



# The Case for Childhood Immunization

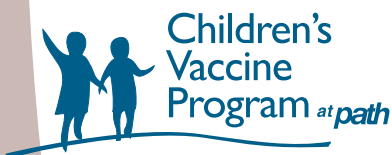
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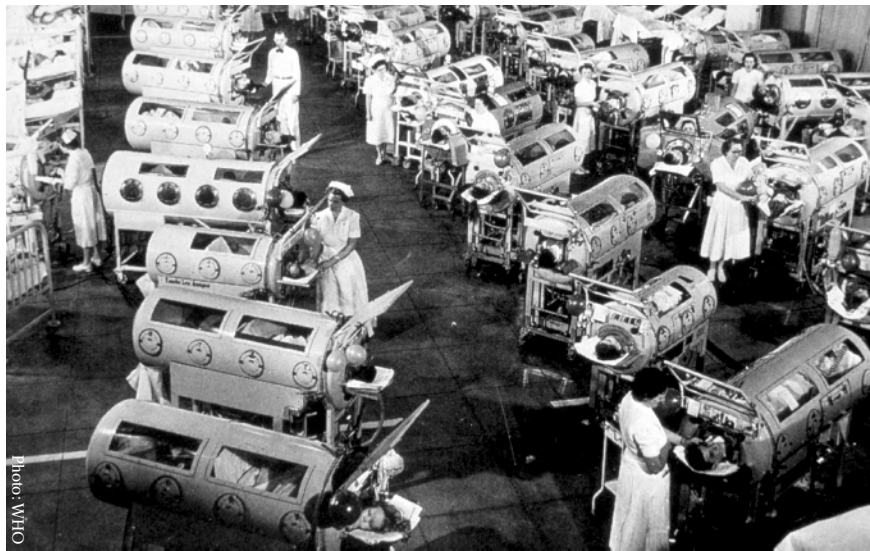
Children's Vaccine Program at PATH

Good health is the foundation upon which individuals and families build long, healthy lives. When unburdened by sickness and disease, children can attend school, and their parents can work, grow or buy food, and build a future for their families. While all primary health services are important, perhaps the most basic and cost-effective is childhood immunization.

Immunization against diseases such as polio, tetanus, diphtheria, and pertussis saves the lives of approximately three million people each year. Immunization also prevents many more millions from suffering debilitating illness and lifelong disability. It is no wonder that many people feel that widespread access to lifesaving vaccines is one of the greatest public health achievements of all time.



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In the first half of the 20<sup>th</sup> century, millions of people died, or were forced to live in “iron lungs” when afflicted with polio. Widespread polio vaccination has made scenes like these a fading memory.

## Infectious diseases can be devastating.

A hundred years ago, infectious diseases were the world’s leading cause of death. Epidemics of smallpox and diphtheria would wreak havoc in towns and cities and take the lives of millions of people without warning.

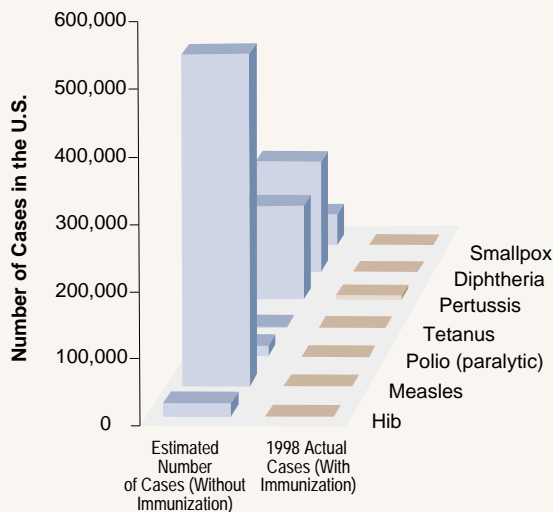
Over the last 50 years, medical science has developed vaccines to reduce the spread of many killer diseases. But other infectious diseases for which we still lack effective vaccines, such as HIV/AIDS, malaria, and tuberculosis, continue to cause illness, disability, and death. Scientists are working hard to develop vaccines to protect people from these diseases as well.

