



PROGRESS TOWARDS

IMMUNIZATION

WINNING THE FIGHT AGAINST DEADLY DISEASES
**THE
LIVING
PROOF
PROJECT**

U.S. investments in global health are working.

The prevention of childhood diseases through increased access to immunizations is one of the greatest success stories in global public health. Millions of children's lives have been saved—at least 20 million over the past two decades—and the number of diseases that can be prevented using vaccine technologies has continued to increase.

Immunization demonstrates the powerful impact of a long-term national and international commitment to improving the lives of the world's children. From the individual contributions of national immunization programs to the massive scale of the global initiative to eradicate polio, immunization has proved to be one of the most important and cost-effective public health interventions available for the prevention of childhood illnesses and death.¹

Across the world, immunization rates continue to rise. Increased access to immunization has led to real health improvements; for example, measles deaths globally have declined nearly 75 percent since 2000.

Global Progress

The story of immunization is one of partnership. Public and private groups, including nonprofit organizations such as Rotary International, have come together in an extraordinary effort to vaccinate children around the world through national immunization programs and campaigns. Over the past decade, the international community has also worked together with the pharmaceutical industry in a unique partnership to develop new vaccines and produce more of them to be sold at lower cost.

Expanded Program on Immunization

When the **Expanded Program on Immunization (EPI)** was launched by the World Health Organization (WHO) in 1974, fewer than 5 percent of the world's children had been vaccinated against the six target diseases: diphtheria, pertussis (whooping cough), tetanus, measles, polio, and tuberculosis (TB).² Since then, through partnership with the United Nations Children's Fund (UNICEF) and countries themselves, routine vaccination is now provided in all developing countries, and global coverage reaches approximately 80 percent of children before their first birthday.³ To the original package of EPI vaccines,⁴ which served as the standard immunization

schedule for years, have come new additions against diseases such as hepatitis B (HepB), *Haemophilus influenzae* type b (Hib), and yellow fever.

GAVI Alliance

Introduction of these new vaccines has been aided by financial support to countries from the **GAVI Alliance**. The GAVI Alliance (formerly the Global Alliance for Vaccines and Immunisation), launched in 2000, is a novel partnership of diverse stakeholders from both the private and public sectors. GAVI focuses on supporting the 72 poorest countries in the world to increase the proportion of children they vaccinate each year, and on introducing new technology such as the **pneumococcal and rotavirus vaccines**. WHO estimates that by the end of 2008, GAVI support reached a cumulative 213 million additional children with new and underused vaccines and had averted 3.4 million deaths.⁵ GAVI has committed \$4 billion (U.S.) to developing countries through the end of 2015.

To meet these goals, GAVI also uses innovative financing mechanisms, such as the **International Finance Facility for Immunisation (IFFIm)**, to attract new funding for immunization. IFFIm converts donor-country pledges into immediately available resources by issuing bonds in the capital markets. This long-term, predictable funding commitment strengthens GAVI's purchasing power, allowing it to drive down prices so that more vaccines can be purchased for the same amount of money.

Advance Market Commitments (AMCs) are another innovative financing mechanism in immunization. They are designed to stimulate the development and manufacture of new vaccines specifically for developing countries. Donors commit money to guarantee the price of vaccines once they have been developed, which creates the potential for a viable future market. These commitments provide vaccine makers with the incentive to invest the considerable sums required to conduct research and build manufacturing capacity.

A pilot AMC for a pneumococcal vaccine was officially launched in 2009. By the end of 2008, 11 countries had already been approved for GAVI support to introduce the pneumococcal vaccine. Even low-income countries are working with GAVI to try to help pay their share.

Innovation and Scientific Advances

In recent years, the vaccine pipeline has been revolutionized, making it faster, more robust, and more aligned with the needs of developing countries.

It used to take 15 to 20 years for a vaccine that had been developed and made available to rich countries to become available in the developing world. Now that time frame is being

WHAT IS IMMUNIZATION?

