

ความท้าทายและโอกาสในการให้วัคซีน HPV: บทวิเคราะห์จากประเทศไทย ในบริบทระดับโลก

Challenges and Opportunities in HPV Vaccination: Insights from Thailand in a Global Context

ลิลลี่ ประทีป¹, กชกร คำสีแก้ว², มينا กรสุธาธิกุล¹,

ทองรัตน บงกชเกตุสกุล³, สิริพร ชูเพชรสมบุญ⁴

¹โรงเรียนสารสาสน์เอกตรา, ²โรงเรียนสวนกุหลาบวิทยาลัย รังสิต,

³โรงเรียนสาธิตมหาวิทยาลัยศรีนครินทรวิโรฒ ประสานมิตร หลักสูตรนานาชาติ, ⁴นักวิจัยอิสระ

Lilli Prateep¹, Kojchakorn Khamseekaew², Mena Kornsuthatipkul¹,

Thongrattana Bongkotkatsakul³, Siriporn Shupetchsomboon⁴

¹Sarasas Ektra School, ²Suankularb Wittayalai Rangsit School,

³Satit Prasarnmit International Programme, ⁴Independent Researcher

Corresponding author: siriporn.shu@gmail.com

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บทคัดย่อ

ไวรัสฮิวแมนแพปพิลโลมา (Human papillomavirus: HPV) เป็นสาเหตุสำคัญของมะเร็งปากมดลูกและมะเร็งอวัยวะสืบพันธุ์อื่น ๆ ทั่วโลก โดยประเทศไทยยังคงมีภาระโรคในระดับสูง การพัฒนาวัคซีนป้องกันการติดเชื้อ HPV ทั้งชนิดสองสายพันธุ์ (Bivalent), สี่สายพันธุ์ (Quadrivalent) และเก้าสายพันธุ์ (Nonavalent) ได้เปลี่ยนแปลงแนวทางการป้องกันมะเร็งปากมดลูกอย่างมีนัยสำคัญ ประเทศไทยได้บรรจุวัคซีน HPV ชนิด Bivalent (Cervarix) ไว้ในโครงการสร้างเสริมภูมิคุ้มกันแห่งชาติ (National Immunization Program: NIP) ตั้งแต่นั้นปี พ.ศ. 2560 โดยให้บริการวัคซีนฟรีแก่นักเรียนหญิงชั้นประถมศึกษาปีที่ 5 อายุ 11-12 ปี การทบทวนวรรณกรรมเชิงบรรยายฉบับนี้รวบรวมหลักฐานจากระดับโลกและระดับชาติระหว่างปี ค.ศ. 2000-2025 เพื่อวิเคราะห์ความก้าวหน้าและความท้าทายของโครงการวัคซีน HPV ของประเทศไทยเมื่อเปรียบเทียบกับประสบการณ์จากต่างประเทศ ผลการสังเคราะห์พบว่าแม้โครงการในประเทศไทยมีส่วนช่วยลดการติดเชื้อ HPV ได้อย่างเป็นรูปธรรม แต่ความครอบคลุมของการฉีดวัคซีนยังไม่สม่ำเสมอ และยังมีข้อจำกัดด้านนโยบายที่ไม่ครอบคลุมเด็กชายและกลุ่มที่พลาดโอกาส (Catch-up cohorts) ประเทศที่ประสบความสำเร็จสูง เช่น ออสเตรเลียและสหราชอาณาจักร แสดงให้เห็นถึงประสิทธิภาพของนโยบายการฉีดวัคซีนแบบไม่จำกัดเพศ (Gender-neutral vaccination) และระบบคัดกรองที่บูรณาการอย่างเข้มแข็ง ขณะที่ประเทศเพื่อนบ้าน เช่น มาเลเซียและฟิลิปปินส์ แสดงให้เห็นความแตกต่างด้านความพร้อมของระบบสาธารณสุขและความร่วมมือระหว่างหน่วยงานสำหรับประเทศไทย แนวทางเชิงนโยบายที่สำคัญ ได้แก่ การขยายกลุ่มเป้าหมาย

