

IMMUNOPROPHYLAXIS OF CA-CX

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Immunoprophylaxis against HPV plays a critical role in preventing cervical cancer (Ca-Cx), particularly in low- and middle-income countries where healthcare access is limited. This work explores HPV's oncogenic role, global burden, high-risk populations, and effective vaccination strategies. It also highlights successful regional efforts and the need for widespread awareness and immunization. Achieving the WHO target for cervical cancer elimination requires coordinated global action, bridging health-care gaps and ensuring timely vaccination for both males and females.

HPV and Its Oncogenic Role

High oncogene HPV strains responsible for malignancy of different areas of both male & female.

Such as:

- Anal cancer
- Vulval cancer
- Vaginal cancer
- Penile cancer

The virus has got affinity for mucus membrane of GI tract & also for genital tract of both individuals.

e.g., Among GI:

- Mouth
- Throat
- Rectum
- Anus

Genitalia:

- Vulva
- Vagina
- Cervix
- Penis
- Scrotum

HPV is a small double-stranded DNA virus having affinity to affect mucocutaneous & anogenital areas/regions, including hands & feet.

HPV is one of the most common STIs in USA.

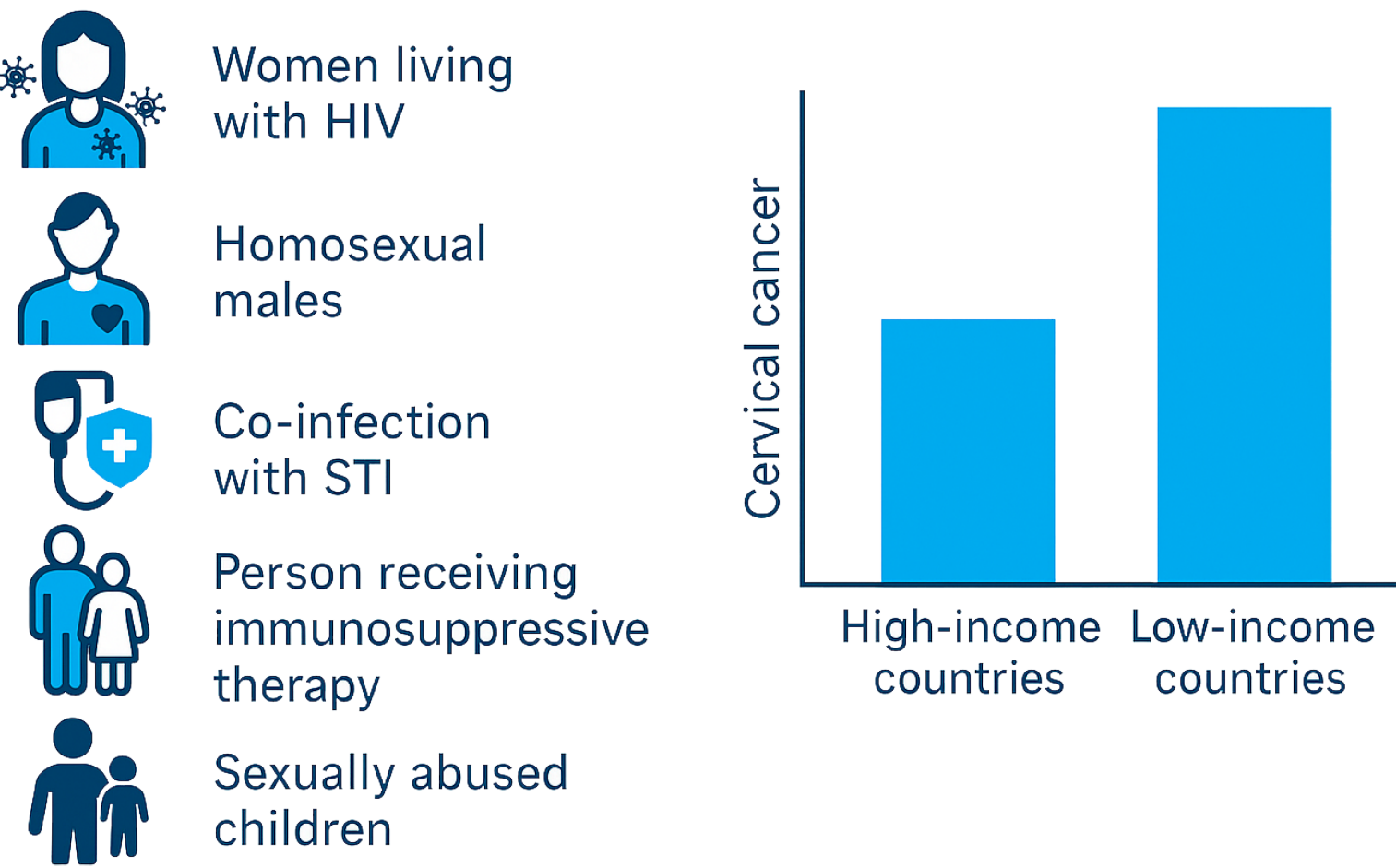
Study revealed that more than 40 types are involved during their journey from preinvasive to invasive malignancy (being an epitheliotrophic agent). Sometimes may require longer time — even years. Observational study also revealed that internal organ e.g., stomach also affected by malignancy through unknown mechanism.

