



Evaluating HPV Vaccine Delivery Strategies in Vietnam



NATIONAL INSTITUTE OF
HYGIENE AND EPIDEMIOLOGY



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Acronyms

AEFI	adverse event following immunization
EPI	Expanded Programme on Immunization
HPV	human papillomavirus
IEC	information, education, and communication
KAP	knowledge, attitudes, and practices
NCHEC	National Center for Health Education and Communication
NEPI	National Expanded Programme on Immunization
NIHE	National Institute of Hygiene and Epidemiology
PMC	Preventive Medicine Center
TOT	training of trainers

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Executive summary

In Vietnam, the National Institute for Hygiene and Epidemiology (NIHE) and PATH are implementing a five-year project entitled HPV Vaccines: Evidence for Impact. The first phase of the project, “Formative research for informing the introduction of HPV vaccine in Vietnam,” was conducted from 2006 to 2007 to understand the critical issues that may affect vaccine delivery and a supportive environment for individual acceptance and understanding of HPV vaccines among key stakeholders. PATH and partners conducted the research in three representative regions in Vietnam, including the north, central, and south, to identify the critical factors for HPV vaccine introduction. The research findings indicated a supportive environment (from policymakers, health workers, and community members’ perspectives) for introduction of cervical cancer vaccine in Vietnam. Informed by these formative research findings, the second phase of the project was a two-year demonstration project to identify appropriate strategies for HPV vaccine delivery that could be integrated into the National Expanded Programme on Immunization (NEPI) in Vietnam. The demonstration project included the following three components:

- **Component 1: Information, education, and communication (IEC).** IEC activities provided knowledge on cervical cancer and prevention measures, including HPV vaccine, to groups within the communities in participating districts via various IEC channels.
- **Component 2: Immunization.** Two vaccine delivery strategies were implemented on a small scale within the current EPI system.
- **Component 3: Evaluation.** Qualitative and quantitative data were collected in midterm and final evaluations through assessment of coverage, acceptability, feasibility, and cost of the two vaccine delivery strategies in Vietnam.

This report summarizes results of both the implementation and research aspects of the three components listed above. Overall, results of surveys in 2009 and 2010 showed coverage was high in both vaccination strategies—one that used schools (strategy A) and one that used commune health centers (strategy B)—with very low drop-out rates after the first and second doses. In general, communities accepted the HPV vaccine, and the vaccine itself (e.g., effectiveness, duration of protection, long-term impact) was one of the most important factors in garnering acceptance. The project had a small impact on regular activities at commune health centers and schools, but no negative impact on transport and storage of other vaccines was seen after the addition of the HPV vaccine. Collaboration was key to project success, as well as trainings that provided knowledge and basic skills for staff involved in the HPV vaccination program. Despite the barrier to introduction that cost may present, further analysis on typical and incremental costs of HPV vaccination showed that the costs tend to approach cost norms of the NEPI.

Based on the findings and experience in implementing project, the following are principal lessons learned:

Lesson 1. Both school-based and commune health center-based strategies can achieve high vaccine coverage rates.

Lesson 2. A communication plan will enhance new vaccine acceptance through an informed decision-making process and will support response to any crisis situations involving unexpected or incorrect information.

Introduction

Cervical cancer is a preventable disease that affects an estimated 529,000 women each year and leads to more than 275,000 deaths.² Cervical cancer is largely a disease of poor women who have limited access to health services; about 88% of women who die from cervical cancer reside in developing countries.² If current global trends continue, by the year 2050, there will be more than one million new cases of cervical cancer each year.³

Human papillomavirus (HPV) is the primary cause of cervical cancer.* Two types of HPV, 16 and 18, account for 70% of cervical cancer cases, although some regional variations exist.⁴ Women are usually infected with HPV soon after initiation of sexual activity, often in adolescence. Most HPV infections spontaneously resolve. However, approximately 5% to 10% of women infected with tumor-causing HPV types develop persistent infections. These women have an increased risk of developing precancerous cervical lesions. If untreated, the lesions can progress to cancer over a period of years, with cervical cancer most common in women after age 40.

Currently, there are two HPV vaccines—Merck’s Gardasil® and GlaxoSmithKline’s Cervarix™. The two vaccines have been licensed in more than 100 countries, of which approximately one third has introduced the vaccines into their national health programs. Both vaccines have been proven at least 90% effective in preventing persistent genital infection with HPV types 16 and 18 in women who have no prior infection with those types and 100% effective in preventing moderate to severe cervical lesions caused by types 16 and 18. Recently released data have also illustrated some cross-protection with subtypes related to types 16 and 18, specifically subtypes 31 and 45.⁵

PATH’s HPV Vaccines: Evidence for Impact project in Vietnam aims to address several of the particular challenges likely to face HPV vaccination programs. The first phase of the project, “Formative research for informing the introduction of HPV vaccine in Vietnam,” was conducted from 2006 to 2007 to build our understanding of critical issues that may affect vaccine delivery and a supportive environment for individual acceptance and understanding among key stakeholders. We conducted the research in three representative regions of Vietnam, including the north, central, and south, to identify the critical factors for HPV vaccine introduction. The research findings indicated a supportive environment (from policymakers’, health workers’, and community members’ perspectives) for introducing cervical cancer vaccine in Vietnam.⁷

* Since audiences in Vietnam are more familiar with “cervical cancer vaccine” than “HPV vaccine,” the terms will be used interchangeably throughout this report.

Project description

Many countries with limited resources lack the infrastructure and systems needed to support effective secondary prevention services for the detection and treatment of precancerous lesions. Because of this, most cervical cancer cases are detected when the disease has advanced to a stage at which treatment becomes difficult or impossible, if treatment is available. In Vietnam, cervical cancer has traditionally not been considered a priority health issue for women. New and effective methods of screening and treatment are not yet widely accessible for women. In addition, women lack knowledge of the disease, and as a result, they do not have a good understanding of disease prevention. According to an assessment by the World Health Organization in 2007,[†] Vietnam had an official cervical cancer screening system, but it was limited in geographic scope and did not include population-based screening, as it was mostly opportunistic and based on diagnosing symptoms. Individual projects or studies have supported some provinces and cities to establish screening programs. Wide use of the HPV vaccine, along with increased knowledge on cervical cancer prevention, could lead to effective primary prevention of this disease.

The first cervical cancer vaccine was approved only in 2006, and therefore, data on delivery strategies (either through schools or commune health centers) in Vietnam to a population of young adolescent girls, not normally targeted by the routine immunization program are not yet available. Questions related to HPV vaccine introduction in a national program include issues related to health policy, health systems, school systems, current EPI capacity, and acceptance among the target population, the community, and policymakers, among others. Since many of these factors were unknown, the demonstration project tested new vaccine delivery strategies in a small, focused way to learn which aspects are important for effective national introduction. Therefore, the evaluation of different HPV vaccine delivery strategies in Vietnam was designed to generate specific scientific evidence on alternative vaccination delivery strategies, the capacity of the existing immunization system, implementation costs, and community acceptance of HPV vaccine, which will help provide policy makers with the necessary information for making decisions about whether and how to introduce HPV vaccine into the national immunization program.

Informed by the formative research findings, for the second phase of this project, we designed the two-year demonstration project to identify appropriate strategies for HPV vaccine delivery that can be integrated into the NEPI system in Vietnam. The project included the following three components:

- *Component 1: Information, education, and communication.* The National Center for Health Education and Communication (NCHEC) conducted IEC activities, which provided knowledge on cervical cancer and prevention measures, including HPV vaccine, to groups within the communities in participating districts via various IEC channels. IEC activities were implemented before and during vaccination sessions to encourage HPV vaccination for young girls in Grade 6, or 11 years of age.
- *Component 2: Immunization.* The National Expanded Program on Immunization (NEPI)/NIHE implemented vaccination using the two vaccine delivery strategies in the four selected districts. Each HPV vaccination strategy for girls in Grade 6 (school-based) or age 11 years (health center-based) was implemented in urban, rural, and mountainous regions. . HPV

[†] World Health Organization and Vietnam Ministry of Health. Đánh giá nhu cầu các chương trình phòng chống UTCTC tại Việt nam năm. Hanoi:2007.

vaccination activities included planning, creating a list of targeted girls, transporting and storing vaccines and supplies, organizing vaccination sessions, monitoring adverse events following immunization (AEFI), managing medical waste, providing supportive supervision and monitoring, and managing and analyzing data.

