

## Vaccines for Development

Owen Barder\*

Immunization is one of the best ways to improve health in developing countries. While the importance of vaccines is increasingly well-understood, significant challenges inhibit increases in basic immunization coverage, introduction of underused vaccines and development of new vaccines.

Five innovative policy measures are being implemented to address these challenges: performance-based grants, a global vaccine purchasing fund, the new International Finance Facility for Immunization (IFFIm), public-private product development partnerships (PDPs) for development of new products, and advance market commitments (AMCs) to create incentives to develop and manufacture new vaccines. These policies have evolved separately, but together constitute a broadly consistent package of measures benefiting from the institutional umbrella of the Global Alliance for Vaccines and Immunization. This brief looks at the underlying problems and assesses the policy response. It suggests that the approaches adopted for vaccines may usefully be extended to other areas of development assistance.

### The case for vaccines

Vaccination is a cost-effective and safe way to improve health. Over the past fifty years, vaccination has transformed lives in both rich and poor countries—resulting in the eradication of smallpox and huge reductions in the burden of previously common diseases such as polio, typhoid and measles. Immunization is particularly well-suited to countries with weak health systems, because it requires little training and equipment and does not depend on skilled diagnosis, long-term drug regimens or extensive medical care.

Despite the weakness of health systems in many poor countries, three-quarters of the world's children now receive a standard package of childhood vaccines through the WHO/UNICEF Expanded Program on Immunization to protect them against diphtheria, tetanus, pertussis, polio, measles and neonatal tuberculosis. These vaccines currently save an estimated 3 million lives a year—almost 10,000 lives a day—and protect millions more from illness and permanent disability.<sup>1</sup>

Donors have rightly recognized that immunization is one of the most cost-effective health interventions for developing countries, with the full package of basic vaccines costing less than \$20 per year of life saved in poor countries.<sup>2</sup> This represents outstanding value for money: development interventions are generally considered extremely cost-effective if the cost per year of life is less than \$100.<sup>3</sup> By comparison, antiretroviral treatment for HIV/AIDS—an intervention that donors widely support in the developing world—costs up to five times as much at \$350 to \$500 per life-year saved. (By way of comparison, in the US and the UK medical interventions are considered cost-effective at \$50,000 to \$100,000 per life-year saved.<sup>4</sup>)

Immunization has other characteristics that make it an attractive form of development assistance. There are few opportunities for corruption, as vaccines have a low market value, and there are no exchange rate consequences as a result of increased imports of vaccines. As well as saving

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lives and preventing suffering, there is a well-established virtuous circle linking improvements in health and life-expectancy to the country's long-term economic performance.<sup>5</sup>

## Policy challenges in vaccination

Figure 1 below shows the annual deaths that could be prevented by current or possible future vaccines. Approximately 1.2 million people die needlessly each year because they did not receive the basic six vaccines against tuberculosis, diphtheria, neonatal tetanus, whooping cough, polio and measles, all of which have been widely used in rich countries since the early 1960s. At least a further 2-3 million deaths a year could be avoided by full use of under-used vaccines against *Haemophilus influenzae* type B (Hib) and hepatitis B as well as the introduction of new vaccines against pneumococcal disease and rotavirus.

Three main challenges hinder more widespread use of vaccines.