ให้ครอบคลุมเด็กชายและกลุ่ม Catch-up, การเสริมระบบส่งวัคซีนในพื้นที่ชนบทโดยใช้แนวทางวัคซีน แบบหนึ่งเข็ม (Single-dose strategy) ตามข้อเสนอขององค์การอนามัยโลก, การบูรณาการวัคซีน HPV เข้ากับการคัดกรองมะเร็งปากมดลูกด้วยการตรวจ HPV DNA และการสื่อสารสาธารณะอย่างโปร่งใสเพื่อลดความเข้าใจผิดและความลังเลต่อวัคซีน ในอนาคต ประเทศไทยควรเตรียมความพร้อมสำหรับวัคซีนรุ่นใหม่ เช่น วัคซีนชนิด mRNA และ L2-based ที่มีศักยภาพในการป้องกันสายพันธุ์ได้กว้างขึ้น และเร่งขับเคลื่อนนโยบายให้สอดคล้องกับเป้าหมาย 90-70-90 ขององค์การอนามัยโลก เพื่อมุ่งสู่การขจัดมะเร็งปากมดลูกเป็นปัญหาสาธารณสุขอย่างยั่งยืน

คำสำคัญ: วัคซีนป้องกันเชื้อเอชพีวี, นโยบายการฉีดวัคซีน, การเปรียบเทียบระหว่างประเทศไทยและต่างประเทศ, ความเสมอภาคด้านสุขภาพ, การฉีดวัคซีนแบบไม่จำกัดเพศ

Abstract

Human papillomavirus (HPV) remains a leading cause of cervical and other anogenital cancers worldwide, with Thailand carrying a substantial disease burden. The introduction of prophylactic HPV vaccines—bivalent, quadrivalent, and nonavalent formulations—has revolutionized cervical cancer prevention. Thailand incorporated the bivalent HPV vaccine (Cervarix) into its National Immunization Program (NIP) in 2017, providing free vaccination to Grade 5 schoolgirls aged 11-12 years. This narrative review synthesizes global and national evidence from 2000 to 2025 to assess Thailand's HPV vaccination progress in comparison with international experiences. Findings indicate that while Thailand's school-based program has achieved measurable reductions in HPV prevalence, coverage remains uneven and limited by the exclusion of boys and catch-up cohorts. Global exemplars such as Australia and the United Kingdom demonstrate the benefits of gender-neutral vaccination and integrated screening systems, while regional comparisons with Malaysia and the Philippines highlight how governance strength and intersectoral collaboration influence program performance. For Thailand, policy priorities include expanding eligibility, strengthening rural access through single-dose strategies, integrating vaccination with HPV DNA screening, and enhancing communication to counter vaccine hesitancy. Looking ahead, preparing for next-generation vaccines and aligning national policy with the WHO's 90-70-90 cervical cancer elimination targets will be essential for sustainable progress.

Keywords: HPV vaccine, Vaccination policy, Thailand and global comparison, Health Equity, Gender-Neutral Vaccination

Introduction

Human papillomavirus (HPV) is one of the most common sexually transmitted infections globally, with over 200 viral types, more than 40 of which infect genital and oropharyngeal mucosa in both sexes.⁽¹⁾ Persistent high-risk types, particularly HPV-16 and HPV-18, cause about 70% of cervical cancer cases worldwide.⁽²⁾ HPV is also linked to anal, vulvar, vaginal, penile, and oropharyngeal cancers, emphasizing its broad public health burden.

Prophylactic HPV vaccines have shifted cervical cancer prevention, with countries such as Australia, the United Kingdom, and the United States reporting up to 90% reductions in HPV-16/18 infections and 70% declines in precancerous lesions where coverage is high.⁽³⁾ However, uptake varies widely, especially in low- and middle-income countries facing vaccine hesitancy, cultural concerns, health-system limitations, and policy fragmentation.

Thailand reflects these disparities. Although HPV vaccination was integrated into the National Immunization Program in 2017 for Grade 5 girls aged 11-12 years,⁽⁴⁾ coverage remains uneven, particularly in rural areas due to cold-chain challenges, workforce shortages, and misconceptions about vaccine safety. The exclusion of boys and catch-up cohorts further limits herd immunity despite evidence supporting gender-neutral programs. These gaps hinder progress toward the WHO's 90-70-90 elimination goals.⁽⁵⁾

This review therefore synthesizes global and national evidence to identify policy gaps, extract lessons from high-performing countries, and

propose strategies to strengthen Thailand's program. The aim is to support evidence-based, gender-inclusive, and culturally informed approaches that move Thailand toward sustainable cervical cancer prevention and the WHO elimination target of fewer than 4 cases per 100,000 women-years.⁽⁵⁾

Ethical Considerations, Conflict of Interest, and Funding

This study is a narrative literature synthesis and did not involve human participants or collection of primary data; therefore, no ethical approval was required. The authors declare no conflict of interest and report no external funding for the preparation of this review.

