Human papillomavirus immunisation of adolescent girls: improving coverage through multisectoral collaboration in Malaysia

Saidatul Buang and colleagues report on collaborative efforts to introduce HPV vaccination in Malaysia and increase coverage

Cervical cancer is the fourth most common cancer in women globally.[1] Human papillomavirus (HPV) types 16 and 18 collectively cause 70% of cervical cancers and precancerous cervical lesions.[1] The UN joint global programme on cervical cancer prevention and control includes HPV immunisation for girls as one of its three priorities at country level, together with screening and treatment for cervical pre-cancer, and diagnosis and treatment of invasive cervical cancer.[2] In Malaysia, the age standardised cervical cancer rate is 7.8 per 100 000 females, making it the third most common cancer in women, with 4352 new cases reported for 2007-11.[3] Malaysia's HPV immunisation programme was introduced in 2010, within a healthcare system that has a credible track record (box 1, table 1). We present a case study of this programme and explore the role of multisectoral collaboration in achieving near universal immunisation of an estimated annual cohort of 250 000 13 year old girls.

Malaysia's HPV immunisation programme was selected from responses to a global call for proposals on multisectoral collaboration issued by the Partnership for Maternal, Newborn and Child Health (PMNCH).[11] We aim to identify key factors in the successful collaboration, particularly during policy formulation, planning, and initial implementation, and report lessons learnt. A methods guide developed by PMNCH[12] and methods specific to the case study were used to develop and evaluate this case (see supplementary material on bmj.com); these included reviewing available data, interviewing key informants, producing a working paper, and holding a stakeholder workshop to review the working paper and gather additional data and input.

KEY MESSAGES

- Malaysia launched a national programme on HPV immunisation in 2010 and within two years achieved its target of vaccinating about 250 000 13 year old school girls each year
- The Ministry of Health collaborated with a range of stakeholders and built strong partnerships based on mutual trust, supported by policies and institutional structures, as well as ad hoc collaborations based on circumstances and personal relationships
- Collaboration within the programme brought benefits, such as mobilisation and best use of resources, and opportunities for innovative problem solving
- Collaboration contributed to detailed implementation planning of the programme to anticipate needs and problems, and was underpinned by strong leadership that supported listening to all and accountability

Development of the national programme on HPV immunisation

Before the development of an effective HPV vaccine, cervical cancer prevention relied on early detection through cervical smear testing. Malaysia's cervical cancer screening programme had consistently failed to achieve its target of three yearly screening of 40% of women aged 20-65. Poor performance of the screening programme caused considerable frustration within the Ministry of Health.[13] The problems with the programme included its opportunistic rather than targeted nature, inadequate cytology services, insufficient funds, and negative perceptions and attitudes.[14 15]

After the HPV vaccine was recognised as effective in preventing oncogenic genotypes of HPV,[16] it was approved for use in Malaysia in 2007. The Ministry of Health recognised that the vaccine would be a useful addition to its cervical cancer prevention approach. High vaccine prices,

Box 1: Key facts about Malaysia

Demographics[4]

- Population: 32 million, consisting of 7.7 million people 0-14 years, 22.3 million 15-64 years, and 2 million 65 years and above
- Life expectancy: males 72.7 years; females 77.6 years
- Infant mortality: 6.2 deaths under 1 year per 1000 live births
- Urban population: Estimated as 75% in 2017[5]
- Poverty: 1.7% of population below the poverty line (2012)[6]

Health[7]

- Malaysia's nationwide healthcare system has a government led and heavily subsidised comprehensive public sector the cost of which is almost entirely borne by budget allocations, and a fee for service private sector that has grown considerably in the last 25 years
- Primary healthcare coverage is provided through the large rural and semiurban health service that is connected to public sector hospitals in each state and the capital city through a referral system. In parallel, a large network of mainly urban private sector clinics provides mainly curative primary level care, and a rapidly increasing number of private hospitals provide secondary and tertiary care

Education[8]

- Malaysia's education system consists of pre-primary (4-5 years), primary (6-11), secondary (12-17), and tertiary (18-22) levels. Primary education is compulsory and largely universal for girls and boys (98.6% net enrolment rate); net enrolment rate for secondary education for females and males is 77.96% and 72.11%, respectively
- The literacy rate for 15-24 year olds (2001) is about 98%

Table1 | Public expenditure on health and education in Malaysia and other countries (% of gross domestic product)

	Health[9]		Education[10]	
Country	2000	2015	2000	2012
Malaysia	2.43	4.00	6.00	5.10
Australia	7.60	9.45	4.90	5.10
Thailand	3.19	3.77	5.40	5.80
Indonesia	2.01	3.35	2.90	2.80
Cambodia	6.40	5.98	1.70	2.60

Case study: aims and methods

however, initially prevented its inclusion in the national childhood immunisation programme, which is provided free of charge and had high coverage. Several initiatives that engaged the problem, policy, and political streams (table 2), as described in the model by Kingdon (2001),[21] resulted in the government approving limited funding for a proposed HPV immunisation programme in 2009.[22] As the HPV vaccines available at the time were expected to provide protection against only 70% of cervical cancer, cervical smear testing for women aged 20-65 was also continued and enhanced.

