Supporting influenza vaccine production in Vietnam

Increasing vaccine supplies against a seasonal and pandemic threat

The ongoing public health threat of influenza

With influenza vaccine development and production resources mostly concentrated in the industrialized world, low- and middle-income countries (LMICs) can face great challenges in protecting against seasonal and pandemic influenza. These countries are often unable to afford or access critical vaccines, which can help prevent the spread of the virus within their own communities, and the rest of the world.

Influenza, a viral disease that causes respiratory illness, can be seasonal in temperate regions, but may occur year-round in the tropics. Seasonal influenza alone causes 290,000 to 650,000 deaths and five million cases of severe disease worldwide each year— including more than one million cases of influenza-like illnesses every year in Vietnam.

Occasionally, extremely destructive strains can emerge and lead to widespread outbreaks called pandemics. The most severe influenza pandemic, in 1918, infected up to 50 percent of the world’s population and caused 20 to 50 million deaths worldwide.

Public health leaders worry that in today’s highly interconnected world, a highly virulent pandemic strain could again lead to millions of deaths, mostly in countries with limited resources. The global 2009 A/H1N1 outbreak led to more than 10,000 cases in Vietnam alone, and dozens of deaths. The country has also experienced isolated cases of avian A/H5N1 influenza in humans and widespread outbreaks in poultry.

The best defense against an influenza pandemic is a well-developed capacity to produce seasonal influenza vaccine, which helps to maintain manufacturing capability on an annual basis. Maintaining manufacturing procedures for seasonal vaccines, required year after year, keeps the influenza vaccine supply chain moving and ensures that manufacturers and distributors can quickly pivot towards pandemic influenza vaccine production if and when needed.

Yet, current influenza vaccines are difficult to produce in large quantities and at low cost. Engaging vaccine suppliers worldwide, including in LMICs like Vietnam, in producing high quality vaccines at a lower cost, is key to meeting seasonal and pandemic demand.

Recognizing Vietnam’s potential as a global vaccine producer

Vietnam produces a wide range of vaccines for domestic use. However, it does not yet have a domestically produced supply of influenza vaccine for use during seasonal or pandemic outbreaks. This forces the country to rely on foreign vaccine manufacturers for influenza prevention and preparedness efforts.

Recognizing its potential to fill a manufacturing gap, Vietnam began working on influenza vaccine development in 2007 as part of the World Health Organization’s (WHO’s) Global Action Plan for Influenza Vaccines, a comprehensive strategy to reduce the global shortage of influenza vaccines.

In 2009, PATH, in partnership with WHO and the US Biomedical Advanced Research and Development Authority (BARDA) within the US Department of Health and Human Services, began a technical collaboration with Vietnamese vaccine manufacturers working on seasonal and pandemic influenza vaccines.

This program, which ran until 2018, aimed to develop regionally based independent and sustainable influenza vaccine production capacity in Vietnam.

From chicken eggs to cell cultures: vaccine development in Vietnam

For almost ten years, PATH worked with Vietnamese manufacturers to produce and clinically evaluate high quality, safe, and effective vaccine candidates for pandemic and seasonal influenza, including developing the operational capacity and policy environment for influenza vaccine production.

Establishing a reliable supply of influenza vaccine

State-owned vaccine manufacturer the Institute of Vaccines and Medical Biologicals (IVAC) has been producing vaccines in Vietnam for decades. IVAC opened its first influenza vaccine production facility in 2009, with support from WHO.

In 2010, PATH assisted IVAC in operationalizing the new facility. This included establishing a sustainable, high quality, and safe egg supply (the viruses for most influenza vaccines are grown in chicken eggs); developing standard operating procedures for laboratory practices; advising on vaccine production procedures; improving the quality management system, with an emphasis on risk management; and providing technical support for international standard clinical trials.

As a result, IVAC was able to produce high quality pre-pandemic influenza A/H5N1 and trivalent seasonal influenza vaccine candidates. Phase 2/3 clinical trials of both vaccine candidates were completed in 2018; results show both to have good safety profiles and to evoke appropriate immune responses.

IVAC also advanced the clinical development of an influenza A/H1N1 vaccine candidate and produced a pilot lot of an influenza A/H7N9 vaccine candidate.

Introducing diverse vaccine development technologies

At the same time, PATH worked with VABIOTECH, another state-owned vaccine manufacturer, to develop a cell-based influenza vaccine. Cell-based vaccines can be produced efficiently, at large scale, and without reliance on egg-supplies, which could bolster pandemic preparedness.

PATH has helped VABIOTECH establish cell-based vaccine production capacity; obtain a license for a cell line that can be used for the commercial manufacture of influenza vaccines; and develop an industrial process to manufacture an inactivated pandemic influenza vaccine at pilot scale.

Developing long-term plans and guidance

PATH worked with Vietnam’s Ministry of Health (MOH) to foster a supportive environment for vaccine development. As a result, the MOH developed a long-term plan for influenza vaccine development and use in Vietnam, and guidelines for influenza vaccine clinical trials and licensure. PATH also supported IVAC and VABIOTECH to establish pharmacovigilance systems—procedures and processes which monitor the effects of the vaccines even after they have been licensed for use.

When vision becomes reality: enhancing pandemic influenza preparedness

This collaboration has demonstrated that influenza vaccine development can be successful even in LMICs, and can act as a model for others.

IVAC is now following the MOH licensing procedures for both its A/H5N1 and seasonal influenza vaccine candidates. The vaccines are expected to be licensed in 2019. After licensure, Vietnam aims to manufacture influenza vaccine at scale, improving access and affordability for the people of Vietnam, and enhancing pandemic preparedness.

This project isn’t just about protecting one’s own borders; it is about extending health security to everyone. By helping Vietnam strengthen its influenza vaccine production capacity, this project has also taken an important step toward increasing local and regional vaccine supplies and potentially improving real-time response in an influenza pandemic.

PATH supports this work in Vietnam through a cooperative agreement funded by BARDA, which also supports influenza vaccine manufacturers in other countries such as Brazil, China, India, Serbia, and Thailand.