## Immunization saves millions of lives each year.

In 1974, only about five percent of the world’s children had access to vaccines. A global effort was launched in the early 1980s to provide six vaccines<sup>1</sup> to 80 percent of children worldwide. Thanks to this effort, immunization saves more than three million lives each year—about ten thousand lives a day—and protects millions more from illness and permanent disability.

<sup>1</sup> The six vaccines of the Expanded Programme of Immunization protect against polio, tuberculosis, tetanus, diphtheria, pertussis, and measles.

**Cases of Vaccine-Preventable Diseases With and Without Immunization, United States**



Adapted from MMWR, April 2, 1999, Vol. 48, No. 12.

Using historical data, the U.S. Centers for Disease Control estimated the number of Americans who would have died from vaccine-preventable diseases if there were no vaccines, compared to the actual numbers of people who died from those diseases in 1998.

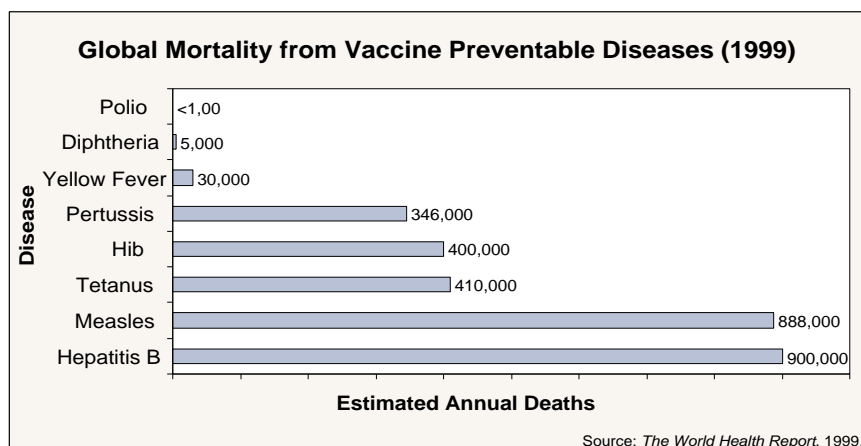
## Immunization can eradicate certain diseases.

Through immunization, we can eradicate or eliminate certain diseases. Smallpox, a disease caused by the variola virus, used to kill five million people per year and disfigure millions more. But thanks to the development of the world's first vaccine, naturally occurring smallpox was eradicated in 1978 through global immunization.

Only 50 years ago, polio was the leading cause of paralysis in the world, permanently crippling hundreds of thousands of children and adults. When polio epidemics swept across North America in the 1940s and 1950s, modern medicine was powerless to stop them. Now, thanks to the polio vaccine, the world will soon be free from the disease.

## But millions continue to die from vaccine-preventable diseases.

Despite the widespread availability of vaccines, around three million people still die each year from vaccine-preventable diseases. These deaths mostly occur in developing countries where health systems may be weaker and less able to cope with an overwhelming set of health problems.



Almost three million people—usually children under five—die each year from diseases that are preventable by vaccines.