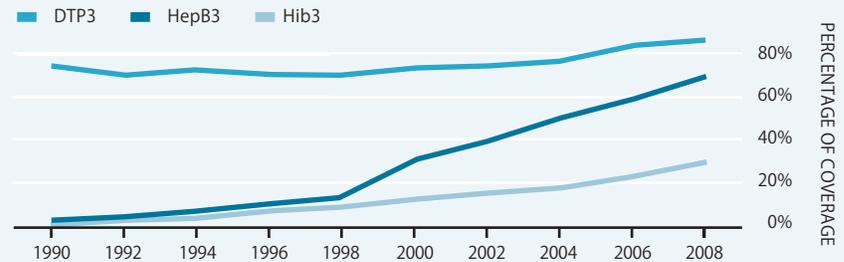
Immunization is one of the most important and cost-effective public health interventions available for the prevention of childhood illnesses and death.¹² Vaccines, which protect against disease by inducing immunity, are widely and routinely administered through immunization programs in every country of the world. Each year, more than 100 million children are vaccinated against measles, polio, and other diseases.¹³

Immunization is a cornerstone of public health programs and serves as a platform for other interventions. These programs have been sustained for decades, even through war and conflict. In one of the greatest successes in public health history, smallpox was eradicated by immunization campaigns in 1979, and polio eradication is now within reach.

Each year approximately 25 million infants do not receive the necessary immunizations, and at least 2.4 million children die from vaccine-preventable diseases—approximately 14 percent of deaths in children under 5.¹⁴ Millions more survive, but are left severely impaired. The long-term effects of these childhood illnesses limit the ability of those who survive to become educated, to work, or to care for themselves or others.

IMMUNIZATION COVERAGE CONTINUES TO RISE

WHO/UNICEF Coverage Estimates for 1990–2008, as of August 2009



Source: WHO vaccine-preventable diseases: monitoring system 2009 global summary

compressed, and it will soon be possible to introduce new vaccines throughout the world simultaneously. Three recently introduced vaccines include those for:

- rotavirus diarrhea, which kills approximately 500,000 children every year;
- human papillomavirus (HPV), a leading cause of cervical cancer, which afflicts some 500,000 women each year, 80 percent of them in developing countries; and
- pneumococcal disease, which causes a large fraction of the world's approximately 2 million annual deaths from childhood pneumonia.

Developing countries used to make do with vaccines tailored to industrialized countries and their delivery systems, but, thanks to increased investments, many new vaccines that specifically target the disease burden in developing countries are in the research and development (R & D) pipeline. For example, a conjugate vaccine currently in development should be much more effective against group A meningococcal meningitis, a frequently fatal infection that causes recurring epidemics in a number of countries in Sub-Saharan Africa. On the horizon are many new opportunities, including a new vaccine against malaria.

An innovative **pentavalent vaccine**, introduced with GAVI support, enables children to be immunized against five diseases—diphtheria, tetanus, pertussis,

HepB, and Hib (DPT-HepB+Hib)—all in one vaccine, reducing the number of injections a child has to get and the number of visits it takes to get them, therefore increasing the likelihood that a child will get all the necessary vaccines. This also reduces the number of vials that need to be transported and cold-stored.

Other innovations have improved the safety and quality of vaccine delivery, such as **auto-disable syringes** that prevent reuse and **vaccine vial monitors**—temperature-sensitive labels—that can be attached to vaccine vials and indicate through a change in color whether an individual vial has been exposed to heat that is likely to have damaged the vaccine.

Results⁶

Global investments in immunization are paying off. Experts estimate that **more than 20 million children's lives have been saved** through routine immunization over the past 20 years.⁷ WHO estimates that immunization averts more than 2.5 million deaths each year from diphtheria, tetanus, pertussis, and measles.