Methods

This study used a narrative review approach to synthesize evidence on HPV vaccination in Thailand and compare it with global experiences. This design enabled integration of diverse sources-including epidemiological studies, vaccine trials, policy analyses, and international reports-to capture both quantitative outcomes and policy challenges. Literature searches were conducted in PubMed, Scopus, Web of Science, ScienceDirect, and Google Scholar for publications from January 2000 to October 2025, supplemented by data from WHO, CDC, NCI, and the ICO/IARC HPV Information Centre.

Search terms included (HPV OR papillomavirus) AND (Thailand) AND (vaccination OR vaccine) AND (policy OR coverage OR uptake OR implementation),

with additional terms for gender-neutral vaccination, HPV screening, and cervical cancer prevention. Only English and Thai articles were considered, and reference lists were hand-searched for additional studies. Eligible publications focused on HPV vaccination or cervical cancer prevention in Thailand or provided comparative evidence from high-uptake or Southeast Asian contexts. Non-peer-reviewed commentaries, incomplete conference abstracts, and papers lacking relevant empirical or policy content were excluded.

Approximately 80-100 records were screened, and 40-50 were included based on recency, evidence quality, and relevance to HPV policy and WHO's 90-70-90 framework. Data were extracted thematically into six domains: epidemiology, vaccine effectiveness, Thailand's program outcomes, barriers to uptake, global comparisons, and future policy opportunities. Higher weight was given to studies from 2020-2025 and WHO-endorsed documents.

Although the review may carry publication or language bias, the use of multiple databases, authoritative sources, and transparent selection criteria helped maintain methodological integrity.

1. Epidemiology of HPV and Cervical Cancer

Global Burden

Human papillomavirus (HPV) is the most prevalent sexually transmitted infection worldwide, with over 200 identified types and about 40 affecting the genital and oropharyngeal regions.⁽¹⁾ High-risk strains, particularly HPV-16 and HPV-18, account for ~70% of cervical cancer cases globally.⁽²⁾ In 2020, cervical cancer caused 604,127

new cases and 341,831 deaths, ranking as the fourth most common cancer in women and second among those aged 15-44 years. HPV also contributes to vulvar, vaginal, penile, anal, head, and neck cancers. While breast cancer remains most common among women (58.5%), cervical cancer still poses a substantial burden globally (15.6%), especially where screening and prevention access are limited.⁽³⁻⁶⁾

Thailand Situation

Thailand mirrors this burden, with HPV-related cancers being a major public health concern. A review of 64,323 Thai cases (1989-2020) reported overall HPV prevalence of 40.47%, highest in penile (84.09%), anal (50.99%), cervical (44.79%), and vulvar/vaginal cancers (46.54%).⁽⁷⁾ Prevalence rose from 40.8% (1989-1998) to 56.4% (1999-2008), then declined to 31.2% (2009-2018). Cervical cancer remains a leading cause of cancer-related death among Thai women, with HPV-16 and HPV-18 identified as dominant types in recent clinical studies.⁽⁸⁾

Global and Regional Comparison

High-income countries such as Australia, the UK, and the US report up to 90% reductions in HPV-16/18 infections and ~70% declines in precancerous lesions due to high vaccination coverage, gender-neutral programs, and strong screening systems.⁽⁹⁾ Thailand implemented national HPV vaccination only in 2017 for Grade 5 girls, with uneven uptake, particularly in rural areas.⁽⁴⁾ Screening rates also remain below WHO targets. Regionally, Thailand performs better than the Philippines, where coverage remains pilot-level, but trails Malaysia, which has broader school-based

vaccination and higher uptake.⁽¹⁰⁾ Without expanded coverage, Thailand risks falling behind countries progressing toward WHO's 90-70-90 elimination goals.