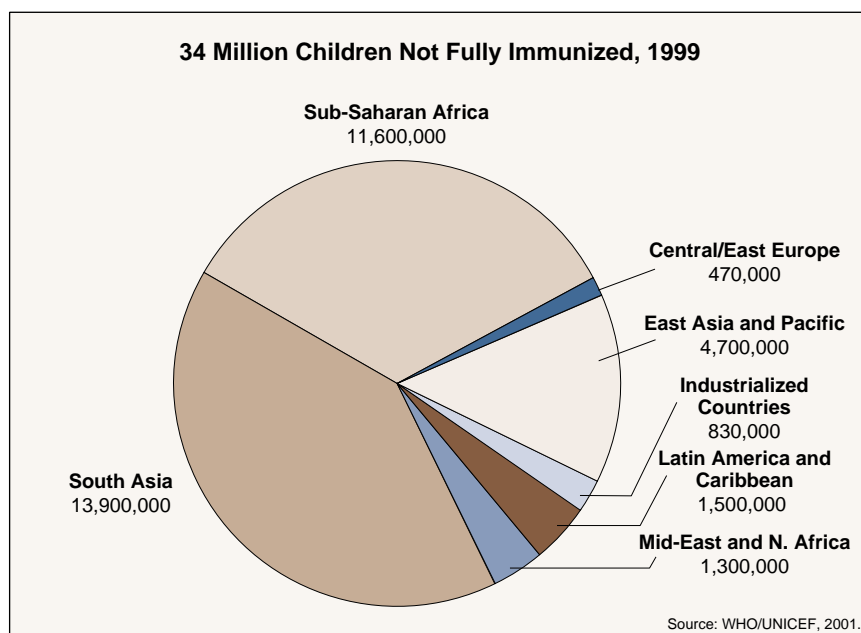


**Polio** is a viral infection that affects the nervous system and can cause severe illness, paralysis, and even death. The virus enters through the mouth and nose, multiplies in the throat and intestinal tract, and then is absorbed and spread through the blood to the spinal cord and brain. Some people do not look or feel sick, but they can still spread the disease to others. Wild poliovirus is close to eradication, but the disease still claims almost 1,000 lives per year.

A child in the developing world is ten times more likely to die of a vaccine-preventable disease than a child in the industrialized world.

Measles alone takes the lives of almost a million children under the age of five each year. Tetanus is another disease that strikes the poorest of children and women, and is nearly always fatal. The disease kills 215,000 newborns and 30,000 women annually, usually when conditions are unsanitary at birth and the mother has not been vaccinated.<sup>2</sup>

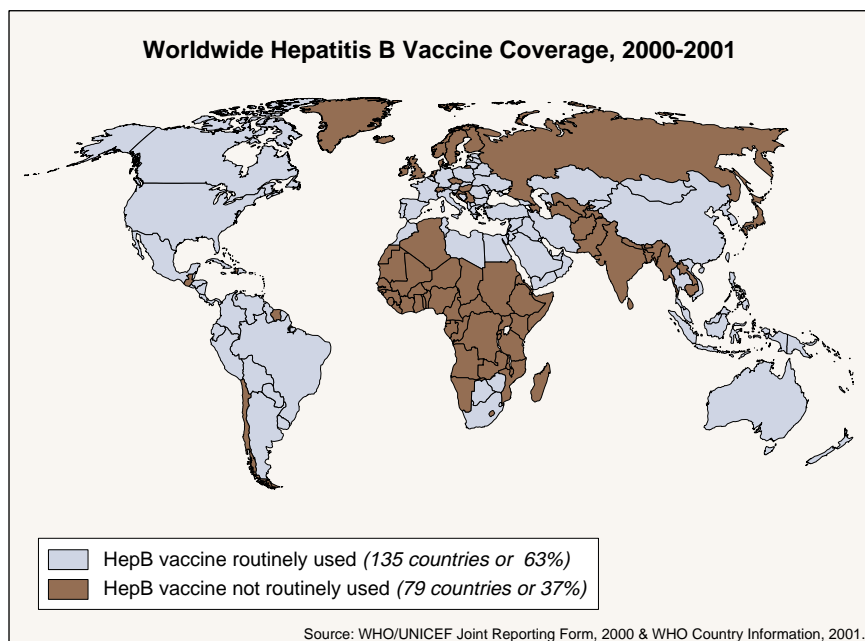
About 26 percent of children (almost 34 million infants each year) still do not have access to basic immunization services, with lowest coverage in sub-Saharan Africa. In some countries, almost half the children have never received a single vaccine. In countries without adequate facilities to care for the sick and disabled, a family member may have to become a full-time caretaker for an ill child—sometimes sacrificing a wage that the family cannot afford to lose. For all these reasons, a child in the developing world is ten times more likely to die of a vaccine-preventable disease than a child in the industrialized world.



Of the world's 34 million children who are not fully immunized,<sup>3</sup> most live in sub-Saharan Africa and South Asia.

<sup>2</sup> Source: *The World Health Report*, 1999.

<sup>3</sup> Full immunization is measured here by the percentage of children receiving the third and final dose of DTP (diphtheria, tetanus, pertussis) vaccine.



Hepatitis B Vaccine is still unavailable in 79 countries despite a recommendation by the World Health Organization that all countries introduce the vaccine in their routine infant immunization program. A global effort is underway to help these countries protect their children against hepatitis B.