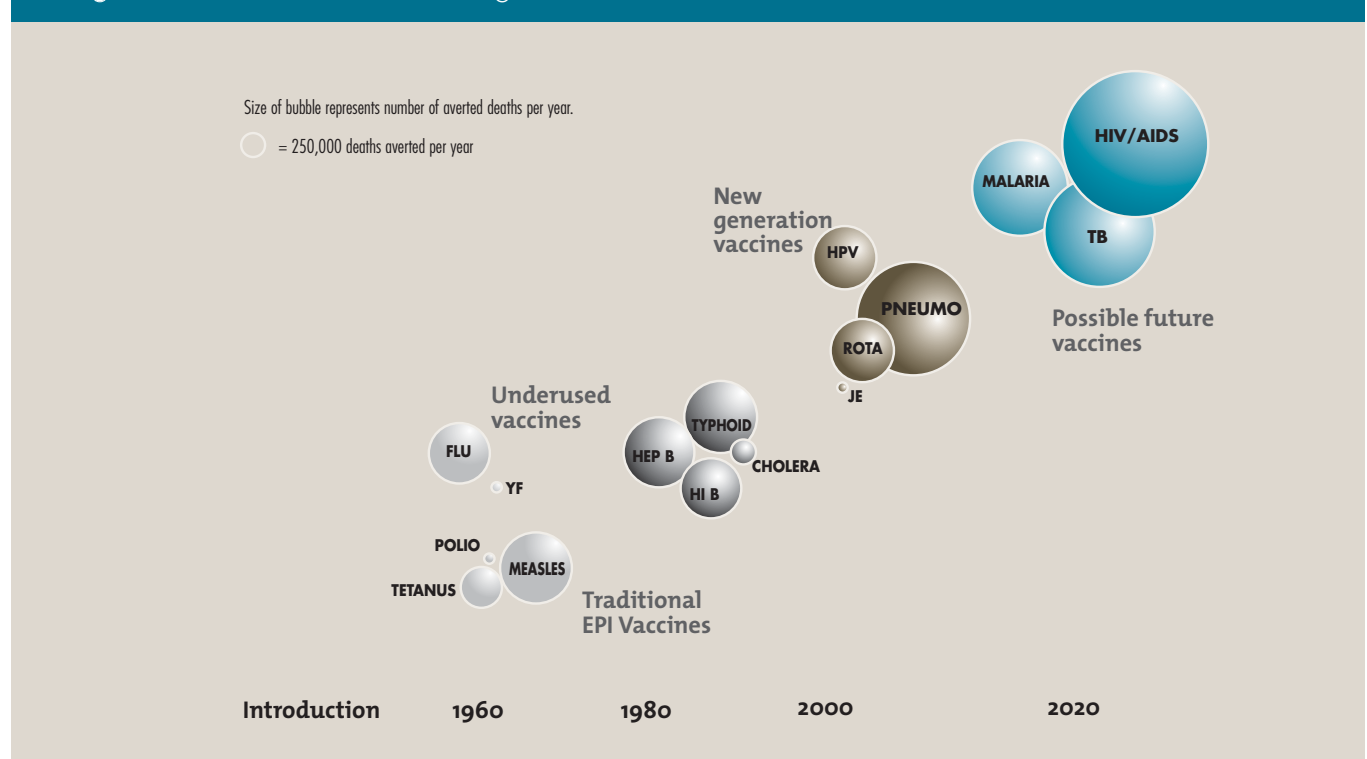
**First**, extending basic vaccine coverage in developing countries depends on building up the health systems with physical

infrastructure, more and better trained personnel, and improved information and logistics. While many countries have demonstrated that vaccines can be delivered inexpensively to remote and rural areas, not all have had sufficient resources or managerial capability to make the modest investments needed. Some donors are reluctant to pay for the recurring expenses of an immunization program, preferring more visible interventions that make better headlines even though they may not be as effective at saving lives.

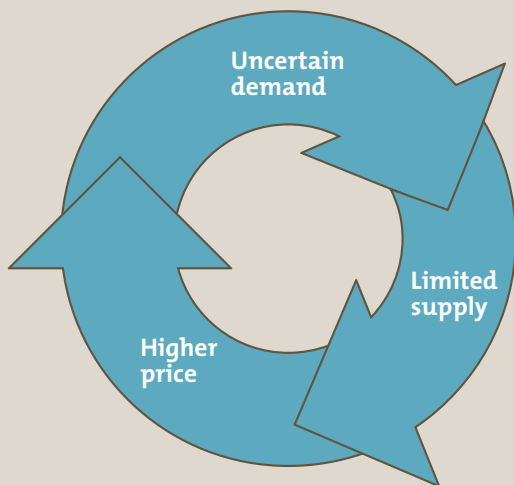
**Second**, some of the existing vaccines have not been affordable for developing countries, so that even where children can be vaccinated, governments could not afford to buy the full package of childhood vaccines—particularly the newer, more expensive vaccines. There is a vicious circle of unpredictable and insufficient donor funding, which leads to unpredictable and insufficient expressions of demand from governments, which in turn reduces investment in vaccine production, driving up unit costs and contributing to supply shortages.

More than a decade after the widespread introduction in the U.S. and Europe of the Hib vaccine, which protects against

**Figure 1. The Vaccine Challenge**



**Figure 2.** The vicious circle of uncertainty, supply and cost



sepsis, pneumonia, meningitis and ear infections, fewer than ten percent of infants in the world's poorest seventy-five countries were routinely receiving it as part of their childhood immunization package, which resulted in almost half a million avertable deaths per year.

