

Japanese encephalitis vaccine introduction and delivery



Fifteen-year effort protects 300 million children from deadly disease

Japanese encephalitis (JE), spread by infected mosquitoes, is the leading cause of viral encephalitis in Asia. Approximately 3 billion people, including 700 million children, live in areas at risk of JE. An estimated 70,000 cases occur annually, and the World Health Organization (WHO) estimates that JE claims 14,000 to 20,000 lives a year, mostly children under age 15. However, because awareness of JE is low and the disease is difficult to diagnose, these figures may significantly underestimate JE's impact.

Even less recognized, however, is the lifelong toll that JE takes on its survivors. About half to three-quarters of survivors suffer long-term or permanent neurological damage including intellectual, behavioral, or neurological disabilities, like paralysis or the inability to speak. There is no cure or clinical treatment for JE. Vaccination is the most important way to prevent JE.

Contributing to key milestones in JE control

Thanks to funding from the Bill & Melinda Gates Foundation and others, including the Margaret A. Cargill Philanthropies, PATH has worked for more than a decade to reduce JE-related death and disability and ensure that every at-risk child is protected by a safe, effective, and affordable vaccine.

Vaccination is the single most important measure to protect children from JE and its devastating consequences.

Through the efforts of PATH and its global partners, there has been unprecedented progress in documenting the burden of JE; ensuring access to safe, effective, and affordable vaccines; and advancing national programs for JE control. JE immunization is now underway in many countries and a priority for others in the near future.

Advancing an affordable vaccine

When PATH began its work to increase JE vaccination, the most commonly used vaccines were expensive, hard to produce, and often unavailable. Looking for an alternative,



Middle school students laugh after receiving JE vaccination in Shan State, Myanmar, during a nationwide immunization campaign for all children under the age of 15. With PATH's assistance, more than 12 million children received protection from life-threatening infection. PATH/Thet Htoo

PATH identified a live attenuated JE vaccine (CD-JEV), manufactured by the Chengdu Institute of Biological Products (CDIBP) and safely used in China since the 1980s. Because this highly effective vaccine was not widely used outside of China, international officials called for specific clinical studies to provide more data for the vaccine. Collaborating with the manufacturer, WHO, and ministries of health, PATH conducted pivotal clinical trials that contributed to global and country decision-making. In October 2013, a major milestone was reached when CD-JEV achieved WHO prequalification. This opened the door for low-resource countries to access financing and funding for the vaccine. PATH also negotiated with CDIBP to agree upon a maximum public-sector price for the vaccine—a price that was reasonable for countries and sustainable for manufacturing.

Providing technical and manufacturing support

In 2006, PATH and CDIBP entered into a collaborative agreement to further the manufacturing and commercialization of CD-JEV. Since then, PATH has provided extensive support to help CDIBP meet international

Good Manufacturing Practices. These efforts included assisting in the design of a new manufacturing facility to ensure a high-quality, adequate, stable, affordable, and sustainable vaccine supply.

Gathering improved data for decision-making

PATH collaborates with national governments, as well as with WHO and UNICEF, to establish evidence-based guidance for countries considering JE vaccine introduction. This includes cost-effectiveness analyses and case studies of countries that have introduced JE vaccines into their national immunization programs.

Expanding outreach through advocacy

Throughout PATH's work, we are sharing information to raise awareness of JE at global, national, and regional levels. These advocacy efforts are helping to prioritize JE immunization, foster collaboration, and inform strategies for JE control. PATH develops customized materials that demonstrate country-specific impact of JE vaccine programs and has supported countries with a decision-making guide to help country leaders and policymakers through the process of introducing JE vaccine.

Over the past 15 years, PATH has worked with JE-endemic countries to introduce and expand immunization programs, reaching around 300 million children.

Introducing JE vaccine in low-resource countries

PATH and its partners continue to provide technical assistance to countries introducing JE vaccines, from developing introduction and rollout strategies to evaluating immunization programs.

By the end of 2018, with PATH's support, the CD-JEV vaccine will be given to around 300 million children in ten countries—a turning point in the battle to protect children from this dreaded disease. Here are some examples of PATH's JE work:

- **Cambodia:** In 2009, Cambodia introduced CD-JEV into routine immunization systems in three provinces. With



A family arrives at their local clinic in West Bengal, India, to get their children vaccinated for JE. India was one of the first countries outside of China to introduce CD-JEV vaccine, following a deadly epidemic that killed more than 2,000 people in Nepal and northern India in 2005. PATH/Julie Jacobson

PATH's support and funding from Gavi, the Vaccine Alliance, the country gradually expanded and introduced the vaccine nationwide in March 2016.

- **Laos:** With technical assistance from PATH, Laos began CD-JEV introduction in six high-risk provinces in 2013, later expanding into two additional provinces. In 2015, Laos was the first country to apply to Gavi for JE vaccines. This support enabled JE immunization to be incorporated into routine immunization programs and expanded nationwide.
- **Myanmar:** With PATH's technical assistance and financial assistance from Gavi, Myanmar introduced JE vaccine in late 2017, reaching nearly 13 million children. In early 2018, Myanmar integrated JE vaccine into its routine immunization program.
- **Nepal:** Nepal became one of the first countries outside of China to use the CD-JEV vaccine when it introduced the vaccine in 2006—one year after a devastating JE epidemic claimed the lives of 2,000 people in southern Nepal and northern India. CD-JEV is now included in the routine immunization programs of the 30 districts most impacted by JE.



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PATH is a global organization that works to accelerate health equity by bringing together public institutions, businesses, social enterprises, and investors to solve the world's most pressing health challenges. With expertise in science, health, economics, technology, advocacy, and dozens of other specialties, PATH develops and scales solutions—including vaccines, drugs, devices, diagnostics, and innovative approaches to strengthening health systems worldwide.

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