High-Risk Groups

Higher prevalence of infection are seen among:

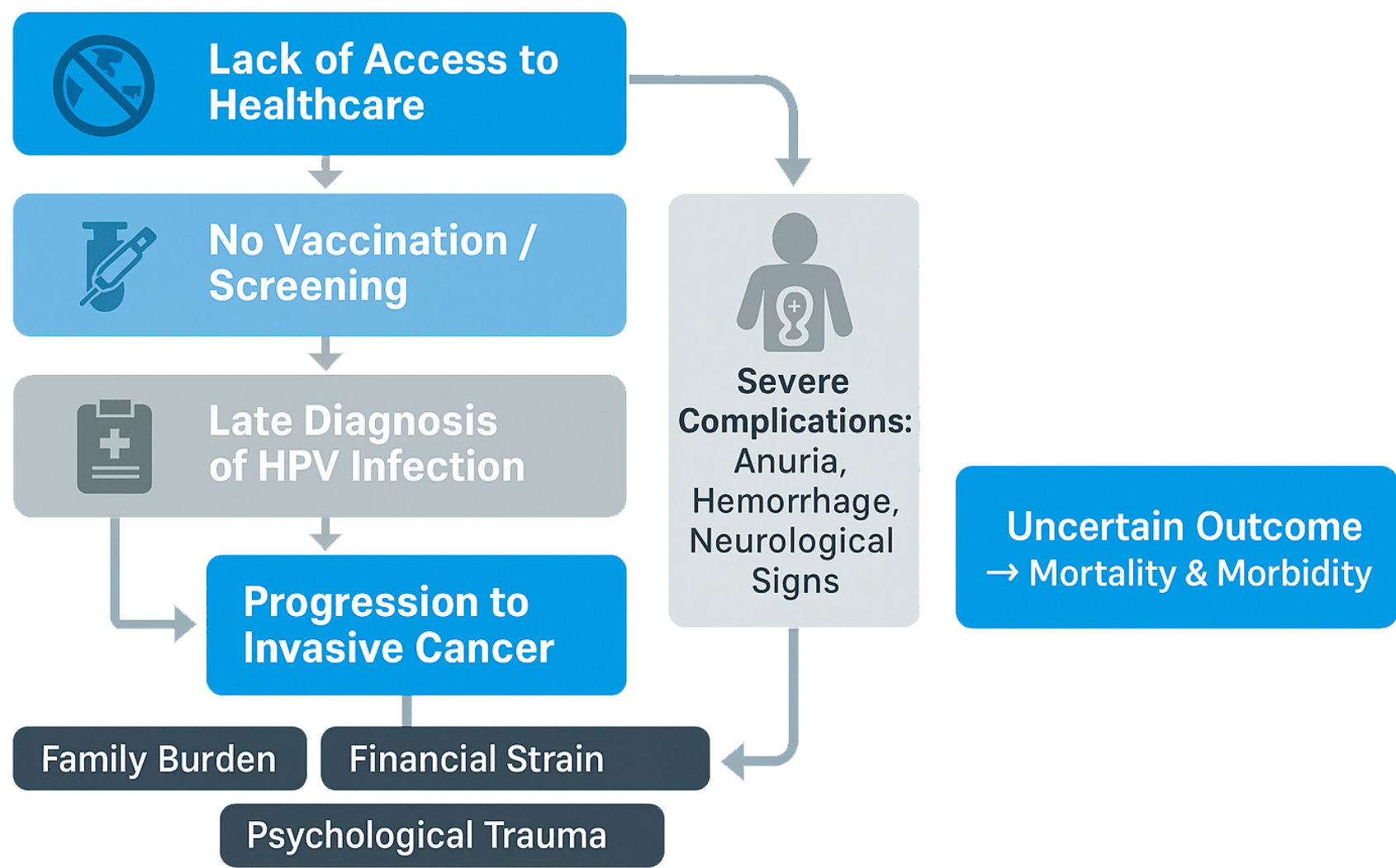
- Women living with HIV
- Homosexual male
- Co-infection with other STI
- Person receiving immunosuppressive therapy
- Sexually abused children

Observational study also revealed that internal organ e.g., stomach also affected by malignancy through unknown mechanism.