- *Component 3: Evaluation.* PATH, in collaboration with NIHE and NCHEC, conducted an evaluation of the project. The evaluation collected qualitative and quantitative data after the first round of vaccinations (midterm) and after the second round (final) to assess coverage, acceptability, feasibility, and cost of the two delivery strategies.

In consultation with NIHE and NEPI, two districts were selected in Thanh Hoa province (Nong Cong and Quan Hoa) and two districts in Can Tho city (Ninh Kieu and Binh Thuy) for vaccination. The selection was based on multiple criteria, including: cervical cancer disease burden, geography, socioeconomic status, EPI performance, population size, and staff capacities. The following sections present a description of the project design and implementation as well as findings from the evaluation.



Fully vaccinated girls during a focus group discussion in midterm evaluation.

Project design

Communication strategy

The formative research findings played a crucial role in structuring key elements of the communication plan, which the project used to sensitize and mobilize the community. NCHEC, in collaboration with NIHE, the National Institute of Cancer, and PATH, developed various IEC messages and materials on cervical cancer, HPV infections, and HPV vaccine. These documents also included instructions on conducting IEC activities for different populations. Communication experts developed several IEC materials including leaflets, posters, panels, and radio spots for communities, and a handbook for village health workers and teachers. Experts and community members reviewed and pre-tested the materials before finalization.

In addition to IEC materials, the project team designed and conducted a series of trainings to ensure project stakeholders (e.g., communicators, health providers, and school teachers) had adequate knowledge about HPV vaccine, cervical cancer, and communication skills. Four training curricula were developed: for training of trainers (TOT), health workers, teachers, and village health communicators. TOT courses were organized at the provincial level with an extension to selected participants from the district level. Following their training, these individuals became trainers for other groups (e.g., commune health workers, teachers, and village health communicators). During these trainings, the project team conducted supportive supervision to ensure the quality for trainers and participants.

Vaccination strategies

Based on input from the formative research and discussion with immunization experts, the project team designed two vaccine delivery strategies to test for suitability for Vietnam. Strategy A was implemented at schools for girls enrolled in Grade 6, with a “mop-up” session (active follow-up) later in the community. Strategy B was implemented in commune health centers for girls aged 11 years (Figure 1).

Prior to vaccination sessions, project staff conducted many activities to prepare stakeholders for the upcoming vaccination activities.

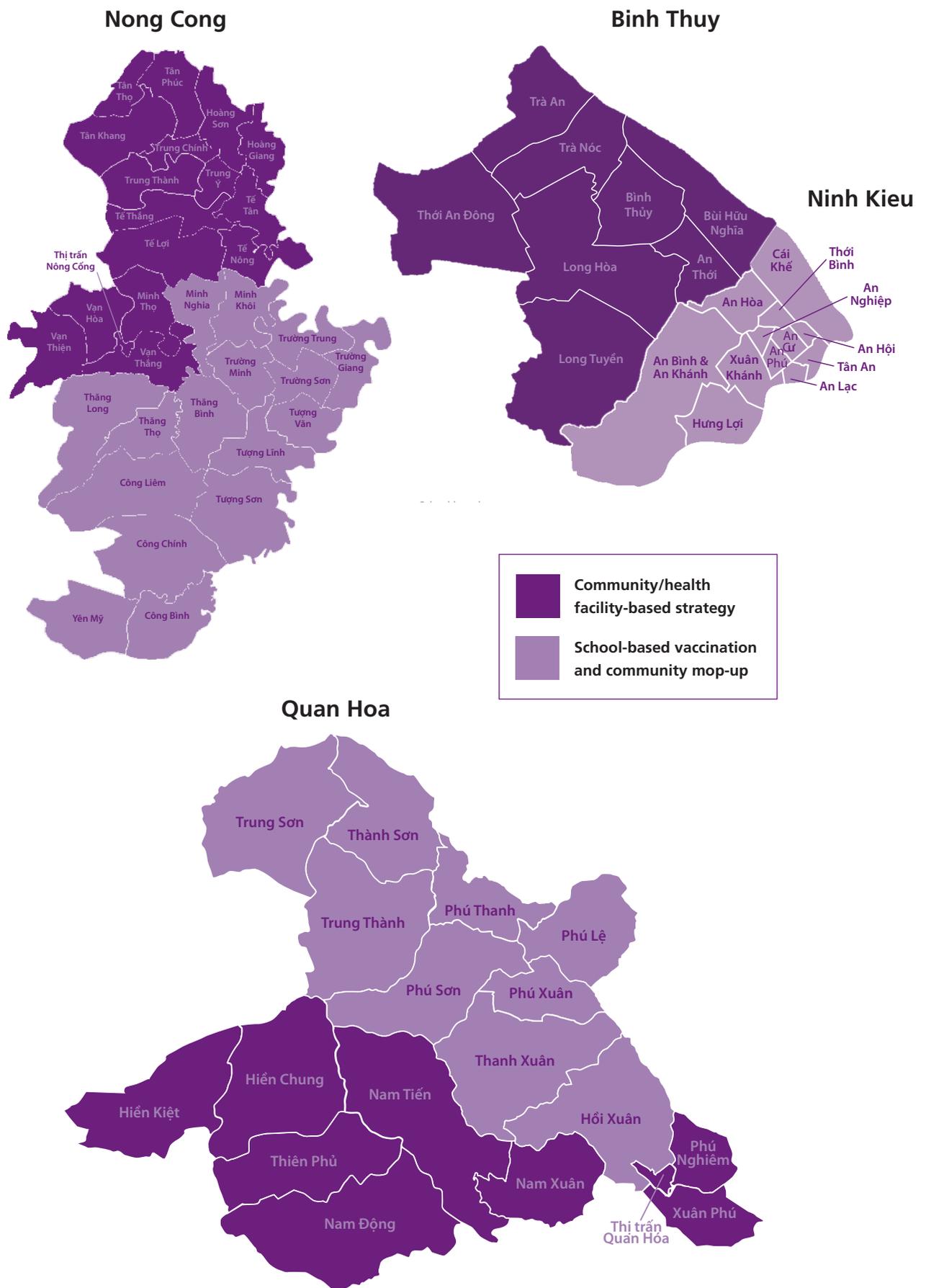
Planning workshop for HPV vaccination at provincial, district, and commune levels

NIHE and PATH organized a workshop for provincial and district staff in order to prepare for vaccination in the provinces. The district Preventive Medicine Centers (PMCs), in close collaboration with the provincial PMC and education departments, conducted planning sessions for staff involved in health care, immunization, and education in the communes. Then, commune health station staff organized meetings with representatives from the commune People’s Committees and Women’s and Youth Unions to plan for HPV vaccination.

Creation of lists of eligible girls for HPV vaccination

Eligibility for participation in HPV vaccination was different from routine vaccination because of the need to identify eligible girls for receipt of a limited supply of HPV vaccine. PATH and national and local partners developed tools for identifying eligible girls, while communes, village health workers, and teachers worked to complete the lists. Schools provided lists of all girls in Grade 6, and commune health workers were responsible for checking the lists with population books and other available sources to ensure the accuracy of the information.

Figure 1. Maps of demonstration project districts



Vaccine transport, storage, and logistics

During the course of the project, national regulations on vaccine transport were adhered to. The vaccine was licensed for use in Vietnam by the Ministry of Health. After licensure, the vaccine was shipped to Noi Bai International Airport. NIHE completed all administrative procedures for receiving the vaccine and initially stored the vaccine at their cold storage facility in Hanoi. The vaccine was then transported to regional, provincial, and district levels. EPI staff from the communes traveled to the districts to receive HPV vaccine for vaccination sessions. In total, there were two shipments of vaccine to Noi Bai International Airport and six shipments of vaccine from NIHE to project sites.