2. HPV Vaccine Development and Effectiveness

Advances in molecular virology since the 1990s enabled development of virus-like particle (VLP) prophylactic vaccines. Three major vaccines are currently used: bivalent Cervarix, quadrivalent Gardasil, and nonavalent Gardasil 9.⁽¹¹⁾ Cervarix targets HPV-16 and 18, responsible for ~70% of cervical cancer cases (WHO n.d.). Gardasil protects against HPV-6/11, which cause ~90% of genital warts, as well as HPV-16/18.⁽¹²⁾ Gardasil 9 extends protection to nine types (6,11,16,18,31,33,45,52,58), covering ~90% of cervical cancers.⁽¹³⁻¹⁴⁾ All currently licensed HPV vaccines are prophylactic and most effective before sexual debut; therapeutic vaccines remain under development and unlicensed.⁽¹⁵⁾

Clinical evidence confirms high efficacy: a landmark trial showed nearly 100% prevention of persistent HPV-16 infection among vaccinated women aged 16-23.⁽¹²⁾ More than 98% maintained HPV-18 antibody seropositivity after two or three doses.⁽¹⁶⁾ Single-dose HPV vaccination has shown durable immunity for up to 24 months, presenting a cost-effective option for low- and middle-income countries.⁽¹⁷⁾ Countries with high vaccination coverage report up to 90% reductions in HPV-16/18 infections and ~70% declines in precancerous cervical lesions.⁽⁹⁾

Australia's nationwide, gender-neutral school program achieved >80% uptake and is projected to eliminate cervical cancer as a public health problem within two decades.⁽¹⁸⁾ The UK and US also report major declines, with the US observing infection reductions of 56% among girls aged 14-19 within four years and 88% after twelve years.^(1,19)

Thailand introduced HPV vaccination into the National Immunization Program (NIP) in 2017 for Grade 5 girls aged 11-12. Pilot work and seven-year follow-ups demonstrate strong effectiveness.⁽⁴⁾ However, coverage remains uneven-especially in rural areas-due to logistical challenges and the exclusion of boys and catch-up cohorts, slowing progress toward WHO's 90-70-90 goal. Epidemiological trends show HPV prevalence decreasing from 56.4% (1999-2008) to 31.2% (2009-2018), following vaccination and broader screening efforts.⁽⁷⁾ Northern Thailand also reports a drop in HPV-related cancer incidence from 25 to 13 per 100,000 between 2008-2017.⁽²⁰⁾ These findings indicate early program success, with greater impact expected through expanded and equitable coverage.

3. Thailand's HPV Vaccination Program

Thailand introduced HPV vaccination into its public health system through pilot school-based programs in 2014, followed by nationwide inclusion in the National Immunization Program (NIP) in 2017, in line with WHO's 90-70-90 strategy.^(9,18) The program provides free two-dose vaccination for Grade 5 girls aged 11-12 years. Uptake is generally high in urban schools but remains inconsistent in rural areas

due to cold-chain challenges, workforce shortages, and follow-up gaps. Seven-year follow-up studies show reduced high-risk HPV infection among vaccinated cohorts, demonstrating early impact.⁽⁴⁾

The program has achieved meaningful progress: school-based delivery is cost-effective, and HPV-related cancer incidence in northern Thailand declined from 25 to 13 per 100,000 between 2008-2017.⁽²⁰⁾ However, limitations persist. Current policy excludes boys and catch-up cohorts, restricting herd immunity, despite evidence that gender-neutral vaccination improves population protection.⁽³⁾ Urban-rural inequities, operational barriers, and vaccine hesitancy also hinder coverage. Adoption of the WHO-endorsed single-dose strategy could reduce logistical burden and expand access.

Sustained progress will require policy expansion to include boys, improved rural delivery systems, and stronger public communication to address misconceptions. Without these advances, Thailand risks lagging behind countries like Australia and the UK, where inclusive vaccination and high coverage are accelerating movement toward cervical cancer elimination.

4. Challenges in HPV Vaccination Uptake

Awareness and Education

Public knowledge of HPV remains low in Thailand, with common misconceptions such as Pap smears being sufficient for prevention or vaccination being unnecessary due to natural infection clearance.⁽²¹⁾ Cultural sensitivity around adolescent sexual health also limits discussion and parental acceptance.⁽²²⁾ Similar global trends

show skepticism when vaccine benefits focus on precancerous lesions rather than cancer outcomes, despite long-term evidence confirming reductions in HPV-related cancers.⁽³⁾ Strengthened health education and community awareness campaigns are therefore essential.

