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Editorial

# Global Vaccination Drive against Cervical Cancer: A Crucial Stride towards its Eradication

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## Revisiting the cervical cancer management

Besides the great strides of advances in the diagnosis and treatment modality, the burden (including financial) of cervical cancer remains high in many parts of the world, and especially in economically compromised countries, the incidence and mortality of this cancer remain much higher than the threshold calculations set by the WHO initiative on cervical cancer eradication. Worldwide, there exists substantial geographical and socioeconomic disparities in cervical cancer, with a clear gradient trend of increasing incidence in countries with lower levels of economic human development. As per the GLOBCAN report 2020, worldwide, there are estimated 604127 estimated cervical cancer cases and over 341831 deaths, with a correlated age-standardised incidence of 13.3 cases per 100000 women-years and mortality rate of 7.2 deaths per 100 000 women-years [1]. Globally there are over 200 known types of human papillomavirus (HPV) genomes: a main culprit and causative virus of cervical cancer. The HPV viral strains are broadly classified as either "high-risk" or "low-risk" based on their association with severity of disease conditions. High-risk HPV strains are associated with increased risk of developing certain cancers, including cervical, anal, vaginal, vulvar, penile, and some oral cancers. The most commonly diagnosed high-risk HPV types are HPV-16 and HPV-18, which are responsible for causation of the majority of cervical cancer cases. On the other hand, low-risk HPV strains are generally not associated with cancer but can cause conditions such as genital warts etc. The recent findings clearly suggest the involvement of HPV infection in neck and head squamous cell carcinoma, esophageal cancer, cervical cancer, head and neck cancer, brain and lung tumours. These independent traditional risk factors, along with various clinical outcomes, and increased prevalence among certain human populations and geographical regions have inspired the interest of scientific community in HPV research. Although the mode of HPVs transmission is poorly understood, however the recent data reported the vertical transmission of HPVs [2].

As per the information provided by CDC (Human Papillomavirus: https://www.cdc.gov/hpv/index.html) and WHO (Human Papillomavirus: https://www.who.int/health-topics/human-papillomavirus-hpv), it is important to understand that most of the HPV infections, even those caused by high-risk strains, do not lead to cervical cancer or may not even induce symptoms at all. In majority of the cases immune surveillance effectively clears the virus without any physiological intervention. However, when an HPV infection persists for a longer time, it may lead to the development of precancerous lesions and, in some cases, cancer.

Besides cervical cancer, HPV infection is attributed with causation of different cancers like oropharyngeal cancers (70% of those in the United States), anal cancer (over 90% of anal cancers), penile cancer (over 60%), vaginal cancer (over 75%) and vulvar cancer (over 70%). Amongst all other HPV induced cancers, cervical cancer is a significant public health concern affecting millions of women worldwide. Caused primarily by persistent HPV infections, cervical cancer can lead to severe consequences, including morbidity and mortality [3]. However, thanks to significant advances in design and development of vaccines against cervical cancer which has emerged as a potential tool in the eradication of this devastating disease.

## Why the global vaccination drive is essential for eradication of HPV mediated cervical cancer

Vaccines against cervical cancer has remained a primary prevention strategy against HPV. Vaccines developed against cervical cancer, commonly known as HPV vaccines are intended to protect individuals from contracting high-risk strains of the HPV. By immunizing young people before they become sexually active and exposed to the virus, these vaccines offer primary protection against cervical cancer. Vaccination not only rescues individuals from the cervical cancer but also help to reduces the economic and emotional burden on affected families and communities [4]. Targeted HPV vaccines are specifically designed to target the most commonly infecting high-risk strains of the virus causing the majority of cervical cancer cases. Precisely, the targeted vaccines target HPV types 16 and 18 strains, which are accounted for more than 70% of all cervical cancer cases, and also provided protection against certain low-risk HPV types that are responsible for causing genital warts [5]. The widely used well known HPV vaccine like Gardasil 9® provides protection against almost nine HPV stains wherein the two are low-risk HPV strains that cause most genital warts, while seven are high-risk HPV strains that cause majority of the HPV-related cancers. Although the HPV vaccination provides strong protection against new HPV infections, however it does not cure an infection once you have it. Of note, the HPV vaccine is not used to treat HPV infections or diseases caused by HPV, but HPV vaccination offers the most promising protection when given at ages 9 - 12. The older age people between the ages of 27 and 45 can also take HPV vaccines who didn't receive all vaccine doses earlier. It is estimated that HPV vaccination prevents up to 90% of HPV-related cancers [6]. The outcome of the clinical trials has clearly demonstrated the high immunogenicity of HPV vaccines. They have demonstrated a robust immune response, leading to the production of antibodies that effectively neutralize the virus and prevent infection [7]. Studies have also shown that HPV vaccines provide long-lasting protection, offering immunity for at least a decade after vaccination. This longer durability of protection is a crucial factor in reducing the risk of cervical cancer in the later part of life. Why there is need to conduct a worldwide drive of HPV vaccinations, because there is clear evidence which reports that since the introduction of HPV vaccines, there has been a significant decline in the prevalence of HPV infections among vaccinated populations. Nevertheless, this decline in infections is directly correlated with the potential decrease in risk of getting cervical cancer in near future [8]. Vaccination drive will also be effective in reducing the incidence of precancerous cervical lesions caused by the targeted HPV strains. By preventing these lesions, the risk of cervical cancer development can be substantially reduced. It has been also described that widespread vaccination strategy against HPV not only protects vaccinated individuals but also contributes to development of herd immunity and thereby reduce the burden on national public health system. It is very clear that when a large percentage of the population is vaccinated, the transmission of the virus will be significantly reduced, and will safeguard the unvaccinated individuals as well [9].