Immunization rates continue to rise across the world. The number of children covered by immunization increased dramatically during the 1980s, as countries tried to reach the goal of universal childhood immunization by 1990.⁸ Although progress slowed in the 1990s, the launch of GAVI in 2000 helped bring new resources and

momentum. A good illustration of this is the percentage of infants that have received the required three doses of diphtheria-tetanus-pertussis (DTP3), which is used as a proxy indicator for country and regional performance of routine immunization programs. WHO/UNICEF estimate global coverage of DTP3 to have reached 81 percent, up from 73 percent in 2000.⁹

Thanks to scaled-up immunization efforts, the prevalence of polio has declined dramatically since the 1988 launch of the Global Polio Eradication Initiative, from an estimated 350,000 cases down to 1,652 cases in 2008.¹⁰

Progress has also been made against measles. Measles is a leading cause of death among young children even though a safe and cost-effective vaccine is available to prevent the disease, but this is beginning to change:

- Measles immunization rates have risen steadily since 1990, now reaching 82 percent global coverage.
- Even in the poorest countries of the world, great progress has been made in increasing measles immunization rates. Africa has, as a region, reached 74 percent immunization coverage, up from 56 percent in 2000.
- The number of measles deaths globally has declined nearly 75 percent from an estimated 750,000 in 2000 to 197,000 in 2007.

Finally, new vaccines are gradually being introduced in low- and middle-income countries. Immunization coverage against HepB and Hib has been increasing since 1990. Also, the past decade has witnessed remarkable strides since GAVI financing support was introduced.

- By the end of 2007, the HepB vaccine had been introduced nationwide in 171 countries, up from 65 countries in 1997.
- Also by the end of 2007, the Hib vaccine had been introduced in 115 countries, up from 26 in 1997.
- Support from the GAVI Alliance will have helped avert 3.4 million deaths from HepB, Hib, and pertussis through 2008.

Moving Forward

Despite evidence of enormous progress, many significant challenges remain. Even where coverage rates are high, immunization programs must be maintained and supported. Where coverage is low, as in many West African countries, immunization programs must be expanded to provide access to those who have not yet been reached. Finally, as new vaccines become available, new financing strategies will be needed to ensure that they can be made available to those who need them.

Maintaining and expanding coverage

One major challenge of immunization programs is that they must achieve a high level of coverage year after year. Programmatic and financial sustainability will require integration with health systems, as well as greater coordination with disease-specific programs such as the U.S. President's Emergency Plan for AIDS Relief (PEPFAR) and the Global Fund to Fight AIDS, Tuberculosis and Malaria (Global Fund). National health systems will need to be improved to support successful delivery of high-quality vaccines, which requires a comprehensive temperature-controlled delivery system called the cold chain. Vaccines need to be transported at the correct temperature to prevent them from either freezing or being exposed to too much heat. But in many countries, it is difficult to ensure this type of transport from the airport to the children in a village who need the vaccines.

Ensuring access to new and underused vaccines

A wealth of new vaccines has opened the door to tremendous opportunities for saving lives. However, an increasing challenge is ensuring sustainable financing for countries to purchase these new vaccines emerging from the R & D pipeline. The newer vaccines are often more expensive than the older, familiar ones. Also, whereas new

COUNTRY SPOTLIGHT: REDUCING HIB MENINGITIS IN MALAWI

Malawi is one of the poorest countries in the world—approximately 65 percent of the population lives on less than \$1 (U.S.) a day—but they have shown great commitment to immunization and have demonstrated real results. Malawi's EPI program became fully operational in 1979. The routine immunization program currently provides measles, DPT-HepB+Hib, polio and BCG vaccinations to children under age 1, and tetanus toxoid vaccine to pregnant women and women of child-bearing age

countrywide. Since Malawi attained the Universal Childhood Immunization goal in 1989, immunization coverage for all target diseases has since been maintained at 80 percent or more. Immunization services are integrated within the preventive health services and funded by the national government budget, with the assistance of collaborating partners and donors for logistics, cold-chain supplies, and vaccines. In January 2002, Malawi introduced HepB and Hib vaccines with support from the GAVI

Alliance. The government of Malawi also committed to an average annual contribution of 5 percent of the cost of the pentavalent vaccine.