**Third**, there are insufficient commercial incentives for the pharmaceutical industry to invest in R&D for diseases primarily affecting poor countries, such as malaria, tuberculosis, HIV and other tropical diseases. In the past, vaccines developed against diseases afflicting rich countries, such as for measles and polio, have been widely and effectively used in developing countries. But there is no commercial rationale to develop vaccines for diseases that occur mainly in the poorest countries and for which there would be only a very small market in rich countries. Though these diseases kill millions of people, the communities affected cannot afford to buy vaccines at a price that would enable developers to recover the research and development costs.

As a result of these three policy challenges, many children remain completely unvaccinated despite the safety, efficacy and affordability of immunization; many others do not receive the full package of available life-saving vaccines; and pharmaceutical innovation is not being extended to the diseases most affecting the poorest countries.

### Three policy challenges

- Insufficient resources for health systems
- High prices & unstable demand
- Insufficient R&D for new vaccines

### Five policy innovations in vaccines

Five important and related innovations have been designed to meet these challenges and maximize aid effectiveness, largely under the purview of the Global Alliance for Vaccines and Immunization (GAVI). GAVI is a public-private partnership that was formed in 1999 to bring together governments, established and emerging vaccine manufacturers, nongovernmental organizations, research institutes, UNICEF, the World Health Organization, the Bill & Melinda Gates Foundation and the World Bank with the goal of strengthening national health and immunization systems, introducing new and underused vaccines, and accelerating the development of new vaccine.

#### PERFORMANCE-BASED GRANTS

From the outset, GAVI adopted a new financing mechanism to build health and immunization infrastructure in developing countries by increasing country ownership and linking funds to both need and performance. Funds are allocated based on country-defined need, with countries with lower immunization rates and high numbers of unvaccinated children getting more resources. Countries with immunization rates of less than 80% can apply for funding to build their health capacity and improve immunization services and can decide themselves how best to use those funds to increase immunization rates. After an initial investment phase, future awards are dependent on the countries meeting their goals and showing results, backed up by data quality audits. The early signs are that linking funding to outputs in this way has successfully created incentives for improved performance, while providing assurance for donors that funds are used for the purposes intended.

#### PURCHASING FUNDS & POOLED PROCUREMENT

An equally important innovation behind the creation of GAVI was the establishment of a purchasing fund for new and underused vaccines against yellow fever, hepatitis B and Hib, particularly combined with the existing diphtheria-tetanus-pertussis vaccine to facilitate rapid uptake and integration into routine immunization schedules. This enabled countries to obtain vaccines that they couldn't have otherwise afforded, and by drastically increasing available resources for these products

and pooling their procurement through UNICEF, GAVI demonstrated a more reliable demand and attracted several new vaccine manufacturers to enter the under-supplied market. However, the expansion of demand for vaccines without corresponding improvements in procurement practice (such as the ability to enter into binding long-term contracts) has resulted in price increases for some vaccines. As a result of these increases and uncertainties about long-term donor financing, the introduction and uptake of newer vaccines in developing countries has been slower than anticipated. GAVI needs to develop reliable and fair burden-sharing among donors, create a predictable and sustainable long-term financing framework for developing countries to enable them to invest in the introduction of new vaccines, and establish long-term procurement contracts with vaccine suppliers that would lower prices and increase security of supply by reducing risk.

#### THE INTERNATIONAL FINANCE FACILITY FOR IMMUNIZATION

IFFIm is a new financing mechanism that will increase the resources available for childhood vaccines in poor countries. Donors will make long term pledges of funding, on the basis of which GAVI can borrow money from financial markets in order to front-load spending on vaccination programs and to enter into long-term procurement contracts. The aim is that both developing countries and vaccine manufacturers will be able to plan ahead, in the knowledge that the necessary resources will be available. This is expected to secure lower prices, accelerate increased availability of new vaccines, and support the substantial system improvements required to absorb new vaccines. The goal is to scale up coverage to 90% in every country.

IFFIm aimed to secure commitments of at least \$4 billion, which is estimated to prevent 5 million child deaths between 2005-2015 and more than 5 million future adult deaths. By April 2006, commitments to IFFIm had been made by Brazil, France, Italy, Norway, Spain, Sweden, South Africa and the UK.