## Newer vaccines are slow to reach the children who need them most.

Children in developing countries also lack access to new vaccines, such as those that protect against hepatitis B and *Haemophilus influenzae* type B (Hib). These vaccines are only now becoming affordable to developing countries, decades after they were first used in North America, Europe, and Australia. Routine use of hepatitis B and Hib vaccines could prevent up to 1.5 million deaths per year.



Children in developing countries are the last to benefit from newer vaccines such as hepatitis B and Hib vaccines.

**Tetanus** is caused by naturally occurring bacteria that enter the body through open wounds. The bacteria cause an increased tightening of muscles, resulting in spasms, stiffness, and arching of the spine. Ultimately, breathing becomes more difficult, and spasms occur more frequently. In the developing world, tetanus is almost always fatal. Worldwide, the disease claims 410,000 lives each year.

**Hepatitis B** is a highly contagious virus and is a major cause of liver disease. More than 2 billion people worldwide have been infected with hepatitis B virus and 350 million are chronic hepatitis B carriers. A chronic carrier often shows no symptoms but can infect others with the virus. Hepatitis B kills almost 1 million people (usually chronic carriers) each year.

***Haemophilus influenzae* type B (Hib)** is one of the leading causes of childhood pneumonia and bacterial meningitis. Each year Hib claims approximately 400,000 lives around the world. Of those that live, many face a lifetime of disability due to the effects of the disease, including mental retardation and deafness. Fortunately the disease is easily prevented through immunization.

## **Strong immunization systems are needed to protect our children.**

Globally, approximately 132 million babies need to be fully immunized each year. In order to meet this need, immunization systems must have adequate resources, trained and motivated staff, and ample vaccine and syringe supplies. Health staff must keep vaccines cool in sweltering heat and they must find ways of reaching every last child—whether in the most rural outpost, or the heart of an urban slum. And this system must repeat itself for children born next year and each year thereafter.

Sustainable immunization systems are those offering good physical access to services, acceptance and utilization of services by customers, good quality vaccines, safe injections, secure funding, and effective record keeping. Developing new and more sustainable delivery systems for existing vaccines will set the stage for introduction of important future vaccines, such as those protecting against HIV/AIDS and malaria.

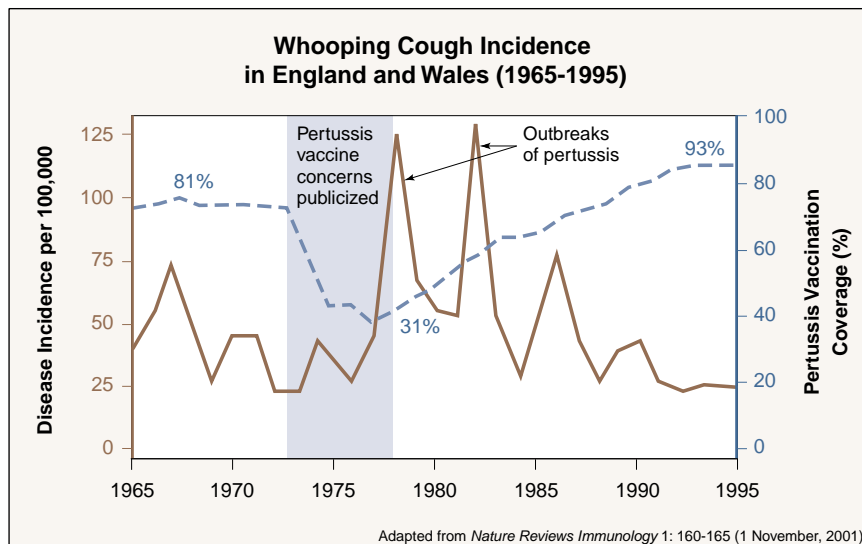


Vaccines must be kept cool as they are transported from manufacturers to villages.

## Diseases reappear when immunization coverage drops.

While developing countries struggle to get vaccines to children who desperately want them, industrialized countries are facing a different challenge. Many people in North America and Europe have become complacent about vaccines, assuming that since certain diseases rarely appear, they are no longer a threat. Others fear that the vaccine itself is more dangerous than the disease. These misperceptions have caused a resurgence of highly contagious diseases such as measles, diphtheria, and pertussis. A measles outbreak in the United States in 1989 led to 123 deaths—ninety percent of those who died had not been vaccinated.

