy, and engagement of frontline health workers - including ASHA/ ANM

workers and teachers are critical to building trust and sustaining high coverage [3,10]. Equity issues also play a significant role for instance girls from underprivileged areas, rural populations, and those who are not in school may have lesser coverage due to differences in education, mobility, and access to health services [3,6].

Current program design focuses on girls only, in line with WHO-recommended cost-effective strategies but does not directly address HPV-related cancers in males, such as oropharyngeal and anal cancers [3,6]. Models, however, indicate that high-coverage girl-only vaccination can also produce significant herd protection in men, lowering the total transmission of HPV [3,5]. Future policy decisions may reconsider the program's inclusion of boys, especially if nano-valent HPV vaccinations become more widely available, and as estimates of the burden of HPV-related cancers in males vary by country [6,8].

Integration with a Broader Cervical Cancer Elimination Strategy

The national HPV vaccination campaign is one component of a broader cervical cancer elimination strategy that includes scaling up screening and improving access to treatment [3,6]. India has been expanding population-based cervical

cancer screening through the National Programme for Prevention and Control of Non-Communicable Diseases, initially, as a primary screening modality, visual inspection with acetic acid (VIA) available at primary health-care facilities for women aged 30–65 years [6,9]. Over 86-88 million women have already been screened for cervical cancer using the VIA method under this programme in late 2024 and early 2025, signalling progress toward early detection and secondary prevention [9]. However, as per the WHO's updated guidelines in 2021, it recommends HPV DNA testing as a primary screening method.

Sustained reductions in cervical cancer incidence will require not only high-coverage vaccination but also the strengthening of diagnostic pathways, timely treatment of precancerous lesions, and equitable access to palliative care for advanced disease [3,6]. Linkages between routine vaccination data, screening registries, and cancer registries will enable continuous monitoring of program impact and inform iterative refinements to national policy [3,9].

Conclusion

India's nationwide HPV immunization campaign represents a pivotal investment in women's health and a powerful example

of primary prevention in a large, epidemiologically diverse population [1]. By combining a scientifically grounded single-dose vaccine strategy with a well-established immunization platform and a commitment to equity, India has positioned itself to substantially reduce the burden of cervical cancer over the coming decades [3,5]. Realizing this potential will depend on sustained political commitment, robust monitoring and evaluation, and continued efforts to reach the most vulnerable populations with both vaccination and comprehensive cervical cancer control services [3,6].

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