The objectives and design of the HPV immunisation programme reflected local strengths and constraints. The objective was the eventual reduction in the burden of cancer, and this was to be achieved by vaccinating girls through the existing school health programme. Girls were chosen as the target group because the programme aimed to reduce cervical cancer. This avoided the additional cost and human resources that would have arisen if boys had been included for the prevention of genital warts, as was the practice in some countries. A school based approach was chosen because the ongoing nationwide school health programme managed by the Ministry of Health was already providing measles/rubella and diphtheria/tetanus toxoid vaccination in 99% of schools in the country and achieving high coverage rates.[23] The target age group for HPV immunisation was 13 year old girls. This group was chosen because more than 80% of this age group are enrolled in school and do not receive other vaccinations.[24] The national HPV immunisation programme aimed to progressively build herd immunity in young adults. Successive cohorts of immunised seroconverted 13 year old girls would be protected when they became sexually active. Fig 1 outlines the programme timeline.

Initial government funds were only enough to purchase the vaccine and run promotional activities (table 3). The Ministry of Health faced the challenge of designing an effective programme to vaccinate about 250 000 girls annually, with no funding for additional staff, cold chains, or additional consumables.

Programme outcomes

Parental consent for daughters to receive the HPV vaccination has been more than 95% from year one of the programme.[25] Of those for whom parental consent was given, completion of three doses has been more than 98%. Population coverage has been more than 80% throughout (fig 2) despite a decline of four percentage points after a policy change in 2013 that restricted free immunisation to public sector schools. Vaccine wastage has remained low (eg, 80 of 70 000 doses in 2010), as have adverse events following immunisation, which have ranged from 0.06% to 0.45%.[26]

Sustainability of HPV immunisation

From 2012, free HPV immunisation was fully integrated into the school health programme and is a key component of the national childhood immunisation programme. Financing for vaccine purchase is provided through the regular budgetary allocation, and staff schedules, logistics and cold chain maintenance, and performance monitoring have been integrated into respective programmes at district and state levels. For the older female population, screening continues with smear tests. In 2017, the initial cohort of immunised 13 year old girls reached age 20, and therefore the age for smear test screening was raised to 30-65 years (previously 20-65 years). The annual target of 40% of the eligible female population continues based on existing available financial and human resources. At the same time, different diagnostic methods are being explored (for example, conventional smear cytology, liquid base preparation, and testing

Table 2 | Collaborative activities that led to the national policy on HPV immunisation

Key stakeholders	Collaborative activities	Outputs
Academics in universities and institutions (problem stream)	Generated evidence	• Cost of vaccine was estimated at about £260 (MYR1300; $378) per person* • 61% of cervical cancer and high grade lesions were associated with oncogenic HPV 16 and 18[15 17] • Only 12.8% of eligible women had had a smear test in the previous 12 months[18] • HPV immunisation could save about £8.6 million ($13.3m) annually[19] • HPV immunisation could reduce the incidence of cervical cancer to 3.5 per 100 000 population[20]
Pharmaceutical companies (problem stream)	Supported academics to produce evidence	Local cost effectiveness studies of bivalent and quadrivalent vaccines and scaling up the smear test programme
	Supported medical associations to conduct seminars	Presumed to have increased awareness and appreciation of the benefits of HPV immunisation
	Participated in meetings with key decision makers in the Ministry of Health	
Ministry of health (policy stream)	Convened a multidisciplinary group of public and private sector specialists to provide policy advice	Reviewed (a) HPV immunisation programmes in Australia, United Kingdom, and other countries, and (b) evidence on the disease burden of cervical cancer in Malaysia and cost effectiveness of immunisation
	Stakeholder consultations	Used this evidence to gather support from ministries of finance, education, women, and family development, and professional medical associations
Public (civil society, mass media) and politicians (political stream)	Advocacy activities on cancer in women, and human interest stories on the illness and death from cancer of the prime minister's wife	Heightened public and political visibility of and support for cancer prevention
Malaysian cabinet chaired by the recently bereaved prime minister (window of opportunity where the three streams converged)	Consideration of a cabinet paper from the Ministry of Health to include HPV vaccination in the national childhood immunisation programme	Approval of the policy and budget