In England and Wales, anti-immunization groups caused parents to question the value of pertussis vaccine in the mid-1970s. As a result, immunization rates fell from 81 percent to 31 percent in a span of just a few years. Two epidemics of whooping cough followed, and many children died needlessly.

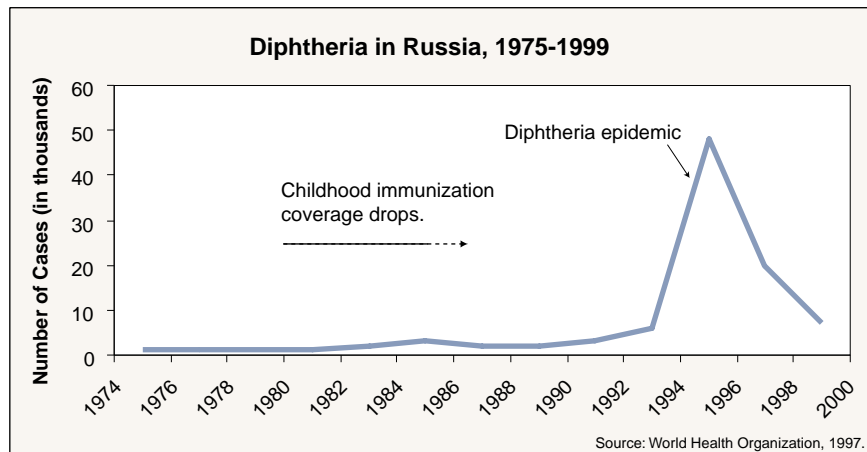


**Measles** is a highly contagious, life-threatening disease. The measles virus causes fever and a painful rash starting in the mucous membranes and spreading from the hairline, down the face and neck, and throughout the body to the hands and feet. Over 850,000 children die each year from measles complications such as diarrhea, pneumonia, and encephalitis.

**Pertussis (whooping cough)** is a serious lung infection that leads to severe coughing spasms. When victims gasp for breath, they make a “whooping” sound, thus giving the disease its common name. Young children who get this disease, particularly babies under the age of six months, can suffer brain damage and even death. The pertussis bacteria that causes the infection is highly contagious: 90 to 100 percent of susceptible children exposed to a single infected subject will contract the illness. Nearly 350,000 people die from complications relating to whooping cough each year.

**Diphtheria** is an infectious disease that spreads from person to person by coughing and sneezing. The disease usually affects the throat and occasionally the skin. Its seriousness can range from a moderately sore throat to toxic, life-threatening diphtheria of the larynx or of the lower and upper respiratory tracts. Some people might not feel or look sick; others might have a sore throat, fever, chills, difficulty swallowing, or a thick gray coating over the back of the throat. Death most commonly occurs when a thin film forms in the throat that eventually blocks the larynx, causing death by suffocation. Ten percent of children with diphtheria die. Today, diphtheria is responsible for approximately 5,000 deaths per year worldwide.

In Russia, a breakdown in the immunization program in the early 1980s resulted in a massive epidemic of diphtheria that peaked in 1995. Infections rose from less than a thousand people in 1980 to more than fifty thousand people in 1995. Controlling the outbreak required expensive and difficult mass immunization campaigns until the routine immunization program was functioning again.





Oral polio vaccine makes immunizations easier to administer by eliminating the need for a needle and syringe. Almost anyone can safely deliver this vaccine.

## **Vaccines are safe. Their benefits overwhelmingly outweigh rare side effects.**

Immunization remains among the safest of modern medical interventions. Each new vaccine must pass rigorous testing before it is licensed; then vaccine use is monitored for side effects. Even in countries where vaccine-preventable diseases rarely occur, the risk of serious side effects is strikingly low when compared with the risk of disease.

Technological advances continue to make vaccines safer and easier to administer. Currently, a vaccine exists that provides protection from five diseases in a single injection.<sup>4</sup> This reduces the number of injections, thus improving the ease and safety of immunization.

## **Immunization can protect the unprotected.**

Immunization can protect a whole community from certain infectious diseases by preventing viruses and bacteria from circulating. Infectious diseases are by nature easily spread, passing quickly through air, fluids, and water from person to person and village to village. However, when enough people are immunized, many viruses or bacteria cannot spread. This effect is called “herd immunity.” The more children in a community that are fully immunized against certain diseases, the more everyone is safe from those diseases.

