

The Role of Healthcare Workers in HPV Prevention: Insights and Implications for Public Health in Gujarat

Gunjan Shrivastava^{1*}, Ripal Sadhu², Disha Kamaljit Singh Gohil³, Kalpesh Dhanji Roshia⁴, HemantKumar Patadia^{5*}

¹Assistant Professor, Parul Institute of Paramedical & Health Sciences Parul University, Vadodara, Gujarat, India.

^{2,3,4}Parul Institute of Paramedical & Health Sciences Parul University, Vadodara, Gujarat, India.

⁵Dean & Principal Parul Institute of Paramedical & Health Sciences Parul University, Vadodara, Gujarat, India.

Corresponding Author:

Dr. HemantKumar Patadia

Dean & Principal Parul Institute of Paramedical & Health Sciences Parul University, Vadodara, Gujarat, India.

Email: hemantkumar.patadia@paruluniversity.ac.in

ORCID ID: [0000-0002-0476-9963](https://orcid.org/0000-0002-0476-9963)

*Corresponding Author:

Ms. Gunjan Shrivastava

Assistant Professor, Parul Institute of Paramedical & Health Sciences Parul University, Vadodara, Gujarat, India.

Email: gunjanshrivastava1986@gmail.com

ORCID ID: [0009-0003-6864-243X](https://orcid.org/0009-0003-6864-243X)

Cite this paper as: Gunjan Shrivastava, Ripal Sadhu, Disha Kamaljit Singh Gohil, Kalpesh Dhanji Roshia, HemantKumar Patadia, (2025) The Role of Healthcare Workers in HPV Prevention: Insights and Implications for Public Health in Gujarat. *Journal of Neonatal Surgery*, 14 (22s), 954-967

ABSTRACT

Human papillomavirus (HPV) infection and its related health effects, including cervical cancer. HCWs play a crucial role in raising awareness, busting myths, supporting the use of HPV vaccination and screening services since they are reliable sources of health information. Implementing public health programmes requires their active participation, particularly in places where access to preventive care or knowledge is restricted. This abstract examines important aspects of health care workers' duties, such as patient education, vaccine advocacy, and involvement in early detection initiatives. It also looks at the difficulties they encounter, like cultural barriers, vaccine hesitancy, and knowledge gaps, and provides recommendations for practices and policies meant to increase their ability. Improving HCWs' roles through focused training, encouraging regulations, and interprofessional cooperation will greatly increase efforts to prevent HPV and lower the number of diseases linked to HPV worldwide.

1. INTRODUCTION

Human papillomavirus (HPV) is recognized as a major global public health concern due to its strong association with various malignancies, most notably cervical cancer. It is the most prevalent sexually transmitted infection (STI) worldwide, and the majority of sexually active individuals are likely to acquire an HPV infection at some point in their lives ^[2]. While many HPV infections are asymptomatic and resolve spontaneously, persistent infection with high-risk HPV genotypes—particularly HPV-16 and HPV-18—can lead to the development of cervical cancer ^[1]. Cervical cancer remains one of the leading causes of cancer-related mortality among women, especially in low- and middle-income countries where access to routine screening and vaccination programs is limited. According to the World Health Organization (WHO), over 95% of cervical cancer cases are directly attributable to HPV infection, highlighting the virus's critical role in the etiology of the disease ^[3]. To effectively reduce the burden of HPV-associated diseases, it is essential to implement preventive strategies such as widespread HPV vaccination, routine cervical cancer screening (e.g., Pap smear and HPV DNA testing), and public health education initiatives ^[1,2].

Provide an overview of the Gujarat healthcare system and the critical role of HCWs in vaccination and the community

1. Gujarat healthcare system structure:

The western Indian state of Gujarat has established a comprehensive three-tier public healthcare system encompassing primary, secondary, and tertiary levels of care. This system comprises a wide network of medical colleges, district hospitals, community health centres (CHCs), primary health centres (PHCs), and sub-centres, ensuring the delivery of healthcare services across both urban and rural regions ^[4,7]. To enhance healthcare accessibility and affordability, the state government has actively promoted public-private partnerships (PPP) and introduced health insurance schemes such as the Mukhyamantri Amrutum Yojana, aimed at providing financial protection for critical illnesses (MoHFW, 2021). The Gujarat Health Department is responsible for implementing a range of central and state-sponsored health programmes, with particular emphasis on disease prevention and management, immunisation, and maternal and child health services. Key initiatives are carried out under the broader framework of the National Health Mission (NHM), aligning state efforts with national health priorities ^[5,6].