Accessibility and Logistics

Although the school-based program improves access, urban-rural gaps persist. Rural regions face limited healthcare capacity, staffing shortages, and cold-chain challenges that reduce coverage.⁽⁷⁾ In contrast, high-income countries like the UK and Australia maintain high uptake through strong national infrastructure and integrated school delivery systems.⁽⁹⁾

Policy and Coverage Gaps

The current program targets only Grade 5 girls aged 11-12, excluding boys and catch-up cohorts.⁽⁴⁾ As HPV also affects men, gender-neutral vaccination—as adopted in high-performing countries—enhances herd immunity and reduces overall HPV burden.⁽⁵⁾ Limited access for older adolescents and vaccine cost remain key barriers.⁽¹⁰⁾

Vaccine Hesitancy and Safety Concerns

Safety concerns and misinformation contribute to hesitation worldwide. Media-driven reports, such as alleged POTS and CFS cases in Denmark, led to a sharp fall in uptake.⁽²³⁻²⁴⁾ While Thailand has not experienced a comparable crisis, community-level concerns about side effects persist.⁽¹⁾ Trust-building requires transparent communication, emphasizing vaccine safety supported by WHO/CDC surveillance, and reframing vaccination as cancer

prevention rather than linked to sexual activity. Evidence shows HPV vaccination does not increase early sexual behavior.

Sustained confidence will depend on culturally sensitive messaging, involvement of healthcare workers, teachers, and local leaders, and proactive engagement to dispel myths. A coordinated communication strategy is vital for maintaining public trust and promoting equitable nationwide coverage.

5. Global Comparisons and Lessons Learned

High-uptake country strategies

High-income countries show that strong national policy, school-based delivery, and consistent communication drive high coverage. Australia's early gender-neutral school program achieved >80% uptake and major reductions in HPV infection and precancers, positioning the country toward cervical cancer elimination within two decades.⁽⁵⁾ The UK maintained high coverage through school-based vaccination including boys, while the US-despite lacking a unified national system-improved uptake through policy tools such as Medicaid expansion and adolescent consent laws.⁽²⁵⁻²⁶⁾ These examples highlight that structured school delivery and inclusive policy design are key to success.

Southeast Asia comparison-Malaysia vs. Thailand

Malaysia's higher coverage is supported by strong MOE-MOH coordination, centralized funding, nurse-led school outreach, and opt-out consent systems.⁽¹⁰⁾ In contrast, fragmented implementation in the Philippines demonstrates how inconsistent governance lowers

coverage.⁽⁶⁾ These contrasts indicate that operational discipline and inter-ministerial collaboration are critical for Thailand's improvement.

Adaptable lessons for Thailand Evidence suggests four actionable strategies:

1. Expand vaccination to boys and catch-up cohorts to enhance herd immunity.⁽⁵⁾
2. Formalize MOE-MOH cooperation with shared KPIs, school-level monitoring, and digital dashboards.⁽¹⁰⁾
3. Reduce urban-rural gaps via outreach clinics, mobile teams, and adoption of WHO-supported single-dose schedules.⁽²³⁾
4. Strengthen trust-building communication using local leaders and HCPs, framing HPV vaccination as cancer prevention, with rapid responses to misinformation.^(23,26)

Integrating these measures would increase and equalize coverage, supporting progress toward WHO 90-70-90 targets through inclusive policy, strong logistics, rural access expansion, and confidence-focused communication.

6. Future Directions and Opportunities

Expand vaccination eligibility

Thailand currently vaccinates only Grade 5 girls, leaving boys and older adolescents unprotected. Expanding to boys and catch-up cohorts would enhance herd immunity and reduce HPV-related cancers in men, as demonstrated in Australia and the UK.^(3,5) Broader eligibility would help Thailand advance toward WHO 90-70-90 elimination goals.⁽⁹⁾

Integrate vaccination with screening

Vaccination alone cannot eliminate cervical cancer; integration with screening is essential. WHO recommends HPV DNA testing for 70% of women at ages 35 and 45.⁽⁵⁾ Thailand's screening coverage remains uneven, particularly in rural areas.⁽⁸⁾ Linking vaccination with organized screening programs would improve cancer prevention and early detection.

Adopt next-generation vaccines

Current vaccines are prophylactic and type-specific. Emerging mRNA and L2-based vaccines offer broader cross-protection and may support simplified dosing schedules, which could benefit low- and middle-income settings. An L2-based mRNA vaccine has shown cross-type antibody responses beyond current formulations.⁽²⁷⁾ Thailand could prepare for adoption through trial participation and regulatory readiness.

