

COMMENTARIES

To Vaccinate or Not To Vaccinate: Who's to blame for low vaccination rates for human Papillomavirus (HPV) in young adults and children in the US?

Caroline Adams, B.A., M.S.¹

¹ Georgetown University

Keywords: HPV, Vaccine hesitancy, Vaccinations, Gardasil

<https://doi.org/10.52504/001c.141250>

Georgetown Medical Review

Vol. 9, Issue 1, 2025

Human papillomavirus, or HPV, is the most common sexually transmitted infection, with approximately 79 million Americans currently infected. While certain strains of this virus cause genital warts and skin infections, other malignant strains carry more serious complications. Oncogenic variants of the virus, most notably strains 16 and 18, are the cause for 100% of cervical cancers, 90% of anal cancers, and 40% of vaginal cancers (Gilson et al., 2008). Cervical cancer alone exhibits an estimated 530,000 new cases per year and approximately 270,000 deaths annually. To halt the spread of HPV and thus, these high-risk cancers, a quadrivalent vaccine for HPV was approved by the Food and Drug Administration in 2006 (Garland et al, 2014).

The vaccine, recognized colloquially as the Gardasil shot, prevents HPV infection by inciting antibody production against proteins very similar in structure to the HPV virus. These antibodies will remain in the body and recognize the virus and eradicate it before it can ever progress to cancer. Randomized control trials displayed a statistically significant decrease in the incidence of cancer in people who were inoculated while already infected with HPV. An even greater decrease was observed in people who were inoculated while HPV-negative (Rotelli et al, 2012). Therefore, the Advisory Committee on Immunization Practice (ACIP), a sub-committee of the CDC, currently recommends the vaccine to all adolescents, regardless of sex, ages 11 and up as a prophylactic measure, to ensure protection as sexual activity increases with age.

When comparing vaccination rates against HPV with other vaccines recommended to adolescents, such as the Tdap or meningococcal vaccines, the rates for HPV fall short. These differences beg the question, why? If the vaccine is effective in preventing fatal cancers, why would any patient deny preventative action? Research points to a few reasons, namely deficiencies in physicians' recommendations and parental concern over vaccine safety and side effects. Dr. Richard Schlegel, a professor in Pathology at Georgetown and a principal researcher in the discovery and development of the HPV vaccine, also offered commentary and discussion of current vaccination rates in the US and abroad.

Human papillomavirus, or HPV, is the most common sexually transmitted infection, with approximately 79 million Americans currently infected (Centers for Disease Control and Prevention [CDC], 2023). While certain

strains of this virus cause genital warts and skin infections, other malignant strains carry more serious complications. Oncogenic variants, most notably strains 16 and 18, are associated with approximately 91% of cervical cancers, 91% of anal cancers, and 75% of vaginal cancers (CDC, 2023). Cervical cancer alone accounts for approximately 12,000 new cases per year in the U.S. and 4,000 deaths annually (CDC, 2023).

To halt the spread of HPV and prevent these high-risk cancers, a quadrivalent vaccine for HPV was approved by the Food and Drug Administration (FDA) in 2006. The vaccine, commonly known as the Gardasil shot, prevents HPV infection by inducing the production of antibodies against virus-like particles (VLPs) that mimic the structure of the HPV L1 protein. Thus, vaccination triggers a robust immune response without the risk of infection. These antibodies remain in the body and recognize the virus if the patient is exposed, eliminating the virus before it can duplicate and thereby preventing the development of cancer.

Randomized controlled trials have demonstrated a statistically significant decrease in the incidence of HPV-related cervical precancers and genital warts. Data from one study found an 87% relative risk reduction (95% CI: 72–94) for children aged 12–13 years, and a 64% reduction in cervical cancer incidence in girls vaccinated before age 17.¹ Additionally, one of the most significant studies comes from Sweden, where researchers followed nearly 1.7 million women over an 11-year period. The study found that women vaccinated against HPV before age 17 had a nearly 90% reduction in cervical cancer incidence compared to unvaccinated women. Even among those vaccinated at older ages, there was a substantial decrease in risk. Overall, the study showed a 63% reduced risk of cervical cancer among vaccinated females compared to those who were not vaccinated.¹ Based on these data and other supporting studies, the Advisory Committee on Immunization Practices (ACIP), a subcommittee of the CDC, recommends vaccination for all adolescents, regardless of sex, starting at age 11, as a preventative measure before sexual activity begins (CDC, 2023).

When comparing vaccination rates for HPV with those of other adolescent vaccines such as Tdap and meningococcal vaccines, HPV vaccine rates consistently lag behind (CDC, 2023). This discrepancy raises the question: If the HPV vaccine is safe and effective in preventing fatal cancers, why are so many adolescents still unvaccinated?