2. HEALTH EDUCATION AND COMMUNITY INVOLVEMENT

Healthcare professionals have a crucial role in fostering community trust, particularly when it comes to dispelling myths and vaccine hesitancy. ^{[8][9]} HCWs raise awareness of vaccines against COVID-19, HPV, polio, and measles through door-to-door visits, group meetings, and IEC (Information, Education, and Communication) materials. ^[10] Their involvement is particularly important in underserved areas with limited access and awareness, like urban slums and tribal groups. ^[8]

3. HEALTHCARE WORKERS ROLE (HCWS)

3.1 Anganwadi Workers, ASHAs, and ANMs as Frontline Health Workers

Frontline healthcare workers such as Anganwadi workers, Accredited Social Health Activists (ASHAs), and Auxiliary Nurse Midwives (ANMs) play a pivotal role in strengthening public health interventions at the grassroots level. These healthcare professionals are instrumental in building community trust, particularly in addressing vaccine hesitancy and misinformation ^[11,12]. Through door-to-door visits, group meetings, and the dissemination of Information, Education, and Communication (IEC) materials, they raise awareness about immunisation against diseases such as COVID-19, HPV, polio, and measles. Their engagement is especially critical in underserved and marginalised areas, including urban slums and tribal populations, where access to healthcare and awareness remains limited ^[12].

3.2 Vaccine Distribution and Cold Chain Maintenance

Healthcare workers (HCWs) receive specialized training in safe injection practices, vaccine storage, and cold chain management—all of which are vital for maintaining vaccine efficacy and ensuring the success of immunisation programmes, particularly in rural and remote regions ^[13,14]. The integrity of the cold chain system ensures that vaccines remain potent from procurement to administration, thus safeguarding public health outcomes and maintaining trust in vaccination efforts.

4. GUJARAT'S IMMUNISATION INITIATIVES

The state of Gujarat has made significant strides in improving key performance indicators under the Universal Immunisation Programme (UIP). Through initiatives such as Mission Indradhanush, Gujarat has actively targeted underprivileged and high-risk populations, including those in remote and low-coverage areas ^[16,17]. The phased introduction of the HPV vaccine represents a proactive step toward preventing cervical cancer. Routine vaccines are provided free of cost through government health facilities and outreach activities, reinforcing the state's commitment to equitable healthcare delivery.



Fig: 1 Comprehensive Overview of Gujarat's Healthcare System

Objective of the review:

To the effective use of HPV prevention techniques, such as immunisation, awareness campaigns, community mobilisation and screening programmes depends heavily on healthcare workers (HCWs). They are at the forefront of public health initiatives to lower HPV transmission and the burden of disease it causes because of their close proximity to communities and direct contact with people.

1. Healthcare Professionals' Roles in HPV Prevention

Teachers are educating the public about HPV cervical cancer, the value of early screening and vaccination in adolescence in particular, who present HPV vaccines at health centres, schools and outreach events. ^{[18][19]} Mobilisers are screening for eligible recipients, resolving reluctance and monitoring noncompliance for further dosages. The purpose of screening and referral agents is to encourage women to take part in HPV DNA or Pap tests for cervical cancer screening. ^[20]

2. Obstacles HCWs Face in HPV Prevention

HCWs face a number of obstacles in spite of their vital role: inadequate instruction on HPV-specific topics, particularly in relation to new vaccines and evolving regulations. Communities' reluctance to get vaccines because of false information or cultural views, which HCWs must deal with little assistance. Lack of transportation for outreach, staff shortages, and cold chain issues are examples of inadequate resources. ^{[23][22]} Social resistance, especially in conservative or rural communities where talking about STIs and sexual health may be frowned upon. ^[21]

3. HCWs' Efficiency in HPV Prevention Initiatives

The beneficial effects of HCWs on HPV vaccine uptake and awareness are demonstrated by evidence from multiple areas. ^[24] Training healthcare workers greatly enhances their capacity to provide family counselling and boost vaccination rates in

low-resource environments (Ndejjo et al., 2020).^[25] Higher completion rates of the entire HPV vaccine series were observed in interventions where healthcare workers actively participated in school-based vaccination delivery.^[26] One of the most frequently mentioned factors in overcoming reluctance and false information is trust in local health professionals.^{[25][26]}

Research Gaps and Actionable Recommendations for HPV Prevention in Gujarat

Gujarat's public health systems have strengthened significantly, but there are still a number of implementation and research gaps that prevent HPV from being prevented as effectively as possible.^[28] Closing these gaps is essential to expanding successful interventions, particularly in rural and low-resource settings. To effectively tackle HPV-related diseases, Gujarat must make targeted expenditures in research, health staff training, community involvement, and service integration. These gaps with evidence-based, state-backed policies will hasten the elimination of cervical cancer.^{[27][29]}

Overview of HPV prevention strategies:

It is well known that Human Papillomavirus (HPV) is a major cause of cervical cancer, as well as oropharyngeal and anogenital malignancies.^{[31][32]} Vaccination, screening and health education are all part of the comprehensive preventative strategies that have been developed in response to the worldwide burden of diseases linked to HPV.^{[33][34]}