<sup>4</sup> The pentavalent DTP-HB-Hib vaccine protects against diphtheria, tetanus, pertussis, hepatitis B, and *Haemophilus influenzae* type B. For full protection, the vaccine is administered in three doses over three months.

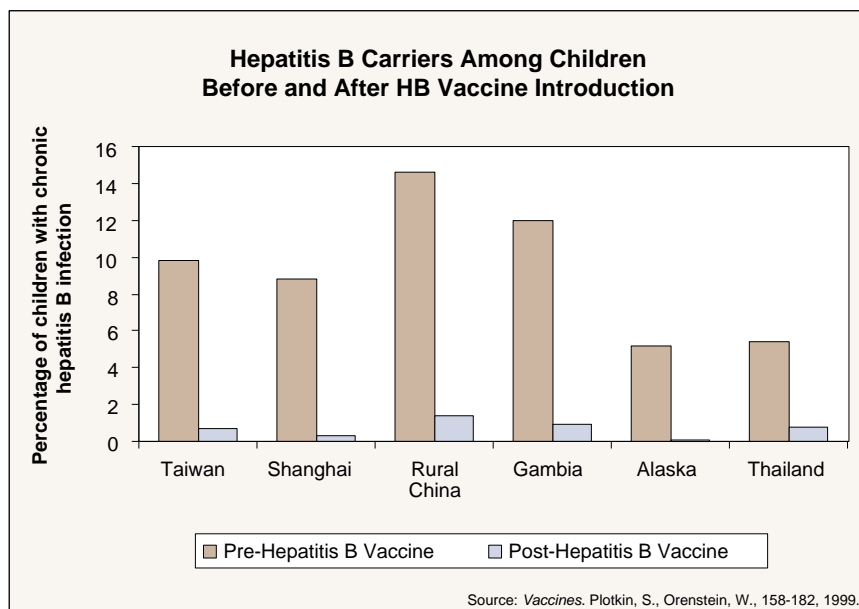
Even in countries where vaccine-preventable diseases rarely occur, the risk of serious side effects is strikingly low when compared with the risk of suffering from the disease.

Few health interventions reduce disease and mortality rates as effectively and safely as immunization.

## Vaccines are effective.

With the exception of providing safe drinking water, no other health intervention reduces disease and mortality rates as effectively and safely as immunization. Immunization prevents suffering and illness from occurring in the first place, thus yielding other benefits such as enhanced worker productivity, greater access to education, greater lifetime earnings, and reduction of treatment costs related to preventable diseases.

The following chart shows the effectiveness of hepatitis B vaccine in reducing the number of chronic carriers among children.<sup>5</sup> In rural China, for example, the vaccine has lowered the percentage of chronic carriers among children from 14 percent to less than 2 percent.



The introduction of hepatitis B vaccine has greatly reduced the number of children who become chronic carriers of the disease.

<sup>5</sup> Children who are infected with hepatitis B often become carriers of the virus. A chronic carrier may show no symptoms for many years, but can easily pass the disease to others. Eventually, sometimes many years after contracting the disease, chronic carriers can develop liver problems, and many will die from the disease.

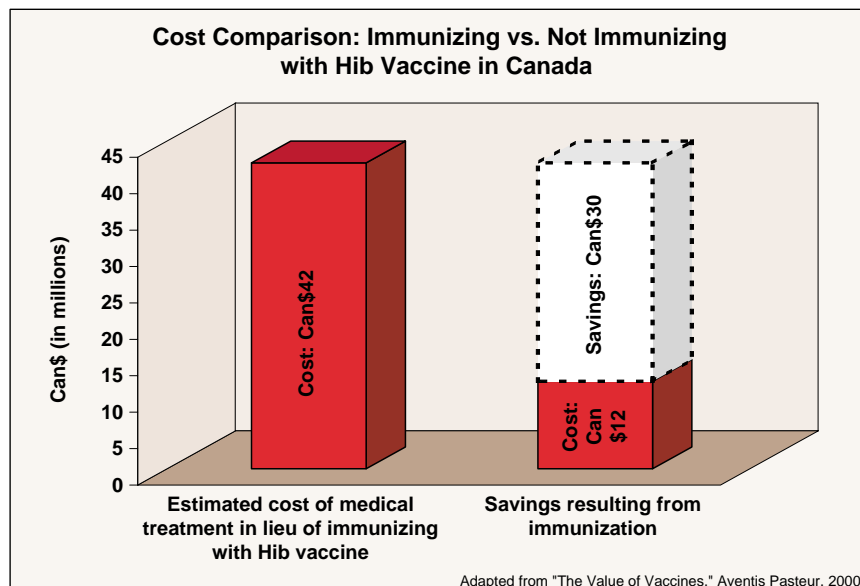
## Immunization saves money.