Supplies for vaccination such as syringes and safety boxes were procured in accordance with EPI regulations. EPI staff at all levels of the health care system were responsible for examining cold chain capacity. Their assessment informed the plan for distribution, transport, and storage of vaccine and/or other supplies to introduce the HPV vaccine. When cold chain capacity at the commune level was insufficient, the project provided a cold box.

Training for health workers and teachers

NEPI staff developed training curricula and tailored them for each target group. National trainers conducted TOTs for provincial and district staff, who then conducted trainings for commune health workers and teachers. NEPI staff also provided supportive supervision during trainings conducted by provincial and district trainers.

Organization of HPV vaccination sessions

HPV vaccination sessions were arranged separately from the scheduled monthly vaccination day for routine EPI vaccines. Prior to vaccination day, health workers checked the lists of subjects, vaccine and immunization materials, and task assignments for staff. Health workers were responsible for coordinating with schools and local authorities at project sites to prepare the vaccination locations. Each vaccination session was carried out in compliance with the assigned vaccine delivery strategy, and each vaccination site was required to have at least four health workers present, with two trained on HPV vaccination, per MOH regulations.‡

Monitoring and management of adverse events following immunization

Health workers who participated in HPV vaccination and emergency teams at district hospitals were trained on monitoring and management of AEFI in general and with HPV vaccination in particular.§ Resources for AEFI management were available at all vaccination sites, including trained health workers and an anaphylaxis kit. District PMCs and emergency departments were responsible for organizing emergency points and informing people about their locations.

Vaccination waste management

Health workers were trained on medical waste management according to Ministry of Health and NEPI regulations/guidelines. At the end of vaccination days, health workers collected and disposed of used syringes and other medical waste appropriately, overseen by trained supervisors.

‡ Decision No. 23/2008/QĐ-BYT on the regulations of using vaccine and biological sample in prevention and treatment. July 7, 2008.

§ Emergency teams at district hospitals in project sites were asked to be ready to address any serious AEFI.

Supportive supervision of HPV vaccination

Regular supportive supervision visits have been conducted to ensure that all project activities complied with project goals and MOH, NEP, and manufacturer regulations. Supportive supervision at the commune level focused on planning, preparation, and organizing for vaccination sessions, to identify solutions for possible challenges. After each visit, a review meeting was held at the district level to discuss the achievements and lesson learned of a given activity. Results of monitoring and supervision activities served as the basis for planning corrective activities, such as reviewing and revising materials for refresher trainings.

Monitoring and reporting

National/regional EPI staff developed a set of indicators (e.g., eligible girls, vaccinated girls, number of IEC materials distributed, number of training and participants), a database, and forms for periodic monitoring. Commune health workers were responsible for recording all data and regularly submitting reports to the district level.

Operational research to evaluate vaccine delivery

Operational research included four components: coverage, acceptability (including knowledge, attitudes, and practice, or KAP), feasibility, and implementation cost. Each component was designed to assess specific objectives and measure a wide range of indicators. The research team used a mix of quantitative and qualitative methods, such as questionnaires, key informant interviews, focus group discussions, and observation checklists. The target population for each research component varied by type and level and included parents, eligible girls, teachers, health workers, communicators, and community leaders. Table 1 presents more detailed information about the operational research components.

Although different methods were used, the findings from these components were designed to provide answers to a common set of research questions, including:

1. Coverage: what level of coverage (three doses of vaccine given on time to the eligible population) was achieved by each of the strategies?
2. Acceptability: what were the facilitating factors or barriers to individual, interpersonal, community, or institutional acceptance of HPV vaccination?
3. Feasibility: what were the facilitating factors or barriers to implementation of the HPV vaccination program?
4. Costs: what were the costs, both start-up and recurrent, incurred to implement each of the HPV vaccination strategies for a fully vaccinated girl?

Table 1. Study population, data collection methods, and sample size of four operational research components of the HPV vaccine project in Vietnam from 2008 to 2010

Component	Study population		Data collection methods		Sample size (in proposal design)	
	Year 1	Year 2	Year 1	Year 2	Year 1	Year 2
Coverage	Parents	Parents	Questionnaire	Questionnaire	780 parents	504 parents
Acceptability, including KAP	Parents	Parents	Questionnaire	Questionnaire	780 parents	504 parents
	Girls	Girls	FGDs	FGDs	780 girls	13 FGDs
	Community leaders		SSIs		40 FGDs	
	Health workers				120 SSIs	
	Teachers					
Feasibility	Health workers	Health workers	KIIs	KIIs	110 KIIs	22 FGDs
	Teachers	Teachers	Facility visit	FGD	12 facility visits	9 KIIs
		Trainers/ Trainees	Observation		30 observations	
Cost	Health workers	Health workers	Micro-costing techniques	Micro-costing techniques Stakeholders workshop	12 communes	12 communes

Abbreviations: FGD: focus group discussion; KI: key informant interview; SSI: semi-structured interview.

Results

HPV vaccine uptake

Program achievement

One of the project objectives was to estimate the HPV vaccination coverage for each delivery strategy of HPV vaccination. Data in Table 2 indicated that high coverage was reached with both strategies, and there was improvement in coverage in the second year. According to records at NEPI, coverage achieved in the school-based delivery strategy (strategy A) was 83.4% in the first year and 93.4% in the second year. The results from the commune health center-based delivery strategy (strategy B) were reported as 92.8% in the first year and 98.0% in the second year. In reviewing the district-level reported data from NEPI, Ninh Kieu was consistently the district with the lowest coverage; however, it is worth noting that coverage increased to nearly 90% in the second year.

Table 2. HPV vaccine coverage rates in years one and two from NIHE's 2010 report

Location	Year 2008-2009		Year 2009-2010	
	Total eligible girls	Coverage rate	Total eligible girls	Coverage rate
All sites	3919	87.0%	3095	95.2%
Strategy A	2412	83.4%	1890	93.4%
Strategy B	1507	92.8%	1205	98.0%
Thanh Hoa	1728	96.7%	1527	98.7%
Quan Hoa	368	97.6%	342	98.2%
Nong Cong	1360	96.5%	1185	98.8%
Can Tho	2191	79.4%	1568	91.8%
Ninh Kieu	1499	75.4%	1064	89.3%
Binh Thuy	692	88.2%	504	97.2%

A very low rate of AEFIs (a total of 64 reports out of 19,145 doses) was seen during the project, and most were mild, with symptoms such as headache, dizziness, and vomiting.

Coverage survey

The estimates of coverage measured by the household surveys after the first and second rounds of vaccination were similar to those reported by NEPI. Coverage achieved in strategy A (school-based delivery) was 83.0% in the first year and 96.1% in the second year. For strategy B (commune health center-based), coverage was 93.9% in the first year and 98.6% in the second year. Data are presented in Table 3.

Table 3. HPV vaccine coverage rates from the midterm and final surveys conducted in Vietnam in 2009 and 2010

Strategy	Midterm survey (2009)		Final survey (2010)	
	N	Coverage rate (95% CI*)	N	Coverage rate (95% CI*)
School-based (A)	500	83.0% (77.6–87.3)	285	96.1% (93.2–97.8)
Health center-based (B)	280	93.9% (88.2–97.1)	219	98.6% (95.7–99.6)
Total	780	86.9% (84.4–89.1)	504	97.2% (95.2–98.4)

*CI: confidence interval.

In the first year, the coverage achieved through delivery in health centers was higher than that attained in school-based vaccination. However, improvements in coverage between the first and second year for strategy A and B resulted in a similar level of coverage in second year.

The high levels of coverage achieved by both strategies in the second year means that very few eligible girls either did not receive any doses of vaccine or received only one or two (of the required three) doses.

The vaccination coverage was high in all study clusters, and all clusters were similar to each other, with the exception of the urban A cluster (Ninh Kieu). The survey data showed that the coverage in Ninh Kieu was significantly lower than in other clusters. This finding was also identified in the midterm survey; however, improvements made in Ninh Kieu facilitated an increase in vaccine coverage in the second year (from 75.4 to 89.3%).

HPV vaccine acceptability

Vaccine acceptability was assessed differently depending on the target group (policymakers, health workers, parents, eligible girls). Key research questions for the policymaker group were designed to understand the decision-making process of government at all levels toward integrating a new vaccine into a national health program. Health workers and teachers were asked if it is feasible and acceptable to include HPV vaccine in the health and education systems. For parents and girls, the study explored the reasons for vaccine acceptability, as well as the decision-making process for vaccination.