HPV Vaccination

The most successful primary preventive method against HPV is vaccination.^[35] Vaccinating girls between the ages of 9 and 14 prior to the initiation of sexual engagement is advised by the WHO. Three vaccines offer protection against high-risk HPV strains, including HPV-16 and HPV-18, which are responsible for over 70% of cervical malignancies^[37] bivalent, quadrivalent, and nonvalent. Immunisation initiatives that are implemented in schools have been successful in increasing immunisation uptake in several nations.^[36] The Vaccine Alliance, Gavi, and the Global Vaccine Action Plan have made it easier for low-income nations to obtain vaccines.^[38]

1. Goal and Significance

Vaccines against human papillomavirus (HPV) are intended to protect against infection with high-risk HPV strains, specifically HPV-16 and HPV-18, which combined account for over 70% of cervical cancer cases globally.^{[39][42]} One of the main preventative measures for cervical, anal, penile, vulvar, vaginal, and oropharyngeal cancer is vaccination^{[40][41]}

2. Types of HPV Vaccines

Three HPV vaccines have been prequalified by the WHO: Cervix, a bivalent vaccination, offers protection against HPV strains 16 and 18.^{[44][45]} The quadrivalent vaccine (Gardasil) guards against genital warts caused by types 6, 11, 16, and 18.^[46] The nonvalent vaccination (Gardasil 9) offers broader protection by covering nine kinds (6, 11, 16, 18, 31, 33, 45, 52, and 58).^{[44][46]}

3. Impact and Effectiveness

In nations with high vaccination rates there has been a 90% decrease in HPV infection and precancerous lesions.^[47] Benefits of herd immunity were seen in both vaccinated and unvaccinated people. Cervical cancer mortality and incidence may have decreased, according to preliminary data.^{[46][48]}

4. Safety and Adverse Reactions

Vaccines against HPV are quite safe and well tolerated. Typical adverse effects include headache, moderate fever, and injection site soreness. no proof of long-term negative consequences.^{[49][50]}

Screening for Cervical Cancer

Early Detection and Screening Methods

Early detection and screening remain essential components of secondary prevention, especially for older age groups and populations with limited access to HPV vaccination. The World Health Organization (WHO) recommends HPV DNA testing as the preferred primary screening method due to its high sensitivity in detecting precancerous lesions^[26]. Additional methods such as Pap smear (cytology) and Visual Inspection with Acetic Acid (VIA) are also widely used, particularly in low-resource settings. In high-burden countries, WHO advises that women be screened twice in their lifetime—ideally between ages 35 and 45^{[26][27]}.

1. HPV DNA Testing

HPV DNA testing detects high-risk HPV strains responsible for cervical cancer. It is the **most accurate** method for identifying precancerous changes and can be used on **self-collected samples**, improving accessibility and privacy^{[26][27][28]}.

2. Cytology (Pap Smear)

A Pap smear screens for abnormal cervical cells and is recommended every three years for women aged 21 to 65, particularly in settings where HPV testing is unavailable. While still effective, cytology is less sensitive than HPV DNA testing^[28].

3. Visual Inspection with Acetic Acid (VIA)

VIA is a low-cost, point-of-care screening method where the cervix is visually examined after applying acetic acid (vinegar). It is especially useful in resource-limited settings and allows for “screen-and-treat” approaches to be implemented during the same visit ^{[29][30]}.

India’s HPV Prevention Initiatives and Gujarat’s Implementation Status

1. HPV Prevention Implementation in Gujarat

Gujarat has been proactive in implementing cancer prevention strategies; however, it is still in the early stages of a full HPV vaccine rollout ^[61].

A. Test Programs for HPV Vaccination With support from the Indian Council of Medical Research (ICMR) and local health officials, Gujarat initiated experimental HPV vaccination programs in the districts of Vadodara and Surat, targeting school-age girls. The programs have shown promising results regarding vaccine safety and acceptability ^{[62][63]}.

B. Screening through NPCDCS Primary Health Centres (PHCs) across Gujarat provide Visual Inspection with Acetic Acid (VIA) screening for cervical cancer. However, due to challenges such as lack of awareness and logistical barriers, screening coverage remains low, particularly in tribal and rural areas.

C. Capacity Building and HCW Involvement Training for Auxiliary Nurse Midwives (ANMs) and Accredited Social Health Activists (ASHAs) in screening, referral, and health education is underway. However, there are challenges in scaling and standardizing these training programs ^[64]. Furthermore, HPV vaccination will not be fully implemented in Gujarat until early 2024. The rural population has limited knowledge about HPV and cervical cancer, requiring greater collaboration among the Health, Education, and Women and Child Development (WCD) departments to improve surveillance and data reporting related to HPV services ^{[66][67]}.