Global Burden and Consequences

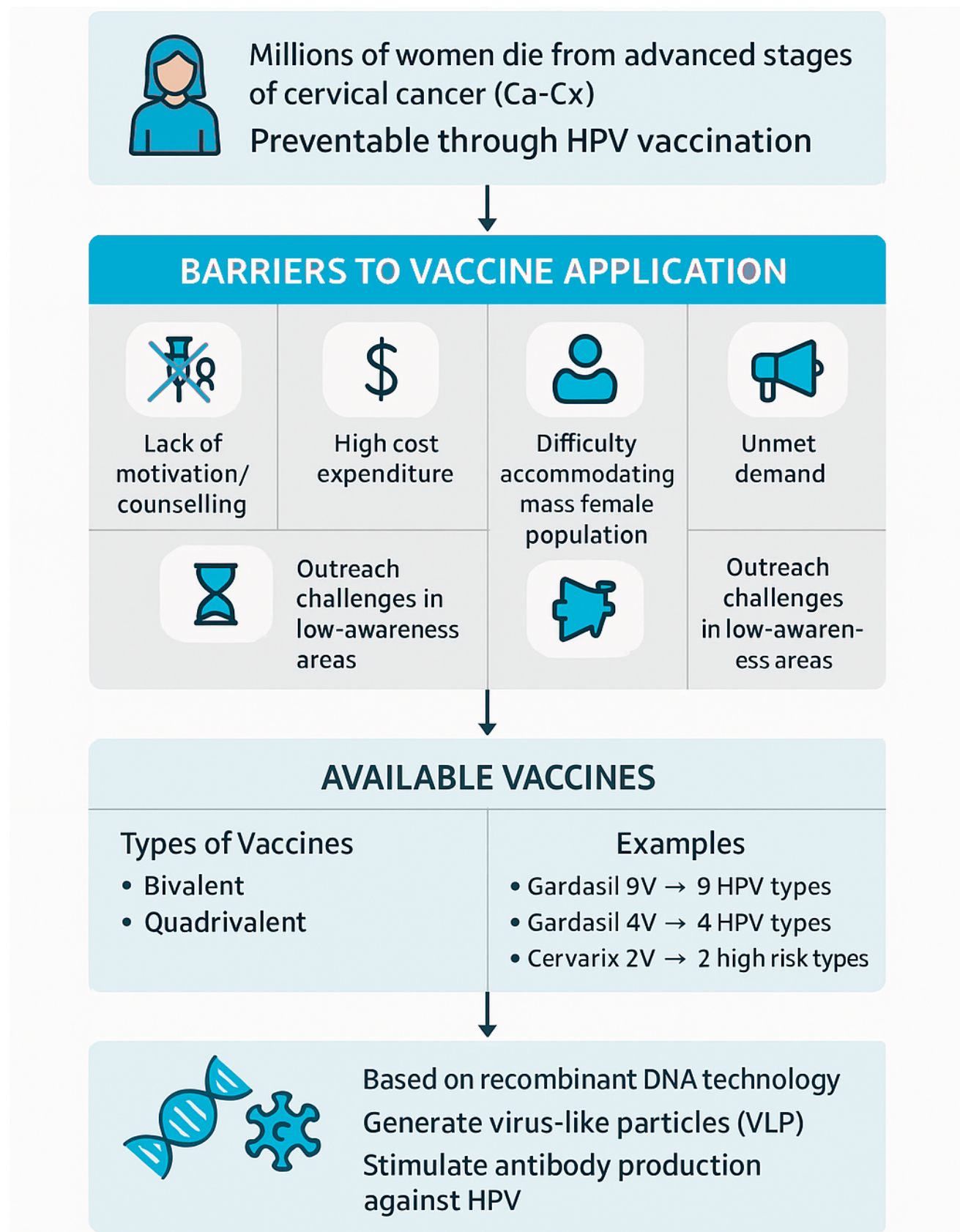
- Highest rate of cervical cancer mortality more in low & middle income countries, that is a reflection of major inequalities probably due to lack of access to health care facilities, including vaccination, screening program, treatment services, social & economical determinants.
- Virulence & violence of the virus against the organ-specific area turn to the individual in a terminal or end stage of life e.g. anuria, severe hemorrhage & neurological involvement.
- The ultimate outcome such as burden of family, finance & future of mortality & morbidity & fear of uncertain hope for improvement or palliation.
- High risk strains — especially 16, 18 — are responsible for dysplasia, preinvasive & invasive malignancy.
- Regardless of sex & reproductive anatomy, the most important challenge is to prevent malignancy & spread.
- Microabrasion produced by HPV invasion provides an opportunity to affect a non-infected person.