Reasons for vaccine acceptance: parents' and girls' perspectives

Three main reasons for vaccine acceptance were reported: risk perception and/or vaccine-related reasons, trust in government programs, and economic benefits (free vaccination).

Perception of risk and/or vaccine-related reasons

Perception of the risk of vaccination may positively or negatively influence vaccine acceptance (whether a girl is vaccinated). If people view the risk of getting a vaccine-preventable disease as important, it is more likely that they will have their child vaccinated. Findings from both the midterm and final household surveys confirmed this tendency. In the midterm survey, 79.0% of parents gave one of following reasons for having had a daughter vaccinated: “Believe that vaccine is good for health”; “Want the girl to be protected from cervical cancer or infection”; “Believe that prevention is good.” In the final survey, the number was 90.7%. Although parents were unclear about the link between the HPV infection and cervical cancer, the majority understood that cancer is a deadly disease.

Trust in government programs

The EPI system in Vietnam has a strong history, with nearly 30 years of recognized performance. This has contributed significantly to a reduction in the burden of vaccine-preventable diseases. It has also fostered a positive attitude in the population toward vaccination, building trust with the community by demonstrating the effectiveness of vaccination and prevention of disease through vaccines. In our research, participants implicitly viewed vaccination as a government-funded program and specifically referred to the EPI program. In general, they believed in these programs, since there exists in Vietnam a common perception that the “government cannot harm people’s health,” as heard from one participant from Thanh Hoa. If a program is believed to be government funded, it is more likely to garner community support.

Economic benefits

Although responses from parents and girls in all project sites mentioned free vaccines as one of the reasons for vaccination acceptance, there was slightly more focus on economic benefits in Nong Cong district in Thanh Hoa province. The responses also indicated that within the context of poverty in rural areas, the freely delivered HPV vaccine helped to increase the acceptability of the vaccine:

“For those who are living in the rural area like us, we are still very poor. When we were told that vaccination helped women to prevent diseases, we found that it was really helpful. In fact, in the rural area, we cannot afford to take a child or a family member to the hospital for health care services. So when we heard that information on the loudspeaker and even on television, we found it did bring benefits, and we took the girls to get vaccination.”

-Focus group discussion, parents of fully vaccinated girls, Trung Chinh, Nong Cong, Thanh Hoa

However, in the larger picture of vaccine acceptance, economic benefits were not key factors. Formative research in Vietnam found that even when people must pay for a vaccine, they are willing to get vaccinated as long as the price is affordable. Additionally, findings from our midterm and final surveys indicated that only a small proportion of respondents mentioned “free vaccine” as their reason for acceptance (11.4% in the midterm survey and 13.7% in the final survey).

Peer pressure and girls’ perspective

Other reasons for vaccination were mentioned, such as not witnessing adverse events with vaccinated girls in the first round. Parents’ decisions to have their girls vaccinated may also have been influenced by other people, such as health workers, teachers, or neighbors. For eligible girls, according to focus group discussions and interviews across geographic regions, there was little variation in reasons for vaccine acceptance. Most stated that the recognized effectiveness of the HPV vaccine in preventing cervical cancer were key factors in vaccine acceptance. This pattern was seen across all groups of girls. Other reasons for vaccine acceptance that were mentioned included: the vaccines were free of charge and eligible girls were unlikely to have a similar chance to access free HPV vaccine.

Reasons for vaccine acceptance: community leaders’, health workers’, and teachers’ perspectives

Community leaders declared their support during project implementation, which was considered by researchers as an indicator of vaccine acceptance. In general, at the commune level, an executive committee, including the commune health center as a permanent member, coordinated project activities. Leaders of the commune People’s Committees directed the operation of the executive committees, which were comprised of members from various sectors, such as education and Women’s Unions. This mechanism ensured that project activities were conducted smoothly. Group leaders highlighted HPV vaccination as a crucial component in improving women’s health. They also actively participated in community mobilization and vaccination days, including delivering speeches prior to vaccination sessions. These activities enhanced perception and acceptability of HPV vaccine in the communities and with leaders in other communes.

Health workers at all levels demonstrated their acceptance of the vaccine by their continuous participation in project activities, including not only vaccinating, but also planning, training, and communicating. Commune health workers’ perspectives are less likely to have an impact on health policy at the national level; however, their work can be used as a foundation for changes at a higher level. They played a very important role in creating the list of eligible girls and organizing and performing vaccinations. Similar to the community leaders, health workers emphasized the importance of the vaccine in preventing cervical cancer. Despite the increased workload of health workers due to the project, they were able to perform their regular work as well.

Teachers* also demonstrated their enthusiasm for vaccination and were effective collaborators with the health sector in a number of ways. They understood the role of HPV vaccination in improving girls’ health, and were able to enrich their knowledge and communication skills through project activities. In general, the HPV program was well received in schools, with active participation by teachers in making the lists of eligible girls and organizing meetings with parents. These actions were clear indicators of their acceptance of the HPV vaccination effort.

* In the project sites, school staff involved in the project were either health officers or teachers in biology. For the purpose of this document, they are referred to as teachers.



Fully vaccinated girls during a focus group discussion in midterm evaluation.

Reasons for non-acceptance

Non-acceptance refers to vaccine refusal or failure to complete the three doses, which happened for several reasons. Although the coverage surveys showed a high vaccine coverage in both strategies, some parents hesitated to have their daughters vaccinated. In the midterm coverage survey, 17.0% of girls in strategy A and 6.1% in strategy B refused full vaccination; however, this was reduced to low levels in the final evaluation—3.9% and 1.4% for strategies A and B, respectively. Ninh Kieu district had the highest number of girls whose parents refused vaccination. Similar patterns for non-acceptance of vaccination (vaccine refusal and failure to complete the series) were found in the qualitative research and surveys, highlighting the following key factors:

- Vaccine-related reasons include concern about side effects, safety, effectiveness, potential effect on girls' health and fertility, and the fact that the vaccine is new. Findings showed that fear of vaccine-related side effects constituted one of the major reasons for HPV vaccine refusal. Side effects in this case may include unexpected impact on girls' health and fertility, as well as worries about the safety of a new vaccine.
- The evaluation also revealed that mothers' suspicion/misinformation/misconceptions led to refusal of vaccination. This behavior generally derived from their misconception or suspicion of the program. For example, in Thanh Hoa, people were proud of their participation in the project; while in Can Tho, respondents indicated their suspicion about the quality of a free vaccine when in fact it is very expensive.

- Participants also emphasized duration of HPV vaccine protection and the appropriate age for HPV vaccination as important reasons for refusal. They believed that HPV vaccine is effective for only five years and then requires additional doses. Based on this misinformation, they believed it was unnecessary to administer HPV vaccine at an early age (e.g., 11 years old), and that it would be better to wait until girls were older (i.e., high school age), closer to the time when they start their sexual life.
- Inaccessibility of vaccination sites for participants was another reason for non-acceptance. In Thanh Hoa, most parents of non- or partially vaccinated girls expressed their willingness to join the program; however, they were not able to make it due to unexpected circumstances (e.g., a health problem on vaccination day, which prevented them from visiting the vaccination site). Additionally, some girls were absent or no longer lived in the project areas by the time of vaccination day.

Community sensitization and mobilization

Program implementation

IEC activities were implemented to increase knowledge among local communities and to mobilize community support. The messages were delivered before and during HPV vaccination sessions through a wide range of communication channels, including mass media, group meetings and discussions, direct communication by communicators, counseling, school and health facility events, and leaflets. Table 4 presents information on communication channels and message content used in the project.

Table 4. Forms and content of IEC in the HPV vaccine demonstration project in Vietnam from 2008 to 2010

Communication forms	Communication content
Indirect communication using local radio, billboards, posters, and leaflets.	Basic knowledge of cervical cancer.
Direct communication in schools, including talk shows, meetings with targeted girls, and meetings with parents.	Causes of cervical cancer and the relationship between HPV and cervical cancer.
Direct communication in the community, including home visits.	Specific and non-specific preventive measures.
Communication campaign prior to vaccination sessions.	HPV vaccines, including features, vaccination schedule, vaccination targets, and potential side effects.
Counseling in schools and commune health stations.	