2. National Initiatives for HPV Prevention

A. Introduction to HPV Vaccination India incorporated the HPV vaccination into the Universal Immunization Programme (UIP) starting with a phased rollout in select states in 2023 ^{[19][20]}. The vaccination, primarily administered through school-based and community outreach programs, targets females between the ages of 9 and 14. In 2022, the Serum Institute of India launched Cervix, the country’s first domestically produced quadrivalent HPV vaccine, which has significantly reduced the cost of immunization ^{[68][70]}.

B. Initiatives for Cervical Cancer Screening Under the National Programme for Prevention and Control of Cancer, Diabetes, Cardiovascular Diseases, and Stroke (NPCDCS), women aged 30 years and older are eligible for VIA-based screening at primary health centres. ASHAs and ANMs receive training as part of this initiative to mobilize women for screening and follow-up care ^[69].

C. Community Engagement and IEC National initiatives focus on raising awareness about immunization, cancer prevention, and menstrual health. Platforms like Sanjeevani and VIN are used for vaccination counselling and tracking to enhance community engagement and facilitate information dissemination ^{[71][72]}.

Healthcare Workers: Bridging the Gaps in Health Awareness and Service Accessibility

Healthcare workers (HCWs), such as nurses, auxiliary nurse midwives (ANMs), community health workers (CHWs) and Accredited Social Health Activists (ASHAs), are key players in HPV prevention initiatives, particularly in rural and low-resource areas like Gujarat.

1. Spreading Knowledge and Combating False Information

Providing correct information about HPV, the risks of cervical cancer, and the advantages of screening and vaccination, healthcare workers perform a crucial educational role. ^[73] Their dependable presence in communities’ aids in dispelling myths, stigma, and cultural taboos related to cancer and reproductive health. ^[74] Research indicates that HCWs’ interpersonal counselling greatly boosts vaccination acceptability for HPV. ^[75]

2. Making Vaccination and Screening More Accessible

HCWs assist with appointment scheduling organize women and adolescents for immunization/screening camps, and perform home visits. HCWs provide referral and escort services to healthcare facilities in rural locations thereby bridging the geographic divide. ^[76] By performing early VIA testing and assisting with follow-up care, they promote the “screen-and-treat” strategy. ^[75]

3. Dealing with Inclusion and Equity

Reaching marginalized groups such as women in rural regions, urban slums, tribal communities, and socioeconomically challenged groups requires the assistance of HCWs. ⁽⁷⁸⁾ They assist in overcoming obstacles related to gender, literacy, and language while seeking preventative care. ^[77]

4. Improving the Reaction of the Health System

HCWs help with reporting, data collection, and tracking of the vaccine inventory (for example, using India's eVIN platform). Their participation guarantees continuity of care, particularly in cases when additional testing or follow-up appointments are necessary for therapy.^[79]

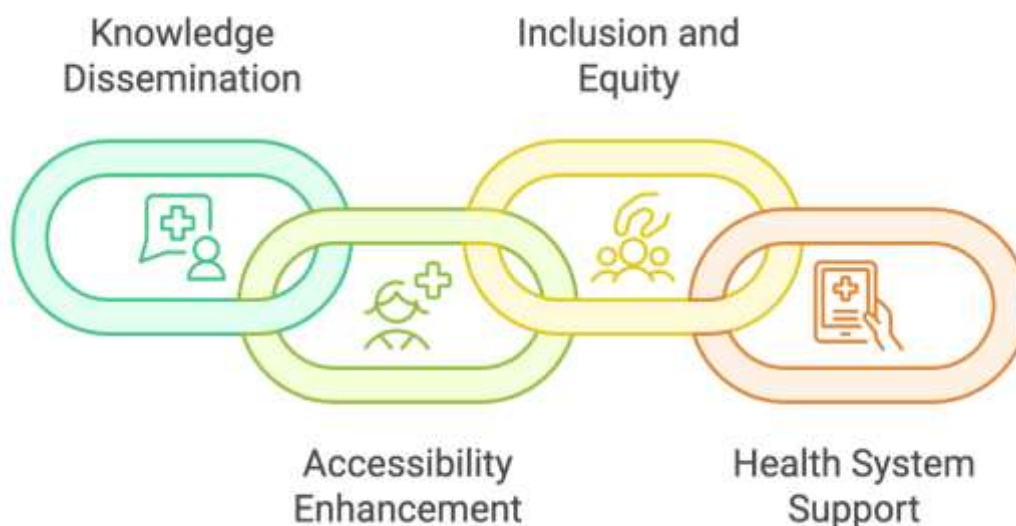


Fig: 3 Healthcare Workers' Role in HPV Prevention

The Importance of Healthcare Workers in Bridging Awareness and Accessibility Gaps

Healthcare workers (HCWs), such as nurses, auxiliary nurse midwives (ANMs), community health workers (CHWs), and Accredited Social Health Activists (ASHAs), are key players in HPV prevention initiatives, particularly in rural and low-resource areas like Gujarat.