Strengthen communication to build trust

Misconceptions about safety, necessity, and sexual behavior remain barriers.⁽²¹⁾ International experiences-such as hesitancy spikes in Denmark and Norway-show how misinformation can rapidly reduce coverage.⁽²³⁻²⁴⁾ Thailand should invest in transparent, evidence-based communication, involving healthcare workers, schools, and community leaders, and emphasize HPV vaccination as cancer prevention.⁽¹⁾

Discussion

This review highlights that while Thailand has made meaningful progress by integrating HPV vaccination into its National Immunization Program (NIP) since 2017, substantial challenges continue to limit the program's overall impact. Compared with high-income countries such as Australia, the United Kingdom, and the United States, Thailand's vaccination coverage remains modest and uneven, particularly in rural provinces where logistical barriers and limited healthcare infrastructure hinder consistent delivery.⁽⁸⁻⁹⁾ These disparities underscore the central role of structural capacity, sustained political commitment, and inter-ministerial coordination in achieving the high coverage rates necessary for cervical cancer elimination.

A key policy limitation lies in the restricted target population. Thailand's current program focuses exclusively on Grade 5 schoolgirls aged 11-12 years, leaving out boys and catch-up cohorts. Evidence from global leaders shows that gender-neutral vaccination and catch-up initiatives substantially accelerate herd immunity and reduce HPV-related cancers in both sexes.^(3,5) The absence of such provisions reflects both financial constraints and policy hesitancy; however, cost-effectiveness analyses from comparable middle-income settings demonstrate that broader eligibility could be justified if combined with efficient, school-based delivery systems.⁽¹⁰⁾

Cultural and social barriers also impede uptake. Misconceptions that Pap smears alone provide sufficient protection or that HPV vaccination promotes early sexual activity persist in many Thai communities.^(21,22) Lessons from Denmark-where public confidence plummeted following unverified reports of postural orthostatic tachycardia syndrome (POTS)-illustrate how misinformation can rapidly erode trust.⁽²³⁾ To prevent similar outcomes, Thailand must strengthen evidence-based communication through healthcare providers, teachers, and community leaders, emphasizing that HPV vaccination is a cancer-prevention tool rather than one linked to sexual behavior. Transparent, culturally sensitive messaging is essential for sustained public confidence.

Integration between primary prevention (vaccination) and secondary prevention (screening) also remains limited. Although national screening coverage has improved, Thailand still falls short of the WHO's recommendation for 70% screening of women at ages 35 and 45.⁽⁵⁾ In contrast, Australia's integration of organized screening and high vaccination coverage has produced a synergistic decline in cervical cancer incidence. Strengthening Thailand's screeningvaccination continuum potentially through electronic health records linking immunization and screening data-could optimize prevention outcomes.

Methodological Considerations

As a narrative review, this study draws on varied sources-including pilot studies, surveillance reports, and national datasets-resulting in heterogeneity that may introduce publication or language bias and limit generalizability. Cross-country comparisons may also be affected by differences in health systems and cultural contexts. These limitations were mitigated through transparent selection criteria and triangulation of credible data, but conclusions should be interpreted with caution.

Findings support a phased policy approach to strengthen Thailand's HPV vaccination program. Short term (1-2 years): prioritize public confidence through transparent communication, highlight HPV vaccination as cancer prevention, improve school-based coordination between MOPH-MOE, and pilot WHO-endorsed single-dose strategies to simplify logistics and expand reach. Medium term (3-5 years): expand vaccination to boys and catch-up groups, integrate immunization and screening data into a national registry, and increase investment in cold-chain infrastructure and workforce capacity. Long term (5+ years): prepare for next-generation vaccines (mRNA/L2-based), and establish a national HPV surveillance and research platform to track impact and guide policy. Sequential implementation of these strategies-combining global best practices with culturally appropriate communication-would enhance equity, increase coverage, and move Thailand toward sustainable cervical cancer elimination.

Conclusion

Human papillomavirus remains a significant contributor to cervical and other cancers worldwide, and Thailand's efforts to address this burden through vaccination represent a critical step forward. Since the introduction of the HPV vaccine into the National Immunization Program in 2017, progress has been made, particularly through school-based delivery targeting Grade 5 girls. Evidence of reduced HPV prevalence among vaccinated cohorts demonstrates the program's effectiveness. However, persistent challenges-including uneven coverage between urban and rural areas, exclusion of boys and catch-up cohorts, and lingering misconceptions about vaccine safety and necessity-continue to hinder optimal uptake.