The UK Government has advocated the idea that spending on international poverty reduction could be more effective if it were "front loaded" rather than spent over time as aid budgets allow.<sup>6</sup> The proposal for an International Finance Facility suggests that the gains from bringing spending forward exceed the borrowing costs. Recent work by the Center for Global Development shows that this is most certainly true for vaccinations, regardless of whether it is true for aid spending more generally.<sup>7</sup>

Front-loading spending on vaccination increases the cost-effectiveness of spending for three reasons. First, there are long term herd-immunity benefits from vaccination. By increasing immunization coverage rates today, the disease level falls and the

risk of catching the disease is reduced in the future. This means that an immunization today is worth more than an immunization tomorrow. Second, the commitment of funds to IFFIm should enable purchasers to enter into long term contracts with vaccine suppliers, which in turn would allow producers to build larger plants and achieve significant returns to scale. This can reduce the costs of vaccination very substantially. Third, the long term commitment enables proper planning and sequencing of investment in systems, training and purchasing to strengthen immunization systems, delivering greater value for money than spending money on a year-to-year basis.

The argument for IFFIm rests on whether these benefits are large enough to outweigh the interest and financing costs. We find that *even after taking the financing costs into account*, front-loading spending on vaccines as envisaged by IFFIm increases value for money by 22 percent.<sup>8</sup> Of that, about half of the benefit is the result of front-loading the spending, and half is impact of greater predictability that the mechanism permits.

GAVI intends to use IFFIm resources to complement its other activities, although it has yet to capitalize on the mechanism's predictability by enabling purchasers to enter into long term purchasing arrangements.

#### PRODUCT DEVELOPMENT PARTNERSHIPS

Over the last decade, dozens of partnerships have been developed to link global health organizations, pharmaceutical manufacturers, biotech firms, academia, and developing-world governments. These public-private partnerships have diverse objectives, composition, organizational structures and funding. Some support the distribution and use of existing medicines, while others focus on beginning or completing the development of new medicines.

The partnerships which aim to develop new vaccines and drugs are known as product development partnerships (PDPs). They typically use a portfolio management approach by investing in different companies who then undertake the research. Examples from the vaccine world include the International AIDS Vaccine Initiative (IAVI), the Malaria Vaccine Initiative (MVI), and the Meningococcal A/C partnership at PATH.<sup>9</sup> Another non-profit business, Institute for

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**By front loading spending on vaccines and making funding more predictable, the IFFIm will hugely increase value for money and so save many more lives.**

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OneWorld Health, uses intellectual property donated by companies to investigate how those technologies can be used to improve global health.

These partnerships are useful for development of new vaccines. They coordinate industry, academic partners and contractors along the vaccine development pipeline, and they manage development portfolios, including in some cases the selection and termination of projects based on the progress they are making.

The PDPs tackle an important policy challenge, namely the lack of investment in new vaccines for diseases which mainly affect poor countries. However, even with generous funding—the vast majority of which comes from the Bill & Melinda Gates Foundation—the total investment in research for vaccines into these diseases is small relative to medical R&D for diseases of rich countries, and tiny relative to the health burden that these diseases impose.

As well as product development PPPs, there are other initiatives (including GAVI's Accelerated Development and Introduction Plans for rotavirus and pneumococcus, as well as the new Hib Initiative), which are focused not only on development of new vaccines but also on promoting the rapid introduction and use of new vaccines by informing evidence-based decision-making within national Ministries of Health.

#### ADVANCE MARKET COMMITMENTS

An advance market commitment is an incentive to stimulate the commercial development and rapid introduction of new vaccines. Donors would make a legally binding guarantee that, if a future vaccine is developed against a particular disease, they will pay for it to be bought by developing countries. The guarantee would be linked to technical standards that the vaccine must meet, and be structured in a way to allow several firms to compete to develop and produce the best possible new vaccines.<sup>10</sup>

A Center for Global Development Working Group examined this proposal in detail, and established that a commitment large enough to have a significant impact on the incentives of the pharmaceutical companies would still represent an excellent value for money. A donor commitment to buy vaccines that would offer firms revenues broadly similar to those they earn from drugs they have developed for rich country markets could immunize children at a cost of \$15–\$30 per life-year saved. This would be highly cost-effective by comparison with other development interventions.

This approach has a number of attractive features. It enables governments to fund the development of new vaccines without hav-

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ing to select particular scientific opportunities to support; and if no vaccine is successfully developed there is no cost to the taxpayer. For firms, it offers the opportunity to make commercial returns in new markets which at present do not offer substantial returns. And for developing countries, it increases the

prospects not only of accelerated development of new vaccines, but also provides funding to ensure that those vaccines will be affordable once they have been developed.

The advance market commitment proposal therefore tackles two of the main policy challenges: lack of affordable access to vaccines that have been developed, and insufficient commercial incentive to develop vaccines for diseases concentrated in developing countries. The G8 Finance Ministers have endorsed the concept, and have called for further technical work to enable them to launch an advance market commitment.