1. Spreading Knowledge and Combating False Information

Healthcare professionals play a critical educational role by accurately educating patients about HPV, the dangers of cervical cancer, and the benefits of screening and vaccination.^[73] Their consistent presence in communities helps to break down cultural taboos, stigma, and misconceptions about cancer and reproductive health.^[74] Research shows that interpersonal counselling by HCWs significantly increases HPV vaccine acceptability.^[75]

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3. Dealing with Inclusion and Equity

To reach marginalized populations, HCWs are needed including women in rural areas, urban slums, tribal communities, and socioeconomically challenged groups.^[78] As they seek preventative care, they help people overcome barriers pertaining to gender, literacy and language.^[77]

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Fig: 4 HCW's Role in HPV Prevention



Role of Healthcare Workers in HPV Prevention and Vaccination Advocacy

1: Health Education and Vaccine Advocacy

HCWs inform community leaders, parents, and teenagers about HPV, its connection to cervical cancer and the value of early vaccination.^[41] They offer culturally relevant messages, which is particularly crucial in societies where conversations about reproductive health may be delicate.^[82] Their in-person counselling is associated with a decrease in vaccine reluctance and an increase in acceptability.^[51]

2: Encouraging Adolescents and Communities

Health care workers (HCWs) arrange for school-aged girls to participate in community-based or school-based HPV vaccination programs in an effort to boost coverage and participation. In areas with low literacy or gender inequities, they are crucial for building parental trust and explaining the benefits of the vaccine.

3: Resolving Vaccine Hesitancy and Misinformation

Health care workers are educated to dispel misconceptions and anxieties regarding the safety of vaccines, infertility and the idea that vaccinations promote sexual engagement. Their regular, fact-based communications foster trust and normalize HPV vaccination as a standard component of adolescent care.^[3]

How Healthcare Workers Influence Vaccine Acceptance Among Adolescents and Parents

The success of HPV vaccination programs depends on vaccine adoption. In places like India, where cultural beliefs, misinformation, and ignorance pose challenges, healthcare workers (HCWs) play a critical role in influencing parental and adolescent attitudes on the HPV vaccine.

1. Trusted Source of Information
2. Addressing Parental Concerns and Myths
3. Cultural Mediation and Community Trust
4. Promoting Adolescent Engagement
5. Increasing Vaccine Completion Rates

Healthcare workers (HCWs), as trusted information providers for parents and adolescents, play a critical role in increasing HPV vaccine uptake. They assist in dispelling myths, addressing safety issues, and increasing awareness through community outreach and private therapy. Their involvement significantly boosts vaccine uptake and completion, especially in settings with limited resources.^[24]

HCWs' role in explaining HPV vaccine benefits, safety, and dispelling myths

Healthcare workers (HCWs) play a crucial role in educating parents and teenagers about the benefits and safety of the HPV vaccine. By providing succinct, culturally aware explanations of how the vaccination prevents cervical cancer, is safe, has

minimal side effects, has no effect on fertility, and promotes early sexual involvement, you can refute common myths that cause vaccine hesitancy. help promote acceptance and trust through community events, school-based initiatives, and in-person counselling, especially in rural and underprivileged areas. ^[31]

Cervical cancer screening:

A key component of preventative healthcare is cervical cancer screening, which looks for early cancer or precancerous abnormalities in the cervix. Screening for cervical cancer is essential for both prevention and early detection. By detecting and treating precancerous lesions before they develop into malignant ones, routine screening can dramatically lower the incidence and death of cervical cancer. Promoting these screening techniques and making sure they are available to all qualified people are important tasks for healthcare professionals. ^{[44][45]}

Screening Tests for Cervical Cancer

- 1) Pap Test (Pap Smear or Cervical Cytology)
- 2) HPV Test
- 3) HPV/Pap Co-Test
- 4) Visual Inspection with Acetic Acid (VIA) or Lugol's Iodine (VILI)

Role of HCWs in Promoting Pap Smear and HPV DNA Testing

Healthcare workers (HCWs) play a critical role in promoting the use of Pap smears and HPV DNA testing for cervical cancer screening in low-resource settings. Women learn the importance of early detection of cervical cancer from them. Address the stigma, fear, and misconceptions related to pelvic exams and testing procedures. ladies for outreach activities and assist in administering tests or referring people to screening centres. Women with abnormal results should be encouraged to follow up and get in touch with therapy. Their involvement expands screening coverage, especially in rural and impoverished areas. ^[77, 68]