All governments must make difficult decisions about where to spend limited health care dollars. The key is to determine which interventions provide the largest benefit for the lowest cost. Immunization is one of the rare interventions that costs very little, but offers huge benefits for the health and well-being of whole populations. This is why immunization is often the cornerstone of public health programs.

The cost of treating an ill patient, even one with a minor illness, is usually hundreds of times higher than the cost of vaccination. For example, each dollar spent on polio vaccine in the United States saves US\$6.14 on treating a patient with polio disease. Canada spends about Can\$12 million a year on Hib vaccinations, but saves about Can\$30 million in treatment costs.

In terms of lives saved, immunization can save a life for between US\$20 and US\$30, depending on the country. This extremely low cost and high benefit makes immunization one of the greatest bargains in health care today.

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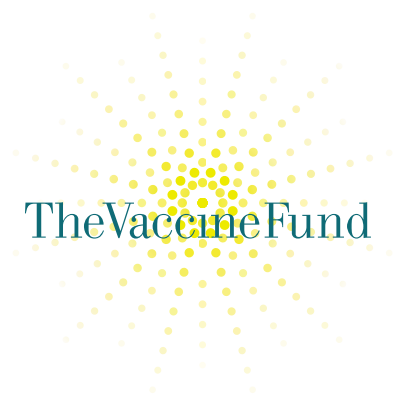
The world has the resources and resolve to dramatically improve immunization programs and save millions of young lives.

## New Hope for Children

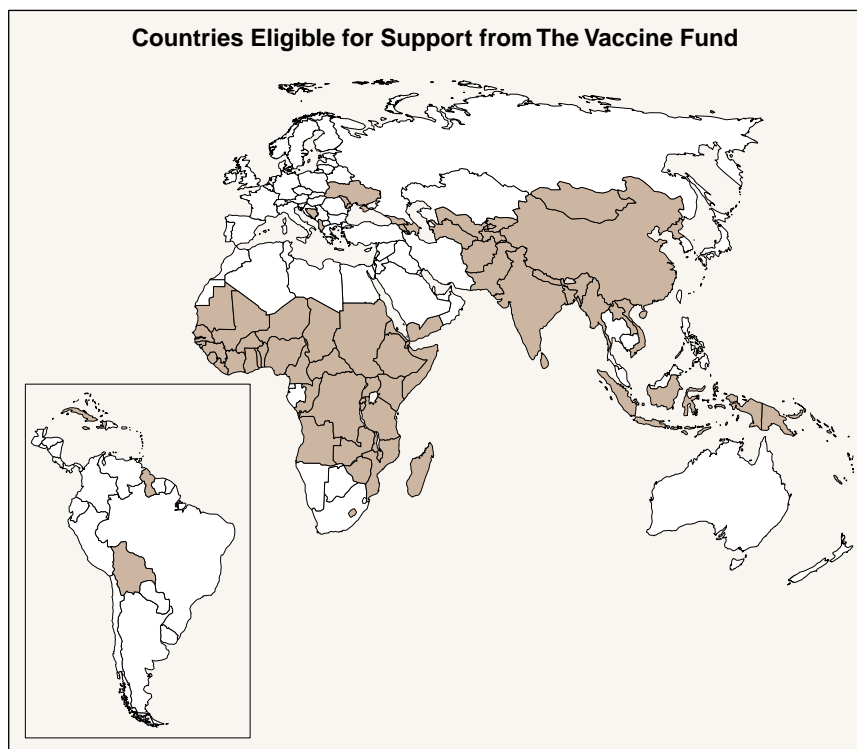
Every child deserves to benefit from lifesaving vaccines. The world has the resources and resolve to dramatically improve immunization programs in even the poorest of countries. The Global Alliance for Vaccines & Immunization (GAVI) is a coalition of organizations formed in 1999 in response to stagnating global immunization rates and widening disparities in vaccine access among industrialized and developing countries. The GAVI partners include national governments, the Children's Vaccine Program at PATH, research and public health institutions, foundations, nongovernmental organizations, bilateral organizations, the United Nations Children's Fund (UNICEF), the World Bank Group, and the World Health Organization (WHO).