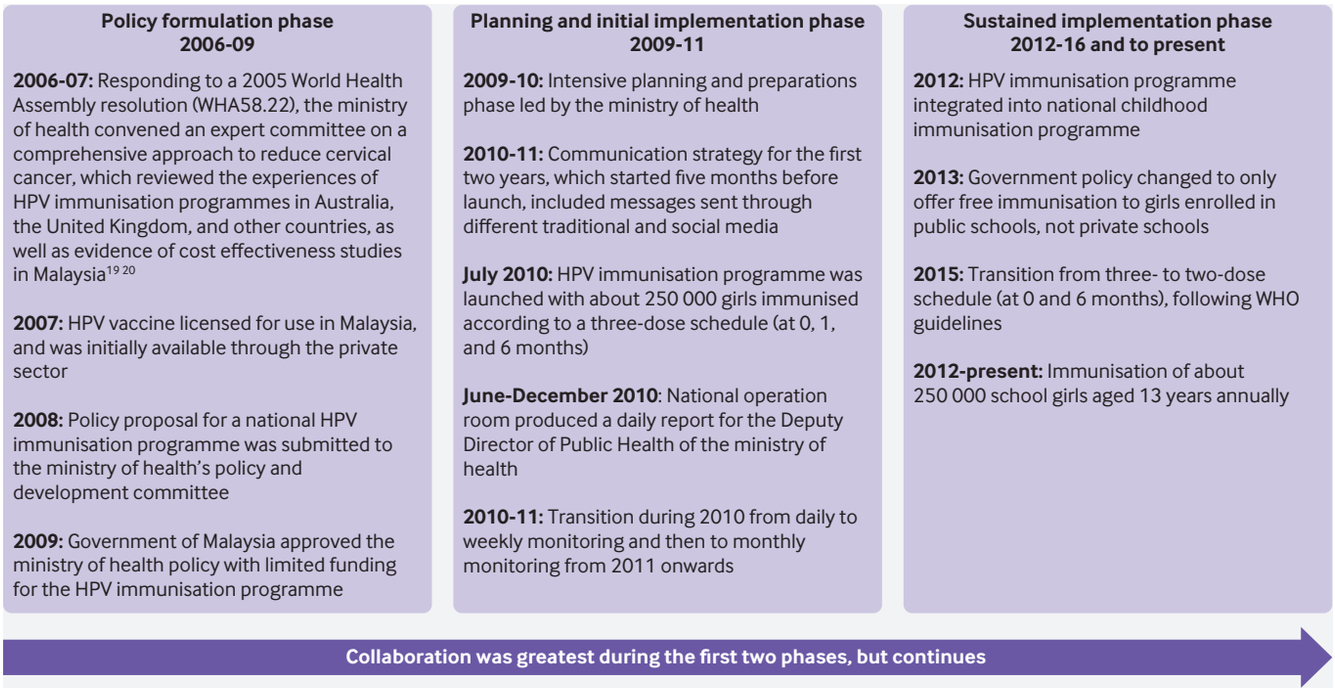

Fig 1 | Timeline of the programme on HPV immunisation in Malaysia

HPV DNA), and cost effectiveness studies are being conducted by a local university.

Collaboration for programme implementation

We identified two themes that underpinned the success of the collaboration.

Collaborative work in planning and monitoring

Collaborative interagency work in planning and monitoring enabled the best use of resources. National roll out of the HPV immunisation programme required detailed, evidence based planning. Planning was both informed and supported by collaboration so that the two processes became mutually reinforcing. For example, almost 650 school health teams worked across about 2960 schools to vaccinate about 250 000 13 year old girls each year. Each girl had to be vaccinated with two or three doses at intervals of one and six months, without interrupting important curricular activities. The three dose schedule had to be completed within the school calendar year in order to minimise drop outs. HPV immunisation was an added task for the school health teams, who already carried out regular developmental assessments and screening, booster vaccinations, and health education. Additional nurses from other outreach programmes were used from time to time. Prior informed parental consent was needed for each girl, and logistical planning based on local data from schools and health teams was needed.

The long established interagency collaborative network of joint school health committees was activated. These committees (fig 3) provided the platform for collaboration between health and education sectors through overlapping subgroups.[27] The introduction of the HPV immunisation programme energised the network of committees. Vertical collaborations between national, state, district, and local levels of the ministries of health and education supported information flow and accountability. At the same time horizontal linkages between the two sectors at each level supported information exchange and strengthened trust. Collaboration efforts contributed to overcoming some of the challenges of implementing the immunisation programme, including ensuring the best use of nurses in school health teams (table 4).

Senior managers in the health and education ministries established accountability by calling for regular progress reports. The collaborative mechanism was strengthened when the education sector was appointed to chair the joint school health committees to ensure appropriate participation and follow up in

Table 3 | Funds allocated for and expenditure of the programme on HPV immunisation*[25]

	Initial implementation (£)			Sustained implementation (£)	
	Government allocation for HPV	Expenditure for HPV 2010-11		Expenditure by procurement cycle†	
	2010-11	Ministry of health	Pharmaceutical company	2012-13	2014-16‡
Vaccine	30m	10.4m	200 000	12.6m	12.6m
Communications		2m			
Training		400 000			
Estimated cost per student		28.27		18.73	13.94

*Currency calculations are approximate figures based on the average exchange rate for 2010. MYR 5=£1.
†Government allocation was merged with the national budget for the expanded programme on immunisation.
‡Malaysia changed from three dose to two dose schedule for 2015-16.