Role of ASHA Workers and Nurses in Rural Gujarat in Community Education

In rural Gujarat, auxiliary nurse midwives (ANMs) and accredited social health activists (ASHAs) are essential in teaching the public about HPV, cervical cancer prevention, and immunization. These frontline healthcare workers are trustworthy communicators, especially for women and adolescent girls. ^[97] Spreading knowledge about the causes of cervical cancer, including HPV, and the need of early identification and prevention. teaching parents and teenagers about the benefits and security of the HPV vaccine. putting together local health days, school visits, and house visits to dispel stigma and dispel myths. encouraging participation in screening camps and facilitating referrals to higher-level care. Their grassroots engagement is critical to improving health literacy and increasing rural populations' acceptance of screening and immunization services.

comparison of urban vs. rural differences in healthcare workers' (HCWs) engagement and outreach efforts for HPV prevention and cervical cancer screening:

1. Type of HCWs

Urban: Clinic-based physicians, nurses, and urban health workers (UHNs).

In rural areas, field-based outreach is conducted by ASHAs, ANMs, and CHWs as the main contacts. ^[11]

2. Mode of Engagement

Urban: Media-driven awareness, school initiatives, and counselling in facilities.

Rural: Village gatherings, door-to-door campaigns, and grassroots

3. Access to Services

Urban: Easier access to hospitals, diagnostics, and private services.

Rural: Dependent on PHCs, mobile health units, and limited facilities.

4. Awareness Strategies

Urban: Digital campaigns, posters, and NGO assistance.

Rural: Health days (VHNDs), folk practices, and interpersonal ^[4]

5. Follow-Up and Tracking

Urban: Digital tools for follow-up, such as EMRs and SMS reminders.

Rural: ASHAs personally remind people, use manual registers, and frequently erratic reminders. ^[5]

6. Challenges Faced

Urban: Reluctance to get vaccines because of false information and a lower perceived danger.

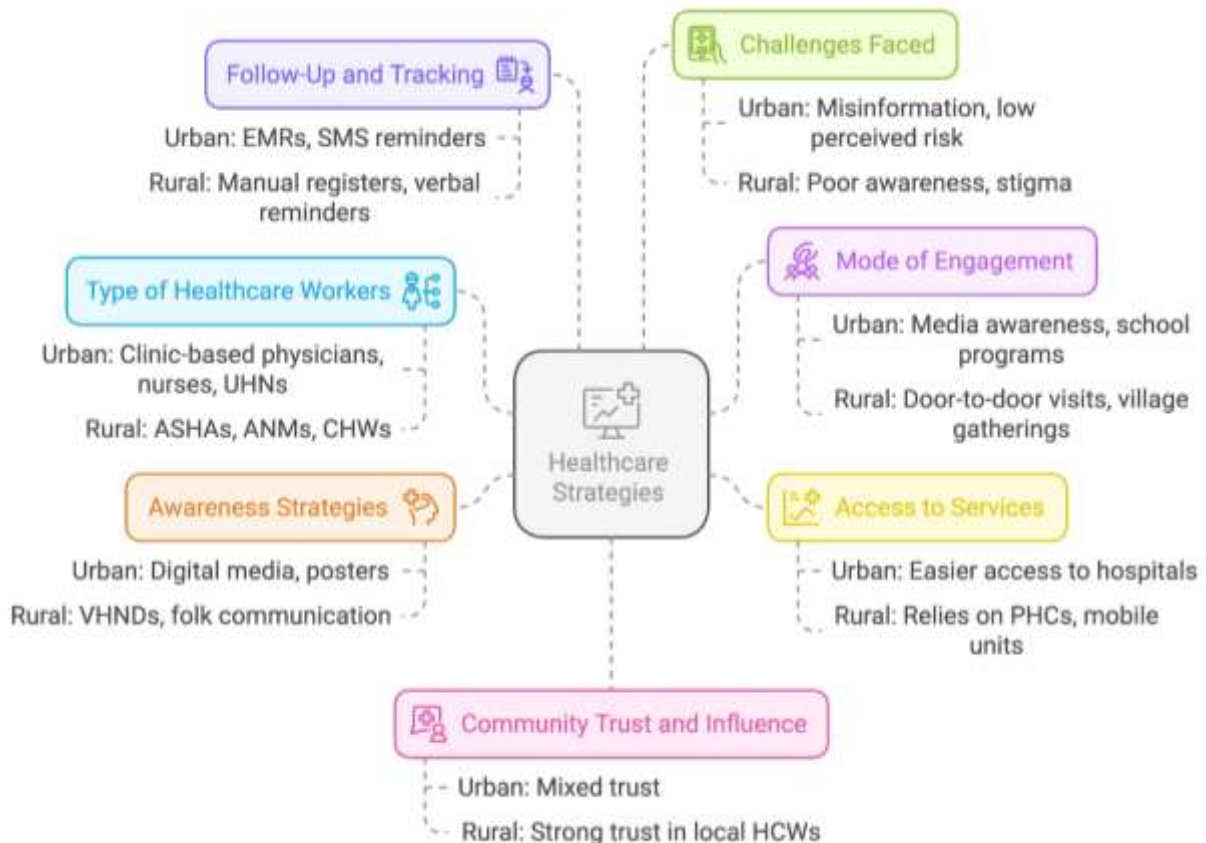
Rural: Lack of knowledge, stigma, misconceptions, and obstacles related to transportation and finances. ^[6]

7. Community Trust and Influence

Urban: Conflicting information sources and varying levels of trust in HCWs.