A new financing resource called The Vaccine Fund was also created in 1999 to provide financial support directly to low-income countries to strengthen their immunization services and to purchase new and under-used vaccines. The Vaccine Fund received an initial US\$750 million grant from the Bill & Melinda Gates Foundation, and has since received additional support from governments and other donors.



In addition to its own programs in developing countries, the Children's Vaccine Program at PATH supports the immunization-related work of UNICEF, WHO, and the World Bank by providing funding, playing an active role in the GAVI partnership, and helping to solve key logistical and managerial problems that commonly plague country programs.



The Vaccine Fund and GAVI partners work together to strengthen immunization programs in the world's poorest countries. This map shows countries eligible for financial support from The Vaccine Fund.

Together, the Children's Vaccine Program at PATH and other GAVI partners are bringing newer vaccines and increased immunization safety to the 74 poorest countries of the world. Through this collaborative effort, we aim to protect an additional 34 million children and save approximately 3 million lives per year. We believe that this effort represents the most exciting and cost-effective investment in recent public health history.

Together, CVP at PATH and other GAVI partners are bringing newer vaccines and increased immunization safety to the 74 poorest countries of the world.

**For More Information on Vaccines  
and Immunization:**

**Children's Vaccine Program at PATH  
(Program for Appropriate Technology in Health)**  
*[www.childrensvaccine.org](http://www.childrensvaccine.org)*

**Allied Vaccine Group**  
*[www.vaccine.org](http://www.vaccine.org)*

**Global Alliance for Vaccines & Immunization**  
*[www.vaccinealliance.org](http://www.vaccinealliance.org)*

**The Vaccine Fund**  
*[www.vaccinefund.org](http://www.vaccinefund.org)*

**The Vaccine Page**  
*[www.vaccines.org](http://www.vaccines.org)*

**United Nations Children's Fund**  
*[www.unicef.org/](http://www.unicef.org/)*

**The World Health Organization: Vaccines & Biologicals**  
*[www.who.int/vaccines/](http://www.who.int/vaccines/)*

**Safe Injection Global Network (SIGN)**  
*[www.injectionsafety.org](http://www.injectionsafety.org)*

## **Other Publications Available from the Children's Vaccine Program at PATH:**

### ***Vaccine-Preventable Diseases***

An overview with a special focus on hepatitis B, Hib, and yellow fever.

### ***Advocacy for Immunization***

How to generate and maintain support for vaccination programs.

### ***Realizing the Full Potential of Childhood Immunization***

Practical advice for doctors and other health workers about promoting immunization in their communities.

### ***Hepatitis B Vaccine Introduction***

Lessons learned in advocacy, communications, and training.

### ***Immunization and Child Health Materials Development Guide***

A practical, "how-to" manual for conducting audience research and developing effective, user-appropriate print, audio, video, and computer-based health education materials.

### ***Helping Young People Become Youth Advocates for Immunization***

Practical ideas for teaching children and young adults about infectious disease, immunization, and injection safety and for encouraging them to promote immunization in their communities.

### ***Unsafe Injections, Fatal Infections***

An overview of medical and social science wisdom on the extent of unsafe injections and the complex reasons why many injections are given in an unsafe manner.

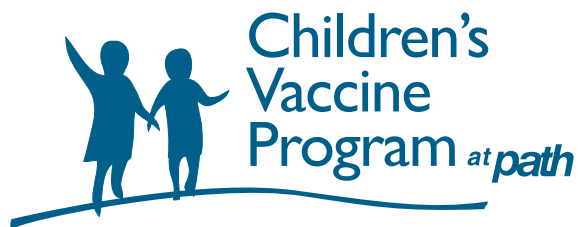
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### **THANK YOU!**

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