Data from the WHO pediatric bacterial meningitis surveillance network through 2005 has shown that the Hib conjugate vaccine has been highly effective in reducing Hib meningitis cases in Malawi, even in HIV-infected children. Hib meningitis incidence rates in the Blantyre district (where the surveillance site is located) among



children ages 1 to 59 months decreased significantly in both rural and urban areas, from 27 to 39 cases per thousand people in 1997 to virtually zero.¹⁵ Malawi shows that even poor countries can do a good job of immunizing their populations, leading to reductions in disease.

vaccine introduction used to occur once every 10 years, recent scientific advancements have led to much more frequent introduction. The cumulative cost of adding many new expensive vaccines to the national immunization schedule can be overwhelming to developing countries. Adding more vaccines to the immunization schedule also requires expanding cold-chain capacity and reinforcing the supporting health care system.

Ensuring adequate financing

Between maintaining and expanding coverage for routine immunizations, and ensuring access for new vaccines emerging from the R & D pipeline, the total costs of financing are significant. WHO/UNICEF estimate that \$11 billion to \$15 billion (U.S.) in additional funding will be needed to reduce mortality due to vaccine-preventable diseases by two-thirds by 2015 (by maintaining and scaling up immunization coverage and introducing new vaccines).¹¹

Endnotes

1. UNICEF/WHO, *State of the World's Vaccines and Immunizations*, 2002; World Bank, *World Development Report*, 1993.
2. J. Bland, J. Clements, "Protecting the World's Children: the Story of WHO's Immunization Program," *World Health Forum*, 19, no. 2 (1998): 162–173.
3. Complete coverage with three doses of diphtheria-tetanus-pertussis (DTP3) is used as a proxy indicator for country and regional performance of routine immunization programs. To be fully immunized, children must receive three doses of the DTP vaccine before their first birthday. WHO/UNICEF immunization coverage estimates, data as of August 2008.
4. Diphtheria-tetanus-pertussis (DTP), measles-containing vaccine (MCV), oral polio vaccine (OPV), Bacillus Calmette-Guerin (BCG) against tuberculosis.
5. GAVI Alliance Progress Report 2008, http://www.gavialliance.org/resources/2008_GAVI_Alliance_Progress_Report.pdf.
6. All coverage data in this section are from WHO/UNICEF immunization coverage estimates, data as of August 2008.
7. GAVI Alliance Progress Report 2008, http://www.gavialliance.org/resources/2008_GAVI_Alliance_Progress_Report.pdf.
8. Universal childhood immunization (UCI) is defined as 80 percent coverage of children with the six original EPI vaccines.
9. DTP3 is often considered the best indicator of access to basic services, including health services. Of the approximately 24 million unvaccinated, 73 percent of these children live in 10 countries: Bangladesh, China, Democratic Republic of the Congo, Ethiopia, India, Indonesia, Niger, Nigeria, Pakistan, and Uganda.
10. WHO Fact Sheet No.114, Poliomyelitis, <http://www.who.int/mediacentre/factsheets/fs114/en/index.html>; <http://www.polioeradication.org/casecount.asp>.
11. Wolfson, et al., "Estimating the Costs of Achieving the WHO-UNICEF Global Immunization Vision and Strategy, 2006–2015," *Bulletin of the World Health Organization*, 86(1) (2008): 27–39.
12. UNICEF/WHO, *State of the World's Vaccines and Immunizations*, 2002; WB, *World Development Report*, 1993.
13. WHO/UNICEF immunization coverage estimates, data as of August 2008, http://www.who.int/immunization_monitoring/data.
14. WHO Department of Immunization, Vaccines and Biologicals estimates for vaccine-preventable deaths for the year 2002 (latest available data).
15. Daza, et al., "The impact of routine infant immunization with *Haemophilus influenzae* type b conjugate vaccine in Malawi, a country with high human immunodeficiency virus prevalence," *Vaccine*, 24 (2006): 6232–6239.

The Living Proof Project is a multimedia initiative intended to highlight successes of U.S.-funded global health initiatives. Millions of lives have already been transformed and saved with effective, affordable solutions. We have the knowledge, innovative technologies and proven tools to do much more. The content for this progress sheet was developed by the Global Health Group at the University of California, San Francisco and SEEK Development in Berlin. It is also available online at www.livingproofproject.org.