Rural: Local healthcare workers are highly trusted; acceptance depends on a personal connection ^[10]

Fig: 5 Healthcare Strategies in Urban and Rural Settings



Challenge of healthcare workers' lack of training or understanding regarding HPV and its link to cervical cancer

Effective prevention and education initiatives are significantly hampered by HPV as a sexually transmitted virus (STI), since sexual contact is the main way that HPV is spread, conversations about it frequently cause patients and healthcare professionals to feel uncomfortable or morally condemned ^[10]. This stigma can lead to misunderstandings about who is at risk, postpone vaccination decisions, and inhibit candid discussions. Particularly in conservative or religious societies, adolescents and their parents may be reluctant to get the HPV vaccine because they believe it may imply sexual behaviour or promiscuity. The link to sexual transmission can cause embarrassment, fear, or a reluctance to take part in cervical screening programs, even in adults. ^[10] Improving public acceptability and engagement in HPV-related health services requires addressing this stigma through provider-led reassurance, culturally sensitive education, and normalization of the vaccine as a cancer prevention strategy. ^[17]

HPV vaccination or cervical cancer screening due to cultural sensitivity in Gujarat

Gujarat, India: Social expectations and cultural standards have a big impact on health communication, especially when it comes to sexual and reproductive health issues. Because HPV is linked to sexual behaviour, there is frequently a great reluctance among community members and healthcare professionals to openly address HPV vaccine and cervical cancer screening. Particularly for single women, talking about STIs is frowned upon. This sensitivity can result in ignorance, silence, and a refusal to take preventative action. Stigma, a lack of community understanding, and gender dynamics all contribute to this cultural reluctance. Even educated women were reluctant to talk to healthcare providers about the HPV vaccine or

take part in cervical cancer screening programs, according to a Gujarati study. This was mostly because of cultural obstacles and a fear of social rejection (Mehta et al., 2017). Culturally relevant teaching methods and community-based interventions that involve women and powerful family members are necessary to address these issues. ^[18]

The Impact of Healthcare Workers' Workload and Lack of Incentives on HPV Prevention

Prioritizing preventative interventions like HPV vaccination and screening has been demonstrated to be adversely affected by healthcare workers' (HCWs') excessive workloads and lack of incentives. Due to time restrictions and a diminished emphasis on preventive treatment, healthcare workers in low-resource environments are frequently overworked. They are less likely to participate in health promotion activities, such as HPV prevention initiatives, when they lack sufficient financial or professional motivation (Mukumbang et al., 2022). ^[10] The dedication and ability of healthcare workers (HCWs) are critical to the effective implementation of HPV prevention programs, including vaccination and cervical cancer screening. However, institutional issues like excessive workloads and insufficient incentives make it very difficult for them to give these services. ^[69]

Quantitative Evidence: Impact of HCWs on HPV Vaccination Rates in Gujarat

The ICMR and PATH, working with the state government, conducted a quantitative evaluation of a Gujarati school-based HPV vaccination pilot project, providing measurable evidence of the positive influence of healthcare professionals on vaccination rates. In the districts of Vadodara and Rajkot, this study was carried out from 2016 to 2017. Frontline healthcare workers (HCWs), namely ANMs, ASHAs, and AWWs, were actively engaged in community mobilization, awareness campaigns, and vaccination administration in both school and community settings. ^[11] Coverage Rate: The program significantly surpassed the then-current national immunization targets by achieving vaccination coverage of 94.2% for the first dose and 93.1% for the second dose among eligible females (ages 10–14). The role of HCWs: The trust and accessibility of HCWs, who carried out house-to-house visits, school outreach, and parental counselling, were significantly responsible for the high uptake, according to the evaluation. Knowledge Improvement: People exposed to HCW-led sensitization had a much higher awareness of HPV and cervical cancer, according to surveys conducted before and after the campaign. ^[111] Over 30,000 girls were vaccinated within a year. ^[13] More than 85% of participants cited health workers as their primary source of HPV information ^[32].