## What can be achieved through world wide HPV vaccination drive?

**First priority for saving lives:** Cervical cancer is the fourth most common cancer in women globally and ranks as the second most frequent cause of cancer-related deaths among women. By vaccinating millions of girls and young women, the world vaccination campaign aims to prevent future cases of cervical cancer, ultimately saving countless lives (American Cancer Society - Key Statistics for Cervical Cancer: https://www.cancer.org/cancer/cervical-cancer/about/key-statistics.html).

**Reducing health disparities:** Cervical cancer disproportionately affects women in resource-constrained settings, where access to screening and treatment is limited. The vaccination campaign seeks to address health disparities by ensuring that vulnerable populations have access to preventive measures [10].

**Comprehensive cervical cancer prevention strategy:** The campaign complements existing cervical cancer prevention efforts of public health systems, such as regular screening and early detection programs. By preventing HPV infections, the vaccines can act as a primary preventive measure, may help in reducing the number of precancerous lesions and cervical cancer cases [11].

**Expanded coverage of protection:** The world vaccination campaign has made significant strides in expanding vaccine coverage globally. Many countries have integrated HPV vaccination into their national immunization programs, making the HPV vaccine accessible to a

broader population including geographically marginalized communities [12].

**Negative impact on HPV prevalence:** Implementation of the vaccination campaign has shown promising results in reducing the prevalence of targeted HPV strains. By interrupting the transmission of these high-risk HPV types, the campaign has contributed in reducing HPV infections [13].

**Prevention of precancerous lesions:** Vaccination has been effective in reducing the occurrence of precancerous cervical lesions caused by the targeted HPV strains. This achievement is a critical step in preventing the development of cervical cancer [14].

## Addressing misconceptions and barriers of HPV vaccination

Despite the numerous benefits of HPV vaccines, misconceptions and barriers have adversely affected their widespread adoption and implementation in different parts of the world. Some of the commonly encountered challenges are as follows:

A. **Hesitancy of vaccination:** Misinformation and wrong concerns about vaccine safety have led to vaccine hesitancy in some communities. Public health campaigns should focus on evidence-based education to dispel myths and build trust in vaccination programs. Effective communication and education are essential to build trust in the safety and efficacy of HPV vaccines [15].

B. **Access, affordability and provisions for sustainable finance:** In many regions, access to HPV vaccines remains limited due to economic barriers and inadequate healthcare infrastructure. Disparities in vaccine access persist in various regions, with many low and middle-income countries facing challenges in procuring and distributing vaccines. Addressing vaccine equity is crucial to ensuring the campaign's success and protecting all women at risk of cervical cancer. The long-term sustainability of vaccination programs requires adequate financial support and commitment from governments, international organizations, and NGO donor agencies. Governments and international organizations must work together to improve access and affordability for all populations [16].

## Looking forward

Undoubtedly, vaccines against cervical cancer have proven to be a game-changer in the fight against this devastating disease paralysing the body and mental health. By targeting high-risk HPV virulent strains, HPV vaccines have offered a powerful strategy for preventing cervical cancer and related precancerous lesions. As we continue to prioritize vaccination efforts, with a particular focus on improving accessibility and addressing vaccine hesitancy, we move closer to the possibility of eradicating cervical cancer once and for all humans across world. Public health initiatives, education, and research efforts must continue to support the implementation and effectiveness of HPV vaccination programs to protect the health and well-being of women worldwide. There is need to employ strategies for strengthening immunization programs. The global efforts should focus more on strengthening existing immunization programs and integrating HPV vaccination into routine immunization schedules. Additionally, targeted vaccination campaigns for underserved populations can improve vaccine coverage. Equally there is also need of conducting public awareness and education programs. Education and awareness initiatives are instrumental in counteracting misinformation and increase acceptance of HPV vaccination. Engaging healthcare providers, community leaders, and educators can play a significant role in dispelling myths and addressing concerns. There is also need to build global collaboration. International cooperation, networking and partnerships are essential to tackle the multifaceted challenges of cervical cancer prevention. Collaborative efforts between governments, non-governmental organizations, and the private sector can accelerate progress and enhance the impact of the campaign. The world HPV vaccination drive against cervical cancer represents a ground-breaking effort to eliminate a cervical and other HPV related cancers that affects millions of women and men worldwide. Through the widespread administration of HPV vaccines, the campaign aims to reduce the burden of cervical cancer, especially in vulnerable populations. To achieve lasting success, it requires collaborative efforts, equitable vaccine distribution, and robust education and awareness programs. By continuing to prioritize and invest in this campaign, the world can move closer towards eradicating cervical cancer and promoting the health and well-being of women everywhere.

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