The communications team developed and distributed more than 20,000 IEC materials on cervical cancer, HPV, and prevention through vaccination, including leaflets for parents and girls, communication booklets, question and answer booklets, billboards, posters, and banners. Communicators, teachers, and commune health workers were trained on communication skills. The project regularly broadcast messages through the loudspeaker system before and during vaccination days. Additionally, teachers, health workers, and communicators organized many meetings with parents and girls at schools and in villages. Staff from IEC centers (at the national and provincial levels) and district PMCs conducted hundreds of supportive supervision visits for IEC activities in all communes to provide timely modifications.

Information received

Communication activities included both direct and mass communication. Findings from the final evaluation showed that most participants confirmed their exposure to at least one

of the project's communication activities. In strategy A, the participants were exposed to the following forms of communication: leaflets (75.8%), posters (81.8%), banners (73.3%), loudspeaker announcements (65.5%), commune health workers (63.9%), and teachers (80.7%). For strategy B, the pattern was similar; however, the frequency was higher than in strategy A: leaflets (83.6%), posters (87.2%), banners (85.4%), loudspeaker announcements (87.2%), commune health workers (70.8%), and teachers (66.8%).

From the focus group discussions, findings showed that girls received consistent key messages on HPV vaccine. Girls in all regions knew that vaccination helps to prevent cervical cancer. However, girls in rural regions (Nong Cong district) and mountainous regions (Quan Hoa district) knew more about the vaccination program, including topics such as eating well before vaccination, the vaccination schedule, eligible groups, and side effects of the vaccine. Parents received different information than girls, and this information varied by geographic area. Parents in the mountainous and rural regions received consistent information, which was mainly related to eligible age, preparation before/after vaccination, and price of the vaccine in the market. Parents in the urban regions received similarly consistent information about the project as those in the mountainous and rural areas. However, there were more frequent reports of rumors, circulated by newspaper articles and internet sources, related to vaccine side effects, effectiveness and cost of the vaccine in the private market.

Key messages and preferred communication channels

Although comprehensive information on the program and HPV vaccine was provided to communities, when asked about it during various focus group discussions, people listed only the information they could remember and what they were most concerned about. In making a decision, people rely on select information that is judged to be important to them. Identifying key points in communication messages and suitable communication channels to convey those messages would help to enhance vaccine acceptability. Table 5 presents the key communication messages retained by participants across geographic regions. Based on observations from FGDs, people in urban regions tend to collect more information prior to decision-making than those in rural and mountainous regions, which highlights the need to tailor communication channels to suit each region.

Table 5. Key messages for target groups

	Mountainous	Rural	Urban
Fully vaccinated girls	<ul style="list-style-type: none"> Number of doses. Effect of vaccine. Side effects. Preparation before vaccination. Cervical cancer in Vietnam. 	<ul style="list-style-type: none"> Vaccination schedule and targeted groups. Number of doses. Preparation before and after vaccination. Cervical cancer in Vietnam. 	<ul style="list-style-type: none"> Effect of vaccine. Cervical cancer in Vietnam.
Parents of fully vaccinated girls	<ul style="list-style-type: none"> Free vaccine. Preparation before and after vaccination. Targeted groups. Number of doses. 	<ul style="list-style-type: none"> Free vaccine. Targeted groups. Effect of vaccine. Preparation before vaccination. 	<ul style="list-style-type: none"> Implementers. Expert advice. Dealing with rumors. Other project activities. Effect of vaccine. Side effects.

In the qualitative study, participants were asked to list the most important messages to them that they received from IEC activities under project. Most girls said the most important information to them was related to HPV vaccine and cervical cancer. Girls in mountainous regions mentioned a detailed list of key messages, including pre- and post-vaccination activities, time between doses, etc. Meanwhile, girls in rural and urban regions listed general information such as cervical cancer and vaccination.

Regarding the most helpful channel, quantitative data showed that the parents' choices were clustered around four channels: commune health workers (28.7%), teachers (19.1%), loudspeaker announcements (17.0%), and leaflets (12.3%). However, from qualitative data, people in Can Tho city preferred "official" communication channels, like television, while Thanh Hoa province preferred local communication channels, direct communication, or communication with visual aids.

Remaining concerns about HPV vaccine

During focus group discussions and interviews in both the midterm and final evaluations, parents in all three regions were most interested in the possible long-term positive and negative impact of HPV vaccine (e.g. duration of protection, fertility). Additionally, some mothers in Can Tho mentioned the ability of the vaccine to prevent other types of HPV, since the current vaccines are effective only against 2 HPV types (see Table 6).

Table 6. List of parents' concerns about HPV vaccine gathered during focus group discussions and interviews across midterm and final evaluations

	Midterm evaluation	Final evaluation
Long-term impact of HPV vaccine	x	x
Duration of immunity	x	x
Project-related information	x	
New vaccine and its safety	x	
Prevention of other HPV types		x
Vaccination for young girls		x
Vaccine trial	x	

In comparison with findings from the midterm evaluation, there were considerable changes in the concerns parents expressed in the final evaluation. Concern remained in year two about the impact of HPV vaccine on fertility; however, it was less than the concern shown in the midterm evaluation. In the final evaluation, there was no concern about the safety of the vaccine. However, there were two new concerns raised: the potential impact of vaccination on health status of young girls and the ability of the vaccine to prevent other HPV types.

Feasibility of HPV vaccine introduction

Readiness of the health system

HPV vaccine introduction had a clear impact on personnel and regular activities of commune health centers, including:

- Lack of personnel on vaccination day (noted in both years). To address this challenge many commune health centers, in both strategies, mobilized additional personnel from commune mass organizations or health staff from districts and provinces, a common practice for community activities at the local level.



Information and counseling session prior to vaccination session.

- Increased workload for health staff (midterm evaluation). Participants argued that introduction of a new vaccine usually requires an important investment in communication activities and training, when local officials already participate in many other national health programs, which leads to significant changes in the workload of health staff. Additionally, during vaccination sessions, standard procedures and the process of immunization were followed according to project guidelines, which required more staff in comparison to other immunization days. The project also required more supervision, which placed a greater burden of work on health staff in provinces and districts.
- The effect of HPV vaccine introduction on regular activities of commune health centers. Findings from the second year evaluation showed that in Nong Cong and Quan Hoa, HPV vaccination had no significant impact on regular operation of the commune health center. Meanwhile, participants in Can Tho reported a clearer impact of HPV vaccine introduction on regular activities of the commune health center, such as reduced services for health checks and treatment during the vaccination session.

Although they recognized the impact of HPV vaccination, they also highlighted the ability to mitigate and control it. Based on observations from supervisory visits during vaccination sessions, it appeared the impact was minor since most vaccination sessions took only half a working day, with one session per vaccine dose required. In many locations they took less, while in one exceptional case (in Ninh Kieu only), the session extended to a second half day. In addition, even when the regular activities of the commune health centers were disturbed, they were able to maintain at least emergency services.



Example of information, education, and communication materials for eligible girls.

Observation also noted very positive reactions from health workers at all levels regarding cold chain capacity and vaccine transport. In general, vaccines are vertically transported along the administrative levels from the province to the district by specialized car and/or cold boxes, and from the district to the commune by motorcycle and vaccine boxes. Health workers greatly appreciated that the transport and storage procedures for HPV vaccines followed usual MOH guidance. At the provincial level, the cold chain is equipped with sufficient capacity in terms of storing and transporting vaccine to lower administrative levels. Communes often receive vaccines at the time of the monthly staff meeting, then transport and store them at the commune. After the vaccination campaign, remaining vaccines can be kept in commune health centers and returned to the district at the next monthly staff meeting. For the HPV vaccine, the district carefully checked vaccine transport and storage. In some locations, mainly in Quan Hoa district, Thanh Hoa province, district staff brought vaccines themselves or accompanied commune staff transporting vaccines from districts to communes. This is not common practice compared to other routine vaccines; however, staff wanted to ensure safe transport given the cost of the vaccine. They also noted that the presence of health workers at the district level could provide commune-level health workers with more confidence, particularly in treating AEFIs, if any were observed.