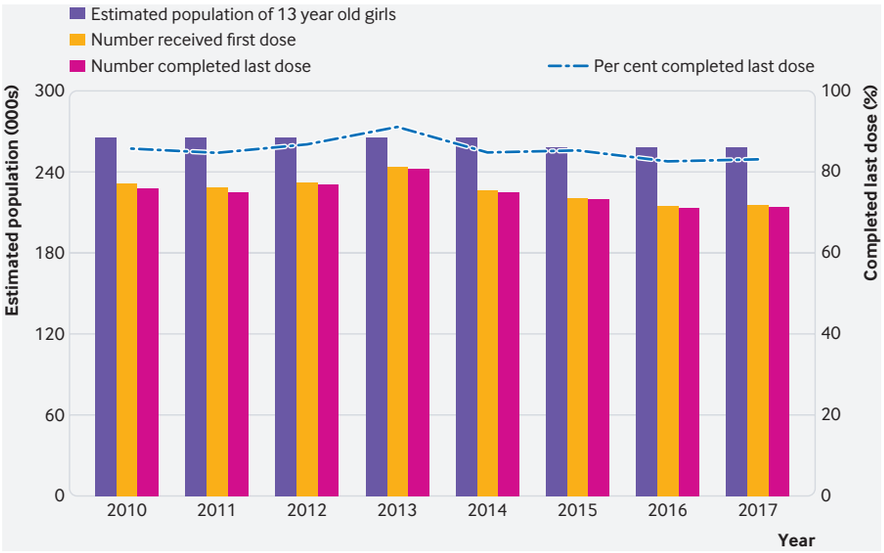

Fig 2 | Number and percentage of 13 year old girls vaccinated through the programme on HPV immunisation, 2010-16

a programme that otherwise risked being viewed as "belonging" to the health sector.

Monitoring of HPV immunisation was integrated into the monitoring system of the ongoing school health programme, which was enhanced during the introductory two year period (2010-11). Operation rooms at national, state, and district level—previously only used for communicable diseases and emergencies—became the centre for the HPV immunisation programme. Detailed planning and monitoring strengthened collaboration, and integrated reporting and validation of data contributed to the programme's accountability (table 4).

For example, additional refrigerators for vaccines closer to schools were needed, to store the large number of single dose vials and reduce travel time for school health teams. Sufficient vaccine for each school team had to be distributed from the national stock according to local schedules and stored at 640 delivery points across the country. To respond to this challenge, a parallel collaborative partnership developed between the Ministry of Health and the pharmaceutical company. When the Ministry of Health explained its difficulties in transporting and storing vaccines, the pharmaceutical company provided, at its own cost (about £200 000; $310 500), additional refrigerators and materials needed for injections because these could not be covered by the Ministry of Health budget (table 3). In addition, to ensure timely vaccine availability during the initial two year period, the pharmaceutical company provided delivery logistics and computer software to monitor cold chain integrity. Thus, the relations between the Ministry of Health and the pharmaceutical company evolved from a contractual agreement governed by procurement rules to an active collaborative partnership (box 2).

Malaysia has a large and diverse mass media, which includes traditional media such as television, radio, and print, and also social media.[29] The Ministry of Health worked with the media to mobilise public opinion in favour of immunisation, empower parents to consent to immunisation for their daughters, and provide appropriate and timely information to address individual concerns. The collaboration was based on a contractual agreement and strong interpersonal relationships. Using its positive image as an agency devoted to public welfare, the Ministry of Health obtained prime time radio and television slots at reduced rates. Together with a larger than usual health promotion budget this enabled wide media exposure, which helped gain support for and acceptance of HPV immunisation. At the same time, the Ministry of Health used Facebook, Twitter, and a dedicated telephone hotline to provide a direct channel for parents and the general public to raise concerns and receive immediate responses from informed and credible professionals.

The Ministry of Health also provided evidence to the national Islamic religious authority (JAKIM) that the vaccine met Islamic requirements. As a result, this authority issued a fatwa that the vaccine was permitted for use in the interest of protecting women against cervical cancer.[30] The fatwa was used widely in briefings for teachers, parents, and schoolchildren and in road shows—information briefings and meetings for members of the public. Other activities included monitoring rumours about HPV vaccination and responding promptly to them, and monitoring adverse effects following immunisation (table 5).

Collaborative work in communication

Collaboration supported effective communication strategies. Introducing a new vaccine for adolescent girls, particularly for a sexually transmitted infection in a socially conservative society, presented challenges. However, the multisectoral collaboration devised communication and surveillance strategies to overcome these problems.