Global comparisons highlight those high-income countries such as Australia, the United Kingdom, and the United States have achieved substantial declines in HPV infections and precancerous lesions through gender-neutral vaccination policies, strong health infrastructure, and integrated screening programs. Southeast Asian neighbors, notably Malaysia, also demonstrate how political commitment can drive wider coverage, while the Philippines illustrates the risks of fragmented, pilot-only implementation. These lessons emphasize that Thailand must expand its policy scope, strengthen infrastructure, and invest in culturally sensitive communication strategies to combat vaccine hesitancy.

To accelerate progress toward the WHO's 90-70-90 elimination targets, Thailand should consider broadening eligibility to include boys and older adolescents, integrate vaccination more closely with screening programs, and prepare for the adoption of next-generation vaccines. With sustained commitment and adaptation of global best practices to the Thai context, the country has the potential not only to reduce the burden of cervical cancer but also to serve as a model for other middle-income nations in the region.

Recommendations

To strengthen Thailand's HPV vaccination strategy and accelerate progress toward the WHO's 90-70-90 cervical cancer elimination targets, four prioritized policy actions are recommended.

1. Expand vaccination coverage to boys and catch-up cohorts (High confidence). Evidence from high-income countries, including Australia and the United Kingdom, consistently demonstrates that gender-neutral vaccination accelerates herd immunity and significantly reduces HPV-related cancers in both sexes.^(3,5) Cost-effectiveness analyses from comparable middle-income settings show that expanding eligibility can be justified when integrated with existing school-based delivery systems.⁽¹⁰⁾ Such expansion would also align Thailand with global elimination frameworks and protect underserved male populations.

2. Strengthen rural vaccine delivery and logistical infrastructure (High confidence). Addressing the urban-rural disparity in vaccine access requires improved cold-chain capacity, expansion of mobile health units, and closer coordination between the Ministry of Public Health and local administrative organizations. Adopting the single-dose HPV vaccination strategy recommended by WHO (2024) could simplify logistics, reduce operational costs, and ensure stable coverage in remote areas. This measure offers a cost-effective means of expanding reach while minimizing dropout rates in multi-dose schedules.⁽¹⁷⁾

3. Integrate HPV vaccination with organized screening programs (Moderate confidence). The greatest long-term impact will come from combining primary prevention (vaccination) with secondary prevention (HPV DNA testing and Pap smears), particularly for women at ages 35 and 45, consistent with WHO guidelines.⁽⁵⁾ Thailand's current screening coverage remains below the 70% threshold, and linking immunization registries with national screening databases could improve follow-up and accelerate early detection of precancerous lesions.

4. Enhance communication and community engagement to build public trust (High confidence). Public misconceptions regarding vaccine safety and necessity remain key barriers to uptake.^(1,21)

Evidence from Denmark's experience with vaccine hesitancy underscores the importance of transparent, empathetic, and evidence-based risk communication.⁽²³⁻²⁴⁾ Thailand should empower healthcare providers, teachers, and community leaders as trusted messengers to normalize vaccination as a cancer prevention measure rather than a sexual health intervention. Sustained public engagement will ensure continued acceptance and program credibility.

In addition, Thailand should prepare for the long-term adoption of next-generation HPV vaccines, including mRNA- and L2-based formulations that offer broader cross-protection and simplified dosing schedules.⁽²⁷⁾ Regional collaboration with ASEAN countries on vaccine procurement could further enhance affordability and equitable access.

From an economic perspective, expansion of vaccination coverage is expected to yield net savings by reducing long-term cervical cancer treatment costs and productivity losses. Modeling studies in other middle-income settings suggest that a gender-neutral, school-based approach is cost-saving within 10-5 years of implementation, especially when combined with organized screening.^(5,10)

แนะนำการอ้างอิงสำหรับบทความนี้

ลิลลี่ ประทีป, กชกร คำสีแก้ว, มีนา กรสุธาทิพย์กุล, ทองรัตนา บงกชเกตุสกุล, สิริพร ชูเพชรสมบุญ. ความท้าทายและโอกาสในการให้วัคซีน HPV: บทวิเคราะห์จากประเทศไทยในบริบทระดับโลก. วารสารสถาบันป้องกันควบคุมโรคเขตเมือง. 2569;11(1):183-196.

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