Impact on schools

Findings from both the midterm and final evaluations showed that the impact of HPV vaccination on school activities varied by strategy. In strategy A, the involvement of schools was more intensive than in strategy B, because vaccination took place in the schools. The most frequently cited impacts included the following:

- *Learning activities* of pupils were affected the most when vaccination was organized on work days (regardless of the vaccination strategy). In general, pupils needed 45 minutes to complete the vaccination process.
- *Regular school activities* were affected on vaccination days. Due to the shortage of physical space, many schools mobilized meeting rooms and libraries for vaccination, significantly disrupting activities in these sections on those few days.
- *Teacher's workload* increased, notably for those who were directly involved in the project.

Participants, however, described these impacts as minor and able to be accommodated, especially as they occurred just three times in the school year. In general, in the vaccination session, the responsible teacher invited students to come during their 'less important lesson' in the schedule. Many schools organized vaccination sessions outside of usual school hours. Teachers also confirmed that their increased workload was acceptable when considering the benefit of the vaccine. In addition, the health sector gained a good collaborator in the education sector; personnel accepted an increased workload to accomplish the goal of vaccinating eligible girls and improving their health.

Partnership for vaccine delivery implementation

Various partnerships throughout the project allowed for successful implementation. Collaborations between the health and education sectors, local authorities, PATH, and other national partners are highlighted below.

Findings from both the midterm and final evaluations showed that the *health and education* sectors closely collaborated at all levels, from provincial to commune, to various degrees. At the provincial level, the collaboration between the two sectors focused more on broader issues, such as policies to facilitate vaccination at the lower levels. In that case, the health sector played a key implementation role, while the education sector provided support. At the lower levels, collaboration between the two was evident in efforts to create a favorable environment for vaccination.

Regarding the *participation of other stakeholders*, evaluation findings showed active participation of local authorities and other departments. People's Committee leaders not only mobilized the participation of other organizations, but also directly launched the first dose of the HPV vaccine and actively supervised and encouraged vaccination during the vaccination days. The participation of local authorities in coordinating vaccination activities was crucial. Under the direction of local authorities, many other organizations, such as cultural and information departments, commune health centers, Women's Unions, and Youth Unions also participated in the vaccination effort.

Collaboration between PATH and partners changed substantially during the course of the project. For advocacy and communication activities, PATH played an active role in coordinating and mobilizing partners' participation. An obvious improvement compared to year one was the timely response from NIHE to incorrect information about the vaccine or the project.

Training

Data from the training evaluation showed that most participants agreed that training content was relevant to the objectives of each training session and also relevant to the knowledge and experience of the trainees. The participants felt that the content was concise, clear, and arranged in a logical way to make it easy to understand.

As indicated in the teaching plan, various training methods were used, including presentations, demonstrations, group discussions, role-plays, and games. All respondents, both trainers and trainees, highly appreciated the training methods used in the training courses, since they promoted two-way communication and interaction between trainers and participants. Some trainers and trainees who were teachers recognized the sequence of applying these methods as a strong point of the teaching methodology.

Feedback from respondents after each training session was generally positive. For example, most participants thought that the layout was clear, with systematic numbering and bullets that helped readers to understand and remember the content. More than 80% of the respondents agreed that no adaptation is needed for the learning materials and there is no need for additional learning materials. However, some respondents noted small font size and poor print quality of the materials, and requested the addition of more pictures in the presentations.

Through group discussions and interviews, the impact of training was seen in the various targeted groups, including health staff, IEC motivators, local leaders, and community members, as seen in the training evaluations within the feasibility study. The trainings strengthened the capacity of health staff at various levels, from the provincial to the commune level, on different issues such as:

- Vaccination skills.
- Planning and monitoring activities.
- Communication skills.

Cost

The results are presented as three related unit cost indicators, described below.

- The project incremental economic cost per dose of HPV vaccine delivered and per fully immunized girl. This indicator captures the cost associated with reaching the coverage levels measured in the second year of the HPV vaccine demonstration project.
- The national incremental economic cost per dose per girl fully immunized under a scenario of introducing the HPV vaccine as part of Vietnam's routine vaccination program (rather than in a small-scale demonstration project). This indicator can provide an estimate for the national immunization program that reflects likely overall resource use related to HPV vaccination if it were integrated into Vietnam's national immunization program.
- The national incremental financial outlay per dose and per girl fully immunized under a scenario where the HPV vaccine would be integrated into the expanded program on immunization (EPI). This indicator provides an estimate of the expected budgetary outlay needed to scale up HPV vaccination at a national level.

The economic incremental cost includes the opportunity cost of all resources used to vaccinate girls with the HPV vaccine, including all personnel and depreciation costs. The financial outlay estimate excludes all capital depreciation costs for vehicles and cold chain and excludes health worker salaries at all levels and assumes that current human resource and vaccine supply chain capacity are sufficient for introducing a new vaccine into the national immunization system.

Incremental economic cost at project scale per dose and per fully immunized girl and per geographical region

Tables 7 and 8 summarize the incremental economic cost per dose and by fully immunized girl associated with reaching the estimated coverage levels in the second year of the HPV vaccination project. The total delivery cost per dose was lowest in the urban areas and highest in the mountainous settings, ranging from an average of US\$5.27 to US\$7.98 for strategy A (the school-based strategy) and US\$5.45 to US\$8.02 for strategy B (the health facility-based strategy). The cost per dose to reach girls in the mountainous areas was 50% higher than the cost of reaching girls in urban areas. The average delivery cost per fully immunized girl ranged from around US\$16.00 per fully immunized girl in urban areas to almost US\$24.00 in mountainous areas. In general, the data did not reveal any clear difference in cost between strategy A and strategy B.

Table 7. Incremental economic cost at project scale per dose by strategy and geographic region, 2010 (US\$)

	Urban		Rural		Mountainous	
	Strategy A	Strategy B	Strategy A	Strategy B	Strategy A	Strategy B
Start-up cost per dose	1.35	1.58	1.84	1.74	2.68	2.71
Implementation cost per dose	3.91	3.87	4.35	4.20	5.29	5.31
Total cost per dose	5.27	5.45	6.19	5.94	7.98	8.02

Table 8. Total delivery cost at project scale per fully vaccinated girl by strategy and geographic region, 2010 (US\$)

	US\$ (2010)		
	Urban	Rural	Mountainous
Strategy A	15.81	18.56	23.93
Strategy B	16.36	17.81	24.06

Table 9 provides a description of the cost profile for HPV program costs by geographical region. A cost profile provides information on how resources are used to support different aspects of the HPV vaccination program. The costs associated with start-up activities, including planning and preparation, IEC activities, and training and consultation, comprised approximately 30% of total program cost, depending on the geographic region. Start-up costs

Table 9. Cost profile at project scale by activity, strategy, and geographic region, 2010

Activity	Urban		Rural		Mountainous	
	Strategy A	Strategy B	Strategy A	Strategy B	Strategy A	Strategy B
Planning and preparation	5%	6%	5%	5%	4%	5%
IEC activities	12%	13%	11%	11%	10%	9%
Training and consultation	9%	11%	13%	14%	20%	20%
Subtotal start-up costs	26%	29%	30%	29%	34%	34%
Personnel	51%	49%	46%	47%	46%	47%
Vaccination supplies	2%	1%	1%	1%	1%	1%
Cold chain storage	1%	1%	1%	1%	1%	0%
Transport	3%	3%	5%	5%	4%	4%
Other implementation costs	18%	18%	17%	17%	14%	13%
Subtotal implementation costs	74%	71%	70%	71%	66%	66%

were highest in the mountainous region, at 34%, where training and consultations accounted for almost 20% of total costs. For example, training costs were higher in Thanh Hoa province, which is both rural and mountainous, compared to Can Tho province, which is an urban area. Personnel costs comprised the largest share of implementation costs, at around 50% across both strategies and all regions. Vaccine supplies and supply chain logistics, such as cold chain, vehicles, and transport accounted for 7% or less across both strategies and all regions.