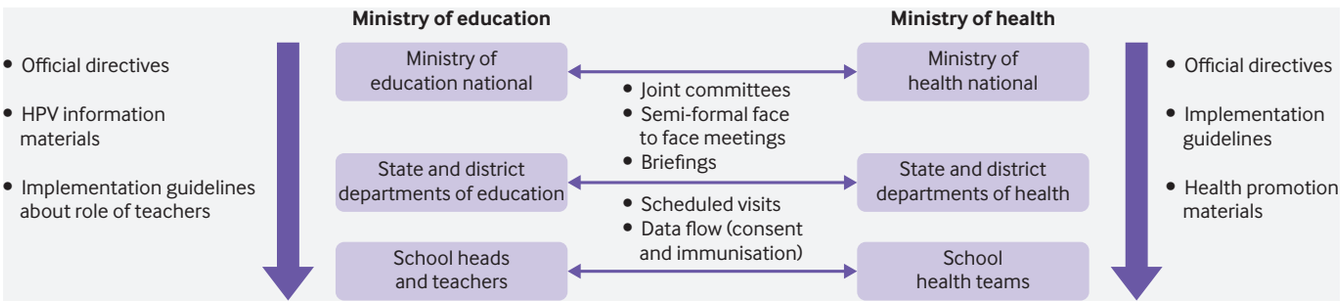

Fig 3 | Mechanisms for collaboration between the ministries of health and education for implementation of the programme on HPV immunisation in Malaysia

Table 4 | Collaborations in planning and monitoring that helped overcome challenges in implementing the programme on HPV immunisation

Implementation challenge	Collaborating stakeholders	Contribution of collaboration to overcoming implementation challenges
Ensure right amount of vaccine is available in the right places at the right time	District education departments	Provided data to 650 school health teams on school locations and enrolments to accurately calculate vaccine requirements
	School health teams	Validated and supplemented enrolment data through visits to schools not on the register of district education offices
	District health officers	Informed national Ministry of Health of suitable locations for additional refrigerators for vaccine storage to be supplied by the pharmaceutical company
	National Ministry of Health (school health unit)	Calculated and informed the pharmaceutical company of the sites to supply new r efrigerators, the vaccine amounts needed for each of the 640 storage locations nationwide, and the schedule of vaccine requirements based on the vaccination schedule of 0, 1 and 6 month intervals
	Pharmaceutical company	Based on data from the Ministry of Health, planned schedule for contractors to deliver the refrigerators to correct sites and the vaccine to the 640 locations according to the schedule for each location
Ensure that immunisation days do not interfere with the school curriculum	District education officers and school heads	Informed school health teams of key dates (eg, examinations, sports days, holidays) in each school's calendar for form 1 (13 year olds)
	School health teams and school heads	Planned school visit schedule and informed school heads
Ensure timely informed consent from parents	National Ministry of Health (school health unit) and state and district health teams	Provided educational briefings on HPV immunisation and its benefits to school heads and teachers
	School health teams and school heads	Agreed on schedules for obtaining signed consent forms and immunisation dates
	School heads and teachers	Provided briefings to schoolchildren and parents, and distributed and collected consent forms
Reduce risk of drop outs between first and last dose in the immunisation schedule	School health teams and district health teams	Ensured first dose was planned so that the schedule could be completed in the same academic year, and included this criterion for estimating vaccine supply schedules
Ensure integrity of the cold chain	Pharmaceutical company and its out-sourced contractors, and health staff at the district level	• Developed web based software • Tracked vaccine delivery to ensure compliance with schedule, amounts of vaccine delivered, and cold chain integrity • Identified points where problems occurred, and triggered timely feedback and corrective education or action
Prompt detection of implementation problems	Health care managers (Ministry of Health) at national, state, and district levels and school health teams	• Electronic communication provided data on implementation coverage and adverse events following immunisation daily and then weekly to operations rooms at district, state, and national levels • District and state level officials were expected to resolve problems promptly and inform the national level of progress • After one year, this transitioned to monthly reporting

Rare but serious adverse reactions, occurring locally or in other countries, could have attracted negative publicity and resulted in a drastic decrease in immunisation coverage in Malaysia, potentially putting the success of the childhood immunisation programme at risk. A small local school survey by the Ministry of Health communications team used focus group discussions to assess student perceptions. This indicated widespread confusion between HIV and HPV, as well as concerns that the vaccine would promote sexual promiscuity, have serious unanticipated side effects, and contravene Islamic law.

In response, the Ministry of Health designed a two pronged, partnership oriented communication strategy that enhanced collaboration with both the education sector and the mass media. Training and support packages were implemented for frontline staff, such as teachers and school health teams, who were known to be key influencers of the perspectives and behaviour of students and parents.[28] Mass media in four languages (Bahasa Malaysia, English, Chinese and Tamil) were used to inform and motivate the general public, especially parents (figs 4 and 5). The key message was "HPV immunisation given when your daughters are young will protect them when they eventually get married". This message avoided association between vaccine protection and early sexual activity.

Characteristics of collaborations that contributed to success

Malaysia's health sector has long benefited from a culture and environment that support intra-agency, interagency, and multisectoral collaboration (box 3). Building on this tradition, Malaysia's Ministry of Health supported and improved a number of relationships between stakeholders to develop and implement solutions to overcome a lack of resources and operational capacity to implement the HPV immunisation programme.