Gender-Specific Challenges Faced by Male HCWs in HPV Awareness Campaigns

When it comes to HPV awareness efforts, especially those aimed towards adolescent girls and women, male healthcare personnel frequently face distinct cultural and communicative obstacles. Talking about sexually transmitted diseases like HPV, cervical cancer, and reproductive health is taboo in many conservative and rural areas, and males are not supposed to take the lead in these conversations. ^[65] revealed that female health professionals were considerably more effective than male workers in raising awareness of HPV and encouraging vaccination uptake. The study was done in Gujarat and Maharashtra. ^[45] In qualitative interviews, male health care workers expressed a sense of exclusion or underutilization, noting issues with community receptivity and their own uneasiness when talking about sexual health issues. ^[45]

Comparison of Gujarat's situation with national and international benchmarks in terms of HPV-related cervical cancer burden and vaccination

Gujarat :In comparison to several other Indian states, Gujarat has a lower-than-average incidence of cervical cancer, per the Indian Council of Medical Research's (ICMR) Population-Based Cancer Registry (PBCR). In Gujarat, the estimated incidence is 7–10 per 100,000 women per year (ICMR-NCDIR, 2020). ^[116] India as a National Standard: According to Globocan 2020, the age-standardized incidence of cervical cancer in India is around 18 per 100,000 women, with a death rate of 10 per 100,000 women. Among Indian women, cervical cancer is the second most frequent type of cancer. Benchmark (WHO Goals): By the end of the century, the WHO's worldwide strategy seeks to have fewer than 4 instances per 100,000 women. By the age of 15, 90% of girls have received all recommended HPV vaccinations. By the ages of 35 and 45, 70% of women had undergone at least one screening. Ninety percent of women with cervical illness receive the right care.

Coverage of HPV Vaccination

Gujarat:

The state of Gujarat started HPV vaccination through school-based initiatives in a few regions at the beginning of 2024, but statewide coverage is still in its infancy. Less than 10% of the eligible population is estimated to be covered.

India (National):

As part of the Universal Immunisation Programme (UIP), the HPV vaccine was made available to females ages 9 to 14 nationwide in 2023. Although early-stage rollout reveals modest coverage (~15–20% in experimental districts), the country's goal is to vaccinate 68 million females by 2025. Global Benchmarks (such as Rwanda and Australia) International Benchmark (e.g., Australia, Rwanda): Australia: Adolescent girls have received over 80% of the HPV vaccine; cervical cancer rates have drastically decreased. ^[116] Since the countrywide rollout in 2011, Rwanda has had one of Africa's highest

coverage rates, at over 90%.^[77]

Mandatory HPV Training Program for Healthcare Workers (HCWs)

All healthcare professionals, including physicians, nurses, community health workers (such as ASHAs), and school health staff, must undergo required training in order to successfully conduct HPV vaccine and cervical cancer screening programs. Training like this ought to cover. The burden of disease and HPV transmission Schedule, safety, and effectiveness of vaccines Dealing with vaccination hesitancy Screening protocols and guidelines (e.g Pap smear, VIA) Communication abilities and counselling^{[18][20]}

Specialized Training Modules for ASHA Workers Focused on Rural Challenges

ASHAs, or Accredited Social Health Activists, are essential in helping to close the gap between rural communities and the health system. ASHAs should get specialized training modules in order to increase the uptake of HPV vaccinations and cervical cancer screening in rural regions.^[22]

Fundamental understanding of HPV and cervical cancer in rural areas, cultural myths, stigma, and vaccine reluctance are common. Communication strategies that work for advising parents and teenage females Logistics and monitoring systems for immunization and screening^[23]

Incentives for HCWs to Meet HPV Vaccination and Screening Targets

HPV vaccination coverage and cervical cancer screening uptake can be greatly increased by offering performance-based incentives to healthcare professionals, particularly frontline staff like ASHAs, ANMs, and nurses. It is possible to design incentives around^[64] Total number of vaccinated eligible girls The number of women who had cervical cancer screenings^[65] Sessions of community awareness were held. Referral completions and follow-ups^[65]

Summarize the critical role HCWs play in prevention in Gujarat

Gujarat's school-based HPV vaccination pilot project, which was carried out by ICMR and PATH from 2016 to 2017, was made possible in large part by healthcare workers (HCWs), especially auxiliary nurse midwives (ANMs), accredited social health activists (ASHAs), and anganwadi workers (AWWs). Activating the community, raising awareness, and administering vaccines directly were among their duties.^[76] They achieved extraordinarily high vaccination coverage rates among eligible girls aged 10-14, with 94.2% of them receiving the first dose and 93.1% receiving the second shot, thanks to their trusted presence in the community, house-to-house visits, and family counselling. In addition, more than 85% of participants said that HCWs were their main source of information on HPV, and those who were exposed to HCW-led sensitization campaigns reported significantly higher levels of awareness regarding HPV and cervical cancer. (ICMR & PATH,2017)^[56]

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