Incremental economic cost per dose and cost per fully vaccinated girl for HPV vaccine integrated into a typical EPI system, by strategy and geographic area

To address government questions about costs for HPV introduction into the current EPI system, the incremental costs of a more typical scenario of introducing the HPV vaccine as part of Vietnam’s routine vaccination program were estimated. Information was collected on likely resource use of HPV vaccination if it were integrated into Vietnam’s national immunization program. These results reflect the necessary activities and inputs that the government would support for HPV vaccine introduction in the future at national scale, using current available human resources, infrastructure and equipment of the EPI system, as obtained from interviews with EPI staff at all levels (national, regional, provincial, district and commune). The incremental cost estimates were then adjusted for a more typical scenario by excluding costs associated with activities done specifically to support the HPV demonstration project.

Tables 10 and 11 show the incremental economic cost at national scale per dose and the cost per fully immunized girl for a scenario in which HPV vaccine is introduced and implemented as part of national immunization services. The average delivery cost per dose would range from US\$1.49 to US\$3.59 for strategy A (the school-based strategy), depending on the geographic region. The average cost per dose would be slightly lower in strategy B (the health facility-based strategy), ranging from US\$1.39 to US\$3.42, depending on the geographic region. The mountainous region would have both higher start-up and recurrent implementation costs compared to rural and urban areas in both strategies. The start-up costs per dose would be around US\$0.90 in strategies A and B in urban areas; US\$1.26 and US\$1.17 in strategies A and B, respectively, in rural areas; and around US\$3.59 and US\$3.42 in strategies A and B, respectively, in mountainous regions. In rural areas, the recurrent implementation cost per dose would be less than US\$1.00 per dose in both strategies. In urban areas, the recurrent implementation cost would be less than US\$0.60 per dose in strategy A and less than

Table 10. Delivery cost at national scale per dose for a typical scenario of introducing HPV vaccine as part of Vietnam’s routine vaccination program, by strategy and geographic region, 2010 (US\$)

Activities	Urban		Rural		Mountainous	
	Strategy A	Strategy B	Strategy A	Strategy B	Strategy A	Strategy B
Start-up costs	0.92 (62%)	0.95 (68%)	1.26 (57%)	1.17 (59%)	1.76 (49%)	1.79 (52%)
Implementation costs	0.57 (38%)	0.44 (32%)	0.94 (43%)	0.81 (41%)	1.84 (51%)	1.64 (48%)
Total cost per dose	1.49	1.39	2.19	1.99	3.59	3.42

Note: figure in parenthesis is the share of out of total cost per dose.

Table 11. Total delivery cost at national scale per fully immunized girl for a typical scenario of introducing the HPV vaccine as part of Vietnam’s routine vaccination program, by strategy and geographic region, 2010 (US\$)

	US\$ (2010)		
	Urban	Rural	Mountainous
Strategy A	4.47	6.57	10.78
Strategy B	4.17	5.96	10.26

US\$0.45 per dose in strategy B. In urban areas, the cost per fully immunized girl would be approximately US\$4.00 to US\$4.50. The cost per fully immunized girl would be approximately US\$6.00 in rural areas and approximately US\$10.00 in mountainous areas.

With regard to the cost profile, start-up costs in a more typical program would comprise the largest share of the total cost per dose, at approximately 50% to 70% depending on the region, since there is an overall reduction in the total cost per dose due to a reduction in the personnel cost per dose. The share of personnel costs in a more typical scenario would decline to around 18% to 37%, depending on the strategy and geographic region. When focusing only on implementation costs (excluding start-up costs), personnel would comprise the largest share, at around 60% in urban regions, 65% in rural regions, and more than 70% in mountainous regions. The share of transport and cold chain costs as a percentage of implementation costs would be around 13%, 12%, and approximately 6% to 8% in urban, rural, and mountainous regions, respectively.

Financial costs at national scale of introducing HPV vaccination into the NEPI, by strategy and geographic area

These results represent an estimate of the incremental financial outlay that may be required to scale up the program; they reflect the economic incremental cost per dose, but without capital depreciation costs for vehicles and cold chain and without health worker salaries at all levels. As shown in Table 12, the financial cost per dose of HPV vaccine would be approximately US\$1.20 in urban areas, regardless of strategy. It would be slightly higher for rural areas, where the cost per dose for strategy A would be approximately US\$1.76 and the cost per dose for strategy B would be slightly lower, at approximately US\$1.65. In the mountainous region, the cost of introducing the HPV vaccine would be around US\$2.60 per dose for both strategy A and strategy B. Focusing on the incremental recurrent cost to the government, the cost per dose would be US\$0.27 for strategy A and US\$0.22 for strategy B in urban areas. In rural areas, the cost per dose would increase to US\$0.50 for strategy A and US\$0.47 for strategy B. In mountainous areas, the delivery cost per dose would be about three times higher than in rural flat areas. The cost per dose for start-up activities would range from around US\$0.90 in urban areas to approximately US\$1.75 in mountainous areas. Table 13 summarizes the total financial cost per fully immunized girl, which would range from around US\$3.50 in urban areas to approximately US\$8.00 in mountainous areas.

Table 12. Incremental financial cost at national scale per dose, by strategy and geographic region, 2010 (US\$)

	Urban		Rural		Mountainous	
	Strategy A	Strategy B	Strategy A	Strategy B	Strategy A	Strategy B
Start-up cost per dose	0.92	0.95	1.26	1.17	1.76	1.79
Implementation cost per dose	0.27	0.22	0.51	0.47	0.85	0.78
Total cost per dose	1.20	1.17	1.76	1.65	2.61	2.56

Table 13. Total incremental financial cost at national scale per fully immunized girl, by strategy and geographic region, 2010 (US\$)

	US\$ (2010)		
	Urban	Rural	Mountainous
Strategy A	3.59	5.28	7.82
Strategy B	3.51	4.94	7.68

As expected, with the introduction of a new vaccine into an existing national immunization program, the largest share of the total cost is the start-up costs, accounting for approximately 70% to 80% of the total cost per dose. The share of total financial cost to personnel would decline to less than 10% in urban and rural areas and around 15% in mountainous regions, reflecting the exclusion of salaries in the financial cost per dose estimates.

In comparison to the cost per dose of other vaccines in EPI system in Vietnam, the total incremental program cost per dose is higher. However, when the recurrent delivery unit cost per dose (without start-up costs) is considered, especially for the urban and rural areas (Table 10), the cost per dose is more in line with the average delivery cost per dose (US\$0.7) reported in another study in Vietnam.⁶

Lessons learned and recommendations

The HPV vaccine project demonstrated that high coverage could be achieved by either delivering vaccine through a school-based program (strategy A) or through commune health centers (strategy B), although higher coverage was observed in strategy B during the first year. Coverage as measured by survey was similar to that collected through the routine health information system, which suggests accurate recordkeeping in the routine system. The findings showed a very low drop-out rate for the first and second doses (less than 1%).

Direct communication, according to evaluation results, was preferred by many people because of its interactive nature. However, using direct communication at the national level would be very costly. Information may reach a larger coverage when using multiple mass media channels, because (1) mass media covers a wide range of audiences, and (2) people appreciate information from mass media channels and consider them reliable sources. Findings also showed communication at lower levels played an important role in clarifying people's concerns related to HPV vaccine and the project.

The high HPV vaccine coverage, as well as generally positive attitudes toward the vaccine in communities, demonstrates the level of acceptance seen for the vaccine. The evaluation results confirmed that vaccine acceptance was influenced by multiple factors, notably those directly related to the vaccine itself. However, parents' acceptance may also be influenced by other parents' decisions to have their daughters vaccinated or by speaking with trusted persons in the community, such as health workers and teachers. Despite the general level of acceptance seen in this project, concerns about effectiveness and overall quality of the vaccine still persist. These concerns will need to be addressed when introducing this vaccine in new communities.