Box 2: Perceptions of key stakeholders

"*The relationship between the Ministries of Health and Education was symbiotic. We have collaborated previously and appreciated that MoH programmes brought great benefit to our girls. The HPV programme was unique in the number of schools and children involved and the intensity of the programme. It was a challenge but we are proud to have helped to deliver it successfully.*"

former director general of education, Malaysia

"*My experience working with the MoH on the HPV programme was rewarding. The MoH openly shared information on the constraints they faced and we were able to share our strengths to address these constraints. We were true partners in this meaningful venture and not mere suppliers of a commodity.*"

former manager, vaccines division, multinational pharmaceutical company

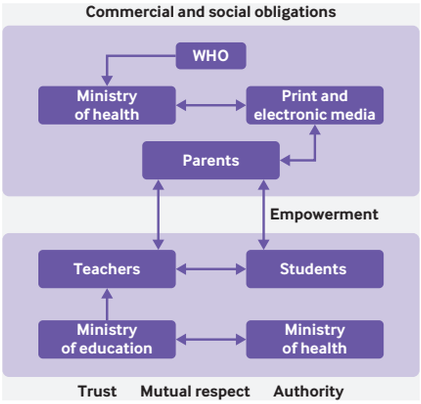

Fig 4 | Interlinked collaboration in the communication strategy for implementation of the programme on HPV immunisation

Programme stakeholders fall into three categories: key players, close supporters, and influencers (fig 6). The relationships between these stakeholders were of different degrees of integration,[32]: cooperation (sharing of information and mutual support), coordination (having compatible goals and common tasks), and collaboration (having integrated strategies and a collective purpose, table 6).

Lessons learnt

Long standing public sector collaboration, even when governed by well established policies and operational mechanisms, needed to be supported and kept effective and dynamic. Stakeholders also needed to be mobilised specifically for the HPV vaccination programme (tables 4 and 6). A key success factor in the collaborations was the reshaping of relationships, away from supervisor-subordinate, manager-helper, or manager-client to true partnership (box 4). An important condition for this was the three layers of strong leadership within the Ministry of Health. Top management provided political commitment and direction and demanded accountability, middle management, which had political, policy, and programmatic skills, guided the detailed planning and ensured all stakeholders were listened to and heard, and

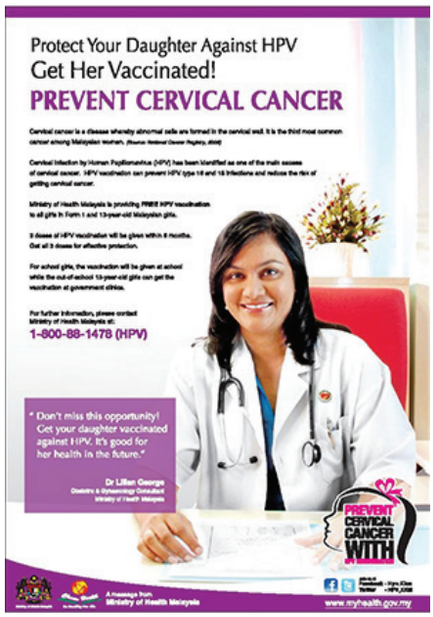

Fig 5 | Example of HPV vaccination campaign used in newspapers and magazines

technical management was innovative and responsive. Communication and listening were essential to foster trust. An example of this is the joint school health committees, which were energised by a new programme in which roles were clearly defined and acceptable to each stakeholder, and which respected the primary mandates of the stakeholders.

These relationships developed within a supportive organisational culture that had built up and grown over time. The Ministry of Health has a strong partnership culture within the ministry and between it and other related government agencies such as those for education, rural development, women, and family development. The value systems and priorities that have governed health system development in the country include "prevention is better than cure", community participation, safety and quality, creative innovations (including to reduce costs), accountability, and sustainability. The HPV immunisation programme illustrates values more recently adopted by Malaysia's Ministry of Health—namely, "patient before patent" and an engagement rather than an authority approach to partnership.

Importantly, collaboration is only one of several factors that contributed to the programme's success. The HPV immunisation programme is backed by substantial scientific evidence, has clear benefits for cancer prevention, and is relatively simple to administer at the point of delivery. In contrast, thalassaemia screening in Malaysia's schools, offered by the Ministry of Health through similar collaborative networks, has not achieved comparable coverage levels. This may be because thalassaemia screening is complex to execute and requires long term follow up of carriers, data demonstrating effectiveness are lacking, and its benefit is not clear to potential recipients.