Global Statistics

Global estimation of 620,000 new cancer cases are detected in females & 70,000 having causal relationship with HPV in 2019.

- Yearly diagnosed new cases are 660,000 & 350,000 deaths globally; more than 90% of cervical cancer having aetiological background.
- Condom may not provide full protection against HPV as inguino-scrotal contact may not be fully covered.



Vaccine and Prevention

It is a tragedy globally that millions of women die from advanced stages of cervical cancer (Ca-Cx); this can be prevented by vaccine administration to stop disease development or progression.

Recent problems encountered during vaccine application include:

- Lack of strong motivation or counselling
- High cost/expenditure
- Lack of knowledge
- Difficulty accommodating mass female population
- Unmet demand
- Challenges in reaching outreach areas where awareness is low

Two types of vaccines are available:

- Bivalent
- Quadrivalent

Both are effective against high-risk strains responsible for cervical cancer.

Common vaccine types include:

- Gardasil 9V — protects against 9 HPV types
- Gardasil 4V — protects against 4 HPV types
- Cervarix 2V — protects against 2 high-risk HPV types (bivalent)

Component & recommendation:

- Use of recombinant DNA technology to generate virus-like particles (VLP)
- Vaccines are capable of producing antibodies against the virus

Vaccination Recommendations

HPV vaccine is a series of shots that are protective against HPV infection, which is transmitted through intimate contact.

Children between 11–12 years are the best candidates for administration of the vaccine.

Vaccine provides protection against:

- 90% of HPV strains responsible for malignancy of cervix, vagina, and vulva
- 90% of HPV strains responsible for anal and penile cancer
- Most of the strains responsible for anal and throat cancer (back of the throat)

HPV vaccine for males (Gardasil) is recommended for boys.

Protective against strains responsible for malignancy of:

- Mouth
- Throat
- Penis
- Anus
- Head & neck
- Genital warts



GARDASIL 9 VACCINE



CERVERIX 2V

National & Global Strategies

National Immunisation Program in Australia has included the HPV vaccine since 2007.

In Australia, the Therapeutic Goods Association (TGA) has approved Gardasil 9 for:

- Females aged 9–45 years
- Males aged 9–26 years

World Health Assembly (WHA 73.2) adopted the global strategy to accelerate cervical cancer elimination as a public health problem, with the following targets as part of the WHO response:

Countrywide achievement & awareness:

- Though cervical cancer still remains a burden, screening and vaccination have helped reduce both incidence and severity.
- Among the Nordic countries, the incidence of cervical cancer is:
 - Highest in Greenland (25 per 100,000)
 - Lowest in Finland (4 per 100,000)
 - Variable range in other Nordic countries (7–11 per 100,000)

Among the Scandinavian countries, the HPV vaccination programme (2008–2009) resulted in a marked decrease in HPV-type disease in the general population.

Other HPV-Linked Malignancies

High-Risk HPV & Oropharyngeal Cancer:

- Regarding the high risk HPV oncogene specially type 16 responsible for oropharyngeal squamous cell carcinoma (opSCC), incidence is increasing in among middle aged (50–69 years) old individual.
- Male has tripled in four high income Nordic countries, among the cf. Denmark, Finland, Norway & Sweden over the last 30 years.

HPV Vaccination in Schools:

- Administration of HPV prophylaxis vaccine implementation programme in school base (both boys & girls) student gradually reduced incidence of some opSCC specially tonsillar area & base of the tongue.

Rising Head & Neck Cancer Trends:

- Incidence of HPV associated head & neck cancers are raising, but with a long delay.

HPV Vaccination Programmes (2009–2013):

- During 2009–2013 HPV vaccination programme included in EPI schedule (Nordic countries)

Australian HPV Vaccination Guidelines:

- Australian Immunisation Handbook recommend HPV vaccination for younger group i.e. 9–25 years including male to male homosexual persons
- including gardasil 9 for 9–45 years female & 9–26 years of male
- HPV 2 doses of vaccine



Image courtesy of University of Queensland Faculty of Medicine

Conclusion

Important considerations should be:

- To cover a wide range of the population, both male and female, especially to include in the EPI schedule as much as possible to meet the unmet demand.
- Till now, the vaccine has probably covered only the tip of the iceberg, so the underprivileged bulk of the population are eagerly waiting to be protected from the disease and its severity.
- Coordination among WHO, WHA, USAID, and UNICEF is necessary — a global strategy to win the challenge, a race early and steady:

**THROUGH
TO**
Immunoprophylaxis of cancer cervix
Eliminate the disease from the world