A systematic review conducted in 2020 analyzed trends in the main reasons for declining HPV vaccination among children aged 13 to 17 between 2010 and 2020.² The study included data from over 100,000 participants and identified three leading reasons for vaccine refusal: insufficient physician recommendation, parental concerns about safety, and a parental perception that the vaccine was unnecessary since their child did not engage in sexual activity at the time of recommendation.

An additional review of barriers to HPV vaccination found the most frequently cited reason for refusal was a lack of a strong recommendation by the primary care physician.³ This review, which included over one million subjects, revealed that when physicians strongly recommended the vaccine, parental acceptance increased. Conversely, when standardized recommendations were perceived to be weak or absent altogether, vaccination rates declined. These findings underscore the critical role of physicians as trusted sources of medical advice.

To address this barrier, strategies must prioritize strengthening physician-patient communication. A focus group study conducted in Baltimore found that many patients felt underinformed and overwhelmed by complex medical terminology. One participant shared, “I just feel like I need more—like someone to tell me why I want this, what the data has been, this is how often, like, this is how many people we have vaccinated. ... Our pediatrician does not have the time to go through those numbers with me”.⁴

Primary care providers, especially pediatricians, must be equipped with the appropriate tools and training—including continuing education, culturally responsive communication strategies, and evidence-based decision aids—to counsel families effectively, address parental concerns with empathy, and promote shared decision-making. The same study by Beavis et al.⁴ examined the adequacy of physician recommendations and found that supplementing conversations with both printed materials (such as pamphlets and flyers) and digital resources (such as videos and websites) significantly improved parental satisfaction and understanding of the vaccine’s risks and benefits.

Additionally, creating opportunities for follow-up visits dedicated specifically to vaccine counseling could provide valuable time for deeper discussion and allow patients to prepare questions in advance. As one parent noted, “I would imagine most parents are rushing around. They get in there, and they sort of forget everything that were your concerns... If you had a list of questions that was provided, then it would make you think about the things that maybe you had forgotten. It would be like a good trigger for that. I think that’s excellent”.⁴

Another frequently cited barrier to HPV vaccination involves parental concerns about vaccine safety and fears that vaccination may promote early sexual activity.² Since the vaccine’s approval in 2006, it has remained a point of cultural controversy, particularly among parents from geographically conservative regions or those with a historical distrust of the medical system. Many of these parents assume that their children will abstain from sexual activity and therefore view the vaccine as unnecessary. Others express discomfort with introducing topics related to sexual health at an early age, preferring to postpone these conversations until later adolescence. This combination of cultural beliefs and mistrust contributes significantly to vaccine hesitancy in certain communities.

In a 2023 cross-sectional study, Black mothers of daughters aged 9–15 years were surveyed about their willingness to vaccinate their children. Notably, the decision to vaccinate was more likely in mothers who had increased peer support—in other words, if other mothers in their community had chosen to vaccinate. The role of family members and friends in the peer network was vital in combating a history of medical mistrust. Interestingly, in a subsequent randomized controlled trial, messaging and advertisements specifically countering “distrust in the system” in Black mothers was significantly associated with positive attitudes toward the HPV vaccine and vaccination intent compared to controls.⁵

These concerns reflect longstanding injustices and exploitative and harmful histories that have strained trust between marginalized communities and the healthcare system. To rebuild this trust, public health education must be comprehensive, community-based, and culturally informed. Nurses, health educators, school staff, and community leaders should be trained to support accurate dissemination of vaccine information, particularly in high-risk populations, such as communities with low income, limited access to healthcare, or higher rates of HPV-related cancers.

While HPV vaccination rates in the U.S. remain below national targets, meaningful improvement is possible with sustained investment in provider education and culturally competent outreach. Policymakers must consider allocating dedicated funding to these efforts, and healthcare systems should prioritize equipping providers with the tools and confidence to serve as trusted advocates. Yet, perhaps the most powerful argument in favor of vaccination comes not from statistics, but from the voice of one of the vaccine's creators. Dr. Richard Schlegel, professor of pathology at Georgetown University and a key developer of the HPV vaccine, powerfully stated: **“Even with my own daughters, vaccinating was a no-brainer. Why would I risk their lives down the line when I could easily protect them now?”**

In the face of misinformation, cultural resistance, and medical mistrust, we must return to the core truth: the HPV vaccine prevents cancer. The tools are in our hands. The responsibility is ours.

Submitted: March 24, 2025 EDT. Accepted: June 16, 2025 EDT. Published: June 25, 2025 EDT.

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