Nevertheless, longer lasting benefits may have emerged from the collaborations established during the different phases of Malaysia's HPV programme. These have their roots in the specific underlying principles of the collaborations, including providing forums to facilitate formal communication and agreements, familiarity and trust, and strengthened stakeholder satisfaction and empowerment. For example, coordination with the pharmaceutical companies led to cost savings through reduced vaccine price, strengthening of the cold chain, and delivery to the point of use. The Ministry of Health has recognised the potential for future innovation through new or renewed partnerships between agencies (government as well as private, such as medical associations)—for example, to establish centralised pharmaceutical procurement in order to negotiate cost savings with suppliers. The Ministry of Health has presented its experience of the HPV programme in many regional and global conferences since 2010. Staff of the programme also provided inputs to a 2017 WHO publication on HPV vaccine communication,[33] and engaged in a study tour in 2011 with staff of the Ministry of Health of Brunei to share their experiences.

Table 5 | Interagency and intraagency collaboration to monitor and respond to rumours

Collaborating stakeholders	Structural features	Functional outputs
• Healthcare managers (Ministry of Health) at national and state levels • Pharmaceutical company • Mass media (newspapers, radio, television)	• Toll free hotline financed by the pharmaceutical company was installed at Ministry of Health headquarters • A unit to monitor rumours was established at Ministry of Health headquarters to track negative news locally and internationally and assess the need for a Ministry of Health response • Links were established between the Ministry of Health unit and social and traditional media	• Real time monitoring of rumours and public/consumer concerns • Referral of personal and programmatic inquiries to appropriate public health or clinical professionals • Prompt response to questions or rumours through electronic media or official statements in the traditional media (eg, during 2010-14, the Ministry of Health issued four press statements) • Information from the telephone hotline, social media, and emails provided useful feedback on concerns about and acceptance of the HPV immunisation programme

Box 3: Context of multisectoral collaboration for health in Malaysia

"Our recipe for success? Create an ecosystem that facilitates the engagement of partners and the community. .... We have an organizational culture that promotes solutions through innovative technology and partnerships."

Director General of Health, Dato Seri Noor Hisham Abdullah

- The ministries of health and education have a long history of close collaboration including joint and consultative policy development and implementation of programmes (eg, for school health and dental care, and for the national school curriculum's coverage of health topics). Collaboration mechanisms (eg, standing committees) and strong institutional memory exist at national, state, and local levels
- Examples of well established collaboration between the Ministry of Health and other sectors include the village development committee partnership between health staff and rural village heads (Ketua Kampung) working for sanitation and disease control, advisory panels for the network of public sector primary care clinics and hospitals providing an official communication channel between the healthcare sector and the community, and the Ministry of Health's ongoing relationships with the media and religious authorities
- More recently the national government has adopted the national blue ocean strategy which aims to foster collaboration between ministries, agencies, levels of government, and the private sector to break down silos in order to achieve faster implementation and better outcomes at a lower cost[31]

Limitations

Although the HPV programme aimed to vaccinate all 13 year old girls in the country, an estimated 15% were not vaccinated. Of these, most were not enrolled in school, while 1-2% were attending school but their parents did not give consent for immunisation. We have few data about the girls not attending school. Studies suggest they are probably from lower socioeconomic groups, particularly those living in remote areas where healthcare access is difficult and provided through periodic visits by mobile health teams.[34] Furthermore, the value of providing HPV immunisation in boys is increasingly recognised—for example, for benign and malignant anogenital disease, as well as head and neck lesions.[35] Closing this gap in coverage is a challenge, and collaboration between sectors may again prove valuable in efforts to reach these groups.

Programme performance is monitored by coverage rates aggregated at the district level. Therefore, variation in uptake and coverage by geographical area, school type, or other relevant factors is not possible at this time. In addition, Malaysia cannot yet afford to monitor seroconversion rates; however, Australia's experience suggests that seroconversion rates in Malaysia could be high.[36]

In the first years of the programme, the Ministry of Health received through the hotline and Facebook questions about and demands for free immunisation for teenage girls at or over 13 years. Those aged 13 were offered free immunisation in health centres, while older girls were initially referred to the private sector In a parallel initiative in 2012, the ministry of women and child development offered free HPV immunisation to 18 year old girls, financed through a government budget allocation separate from that of the Ministry of Health. It was first available in clinics of the ministry of women and child development which were mainly in urban areas, and then offered for free to females enrolled in universities through collaboration with the ministry of higher education. However, the uptake was low. The collaboration between the Ministry of Health and the ministry of women and child development was mostly about provision of technical advice, information, and educational materials, rather than design, planning, implementation, or monitoring. The data on the programme achievements are not robust enough to be used for evaluation. This initiative ended when the first cohort of 13 year olds from school reached 18 years.

In 2013, government policy changed so that children enrolled in private schools were no longer entitled to free immunisation. The rationale was that these children belonged to higher income households and could afford vaccination in private, fee-for-service medical clinics. A slight decline in coverage followed (fig 2), but it is unclear whether this was due to the lack of a clear reporting mechanism from the private sector or to lower coverage.

