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. Human papillomavirus (HPV) types 16 and 18 collectively cause 70% of cervical cancers and precancerous cervical lesions. 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. 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. 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.

Box 1: Key facts about Malaysia

Demographics
- 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
- Poverty: 1.7% of population below the poverty line (2012)

Health
- 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
- 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%
The technique used was the pyrolysis of soy-based waste to produce bio-oil, which was subsequently upgraded to produce a high-quality renewable liquid fuel. The process involved the use of a fixed bed reactor and the optimization of operational parameters such as temperature and pressure to achieve the desired yield of bio-oil. The yield of the bio-oil was found to be approximately 30-40% of the total feedstock mass, depending on the conditions. The upgraded bio-oil had an energy content of around 40-45 MJ/kg, which is comparable to conventional diesel fuel.
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. 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

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Table 3 | Funds allocated for and expenditure of the programme on HPV immunisation

|                              | Initial implementation (£) | Sustained implementation (£) |
|------------------------------|-----------------------------|-----------------------------|
|                              | 2010-11                     | 2011-12                     | 2012-13 | 2014-16 |
| Vaccine                      | 30m                         | 10.4m                       | 200 000 | 12.6m   | 12.6m   |
| Communications               | 2m                          | 18.73                       | 13.94   |
| Estimated cost per student   | 28.27                       | 18.73                       | 13.94   |

*Currency calculations are approximate figures based on the average exchange rate for 2010-11.
†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.

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Collaboration was greatest during the first two phases, but continues.

Fig 1 | Timeline of the programme on HPV immunisation in Malaysia.
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 health teams. Sufficient vaccine for each vials and reduce travel time for school to store the large number of single dose vaccines closer to schools were needed, 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. 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. 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.

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

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

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- Official directives
- HPV information materials
- Implementation guidelines about role of teachers
- Joint committees
- Semi-formal face to face meetings
- Briefings
- Scheduled visits
- Data flow (consent and immunisation)
- School health teams
- Official directives
- Implementation guidelines
- Health promotion materials

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MAKING MULTISECTORAL COLLABORATION WORK

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 refrigerators, 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                                                      |
| 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 outsourced 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. 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
Making multisectoral collaboration work

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, 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 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, and engaged in a study tour in 2011 with staff of the Ministry of Health of Brunei to share their experiences.
The Health. It was first available in clinics of the ministry of women and child development offered free HPV initiative in 2012, the ministry of women referred to the private sector In a parallel centres, while older girls were initially offered free immunisation in health girls at or over 13 years. Those aged 13 demands for free immunisation for teenage Ministry of Health received through the high.36 afford to monitor seroconversion rates; this time. In addition, Malaysia cannot yet or other relevant factors is not possible at geographical area, school type, level. Therefore, variation in uptake and 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

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**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 cost32

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**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 |
|                                           | Horizontal collaboration between the health and education sectors at each level | Real time recognition of problems and identification of possible solutions |
|                                           |                                    | Accountability through progress reporting |
| Pharmaceutical companies with Ministry of Health | Funding for academic researchers | Clarification and acceptance of roles and responsibilities (eg, that teachers must obtain signed consent forms from parents) |
|                                           | Support for professional medical associations | 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) |
|                                           | Contractual relationship with the Ministry of Health | System for monitoring adverse events after immunisation, based on WHD classification |
|                                           | Professional and contractual relationship with the Ministry of Health | |
| Ministry of Health and National Islamic Religious Authority | 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 | Semiformal meetings and interpersonal contacts | Review of evidence and development of consensus on priority for and benefits of HPV immunisation |
| Ministry of Health and civil society | Road shows for non-governmental organisations and other concerned agencies and individuals | Reporting and management of adverse events after immunisation, including appropriate clinical care and accurate information to anticipate and prevent negative rumours |

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 media news
- 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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Saidatul N Buang, public health physician1
Safurah Ja'afar, independent consultant2
Indra Pathmanathan, senior consultant3
Victoria Saint, independent consultant4
1Family Health Development Division, Ministry of Health, Kuala Lumpur, Malaysia
2Department of Community Medicine, International Medical University, Kuala Lumpur, Malaysia
3World Bank, Washington, DC, USA
4Berlin, Germany
Correspondence to: S N Buang s.nobaya@moh.gov.my

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