The project negatively impacted regular activities at commune health centers and schools in minor ways. For commune health centers, the effects mainly occurred during preparation and implementation of the first dose, due to time and effort spent on preparation (e.g., training, planning, identifying eligible girls, and communication). However, health workers at the commune level consistently noted that this impact was acceptable and under control. Support from local authorities and smooth, cross-sector collaboration were key factors in mitigating negative impacts. The project reinforced existing collaboration between the health and education sectors. Transport and storage of other vaccines were not affected by the addition of HPV vaccine, and it is anticipated that this will not change if HPV vaccination is scaled up as part of the national EPI. The primary reason is the cold chain system is adequate and functions well. However, long-term program planning should take into account the fact of unstable electricity and poor infrastructure, which is a common problem in mountainous areas of Vietnam.



A girl being vaccinated with HPV vaccine in a commune health center.

Project trainings provided knowledge and basic skills for staff involved in the HPV vaccination program, and training sessions achieved their objectives. The content of the trainings was considered useful and necessary for the planning and implementation of immunization and communication activities at various levels.

In general, start-up costs comprised the largest share of incremental unit costs in both the economic and financial analyses. These costs were incurred primarily in the first year and declined in the second. It is expected that start-up costs will be an important investment but will be limited in duration to about two years. While there were no clear differences in actual incremental program costs per dose between the vaccine delivery strategies as part of the HPV vaccination project, small differences in unit costs between strategies are expected to occur for the scenarios of typical use at national scale. The estimated cost per dose for school-based strategy A would be slightly higher than the cost per dose for health facility-based strategy B in all geographic areas. The differences in incremental costs across geographic regions reflected the remote locations of the mountainous regions and lack of economy of scale to efficiently deliver the vaccine at a lower unit cost.

Based on the above findings, summarized below are key lessons learned and suggested recommendations for future HPV vaccine implementation.

Lesson 1. Both school-based and commune health center-based strategies can achieve high vaccine coverage.

Both administrative and survey data showed a relatively high vaccine coverage that substantially increased in the second year. Among others, one key factor contributed to this achievement: the work was conducted by a capable system (NEPI) that was fully equipped (with personnel, technical expertise, cold chain, and materials) to perform this assignment,



Parents of fully vaccinated girls during a focus group discussion in final evaluation.

and with NEPI staff present in all communes throughout Vietnam. That will allow a smooth operation from national level downward of any new government-funded vaccination program. NEPI has nearly 30 years of experience in immunization in communities and schools. Other vaccination program in schools demonstrated not only their expertise, but also the willingness of the education sector to collaborate.

Recommendation: Since both strategies are feasible and can yield potentially high coverage rates, the choice of strategy can be based on factors such as local context and number of eligible girls to optimize the use of available resources.

Lesson 2. A communication plan will enhance new vaccine acceptance through an informed decision-making process and will support response to any crisis situations involving unexpected or incorrect information.

IEC activities are key to raising awareness and promoting healthy behavior. From the HPV vaccine project experience, it appears that an adequate communication plan enhances community acceptance of a given new health service. The communication messages and channels need to be tailored to specific audiences and reflect regional differences (e.g., different preferences for communication channels or messages). This approach will allow maximum reach to various audiences. Plans for responding to resistance or incorrect information are also needed to make sure all emerging issues will be adequately addressed.

Recommendation: During new vaccine introduction, it is important to develop a comprehensive communication strategy, including a crisis communication plan to address unexpected or incorrect information.

Recommendation: Communication messages and channels need to be tailored to specific conditions, including geographic regions and audience segment. Based on project findings, it is recommended that mass media be used in urban settings while direct/interactive communication should be used more broadly in rural and mountainous areas.

Lesson 3. Strong partnership leads to effective implementation.

The HPV vaccine project in Vietnam demonstrated the value of effective collaboration between health and other sectors. With interconnected systems, collaboration is key to achieving program success. In addition to a long-term partnership between health and education sectors in a broader health program, participation from other stakeholders, like local authorities, mass media, and community-based organizations, also played a role in building trust and mobilizing the community during the demonstration project.

Recommendation: Program design should create a mechanism that involves relevant stakeholders and enables a partnership among them. Participation of local authorities, especially leaders, is essential for smooth implementation.

Lesson 4. Introducing new vaccine can strengthen compliance with Ministry of Health regulations on vaccination organization, IEC, training, and adverse event surveillance and management.

Supportive supervision was conducted on a regular basis at all levels, which enhanced the capacity of local health workers by providing regular guidance and feedback on Ministry of Health procedures and regulations. Health workers recognized the importance of following regulations, and leaders of relevant agencies confirmed that the HPV vaccine project provided a chance to standardize the skills and capacity of staff.

Recommendation: Supportive supervision should be included as a key assignment of designated health workers. A supportive supervision plan should be created to facilitate this procedure.

Lesson 5. Adequate training materials are essential for program success.

As with every new vaccine, training for health workers and other relevant actors was crucial for program success. Trainings provided an opportunity for participants to revisit and update their existing knowledge. Skills and knowledge gained during these trainings may also be applied in other similar work (e.g., cross-cutting areas), thus enhancing health workers' overall capacity in the long run.

Recommendation: An adequate training program should be developed that provides knowledge about cervical cancer, HPV vaccine, and HPV, as well as implementation-related information. Training content should be tailored to specific trainee groups (e.g., health workers, teachers, communicators).

Lesson 6. Integrating the work into an existing system can reduce costs to an affordable level.

The estimated average delivery costs per dose and per girl fully immunized were much lower for national scale implementation than they were for the small-scale demonstration projects. Although costs were high compared to other vaccines currently in the EPI, that the HPV vaccine is targeted to a new group (young adolescent girls), this increased incremental unit cost should be acceptable.

Recommendation: Incremental cost of adding HPV vaccine into the current EPI system is feasible and affordable when activities are integrated well into currently routine EPI practices.

Recommendation: The incremental delivery cost per dose at national scale in a typical scenario of use as part of the existing EPI should be considered affordable for HPV vaccine, given that it is a new vaccine targeted to a new group (young adolescent girls), when compared to other EPI vaccines and given that the recurrent costs are likely to be in line with other vaccine delivery costs.

Lesson 7. An evidence-based approach to new vaccine introduction is both feasible and effective.

From the formative to operational research via the implementation of demonstration project, we learned that an evidence-based approach can be a successful platform for introduction of a new vaccine. Although this process may not be feasible for low-resource settings without external support to do at the level done in this project, this model of research to support decision-making could be implemented at a more basic scale if national partners are able to identify ways to integrate this into their regular work and some modest additional resources. This will really enhance the decision-making process based on evidences.

Recommendation: An evidence-based approach using basic operational research should be used to guide new vaccine introduction.

Conclusion

PATH's five-year HPV Vaccines: Evidence for Impact project has demonstrated a practical approach for new vaccine introduction through formative research, communication and advocacy, and a demonstration project. The demonstration project estimated HPV vaccine coverage, evaluated vaccine acceptability, measured the feasibility of vaccine introduction for the health and education systems, and calculated the delivery cost of vaccine introduction. Together, these findings provide crucial data for policymakers when considering whether and how to include HPV vaccine in the national health program.

The project identified important results for moving forward with the introduction of HPV vaccine in Vietnam. Both vaccination strategies worked well at the local level, resulting in a high HPV vaccine coverage. Although various concerns about HPV vaccine still exist (e.g. long-term potential impact of HPV vaccine), the new vaccine was well received in project provinces due to its perceived benefit of preventing cervical cancer. The health and education sectors demonstrated their ability to collaborate effectively regardless of delivery strategy, which, coupled with participation from other community-based organizations, led to vaccination success. Finally, although the delivery cost of the vaccine in the project was relatively high, the costs for HPV vaccine introduction may approach normal costs over time and at greater scale.

Cervical cancer continues to be a leading cause of death for women throughout the world. Experiences in Vietnam and other project countries could be shared in a wider context to reduce the lag time between when a new vaccine is available in the market and when it is included in national health programs of low-income countries. Although the price of HPV vaccines has come down dramatically in recent years, it is still too high for low-income countries and serves as an important barrier to widespread access. This issue and the additional cost of delivering HPV vaccines in

national immunization programs will be important in the decision-making process, but cost should not be the sole criterion. With the evidence on operational feasibility and community acceptance provided in this project, when the cost question is resolved, Vietnam will be ready to move forward in introducing this new vaccine.

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