Conclusion

In this case study, multisectoral collaboration was used to overcome a lack of resources by generating additional resources and making the best use of the resources available. It supported improvement and innovation in, for example, vaccine delivery and cold chain integrity, surveillance, and strategic communications. As a result of the collaboration, the implementation of the HPV programme

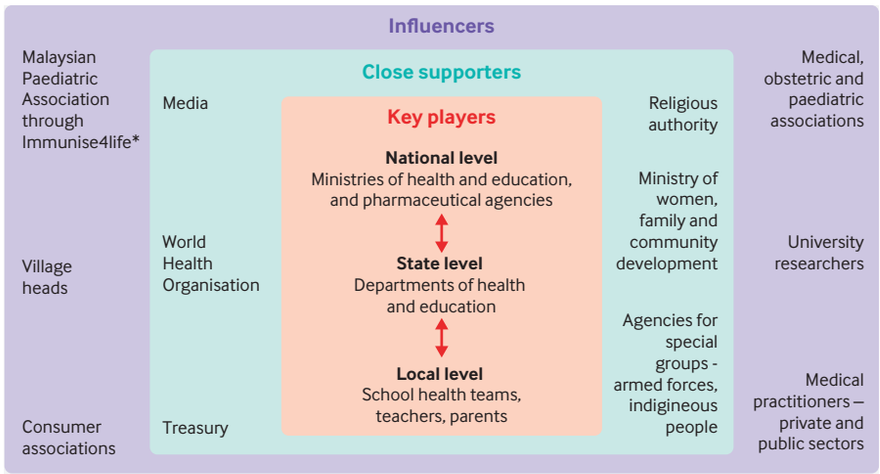

Fig 6 | Stakeholders in Malaysia's programme on HPV immunisation

Table 6 | Characteristics of key collaborations in the programme on HPV immunisation

Key stakeholders and type of collaboration	Structural features or processes	Functional outputs that supported planning, monitoring, and communication
Joint school health committees: Ministry of Health and Ministry of Education (fig 3) Collective purpose, integrated strategies throughout the programme	Vertical collaboration: overlapping national, state, district, and local groups within each sector	Transmission of authority through guidelines and credible materials for briefings and training
		Real time recognition of problems and identification of possible solutions
		Accountability through progress reporting
	Horizontal collaboration: between the health and education sectors at each level	Clarification and acceptance of roles and responsibilities (eg, that teachers must obtain signed consent forms from parents)
		Exchange of local information (eg, that teachers and students are generally aware of cancer but not of HPV; and data on school enrolments and academic calendars to enable planning and health team visit schedules)
		System for monitoring adverse events after immunisation, based on WHO classification
Pharmaceutical companies with Ministry of Health Coordination: compatible goals and common tasks; particularly strong during initial implementation phase	Funding for academic researchers	Local studies on cost effectiveness published in peer reviewed international journals
	Support for professional medical associations	Educational and promotional activities about the benefits of HPV immunisation
	Contractual relationship with the Ministry of Health	Vaccine price: senior Ministry of Health officials negotiated significant price reductions using arguments of economies of scale, long term future commitment to vaccine purchase as part of the regular budget, and the reputation of the Ministry of Health as a good client
	Professional and contractual relationship with the Ministry of Health	Complementary provision of additional cold chain equipment, injection consumables, and funding for promotional activities
Ministry of Health and National Islamic Religious Authority Cooperation: sharing of information and mutual support during initial implementation phase	Informal meetings between key people	Fatwa (formal ruling) by an Islamic authority that the use of the HPV vaccine is permitted (that is, it meets the requirements of Islamic law)
Ministry of Health and private health sector Coordination: compatible tasks and common goals throughout the programme	Semiformal meetings and interpersonal contacts	Review of evidence and development of consensus on priority for and benefits of HPV immunisation
		Reporting and management of adverse events after immunisation, including appropriate clinical care and accurate information to anticipate and prevent negative rumours
Ministry of Health and civil society Cooperation: sharing of information and mutual support during initial implementation phase	Road shows for non-governmental organisations and other concerned agencies and individuals	Platform to discuss concerns and provide convincing reassurance

was strengthened and was detailed, evidence based, and on time, which contributed to the success of Malaysia's HPV immunisation programme.

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Box 4: Factors contributing to successful collaboration in Malaysia's programme on HPV immunisation

Factors supporting effective multisectoral collaboration included the following.

Between the health and education sectors
- Mutual trust and respect were built through timely exchange of specific information, such as training packages, the key message, informed consent from parents, and monitoring adverse events following immunisation

Between the health sector and news media
- Transparent, credible, and timely communication was maintained on issues such as Islamic halal requirements and adverse events following immunisation

Between the health sector and parents and schoolchildren
- Engagement rather than advocacy was used; parents were treated as partners in the programme and had convenient and simple access to authorities to discuss and resolve concerns

Collaboration alone, however, was not sufficient. Other important and mutually reinforcing elements included:
- Evidence based planning and implementation
- Building trust and credibility
- Strategic communication and innovative use of mass media

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Supplement 1: Methods for developing the case study

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