#### MOVING FORWARD

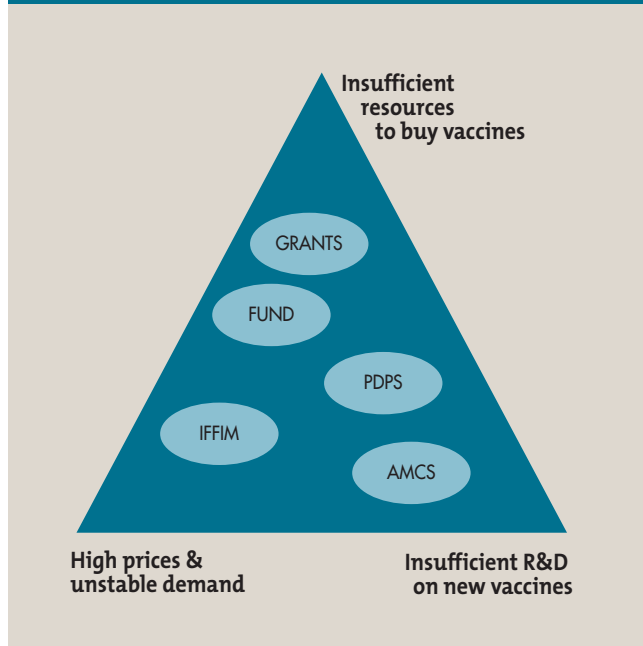
Vaccines are increasingly recognized as having an essential role to play in improving public health and promoting development in poor countries. They are a cheap, effective and safe way to combat infectious diseases and so improve the lives and livelihoods of the poor. Vaccines are a necessary component of any strategy to meet the Millennium Development Goals.

Greater use of vaccines is, however, inhibited by three constraints: insufficient resources to develop health systems; the cost of new vaccines, partly as a result of unpredictable demand; and the lack of commercial incentive to develop new vaccines for diseases concentrated in developing countries.

Figure 3 illustrates how the five policy innovations address these challenges. Though the policies have been developed separately, they contain the makings of a coherent response to the need to increase access to vaccination in developing countries.

Through its performance-based grants and vaccine purchasing fund, GAVI channels additional resources to enable health systems development and to increase resources for vaccine procurement. With the addition of the International Finance

**Figure 3. Challenges and Policies**



Facility for Immunization, GAVI should make longer term commitments through UNICEF, which together with front-loaded spending will make purchasing more predictable and bring down vaccine prices, as well as enabling better planned investment in health systems. The public private partnerships have increased resources flowing to the development of vital new vaccines, and helped countries to position themselves to take advantage of the opportunities that these provide. Finally, if advance market commitments are implemented, they will complement that increased research with commercially financed research and will help to ensure that new vaccines are widely available when they are developed.

Within this broad framework of immunization challenges and opportunities for innovation, policy makers within donor governments, technical agencies, pharmaceutical companies and national Ministries of Health will face many choices about how to best increase immunization over the coming years. As they do, they should be guided by the following principles:

- Retain a strategic overview of the challenges, and take a coherent view of the way in which these approaches can work together to meet them.
- Ensure that the funding for the purchase of vaccines is consistent & predictable, to enable developing countries to introduce new vaccines with confidence about long term sustainability. IFFIm represents one such mechanism, national budgetary processes permitting.
- Reform the procurement of vaccines by entering into long-term contracts, so that vaccine companies can invest in expanded production to bring down costs by reducing risk burden.
- Increase investment in health systems in developing countries to ensure that immunization reaches as many children as possible.
- Send consistent signals that the goal of policy is not merely to buy vaccines as cheaply as possible, but also to ensure that vaccine companies can make reasonable returns producing vaccines to meet global demand and to enable them to develop new vaccines.
- Increase funding for all these approaches together and ensure that additional resources for the development of vitally needed new vaccines are not competing with funding available for the purchase and use of existing products.

## References

- 1 Owen Barder, Michael Kremer, and Heidi Williams (2006) "Advance Market Commitments: A Policy to Stimulate Investment in Vaccines for Neglected Diseases," *The Economists' Voice*: Vol. 3: No. 3, Article 1. <http://www.bepress.com/ev/vol3/iss3/art1>. pg. 398.
- 2 Ramanan Laxminarayan, Jeffrey Chow, and Sonbol A. Shahid-Salles (2006). "Intervention Cost-Effectiveness: Overview of Main Messages. *Disease Control Priorities in Developing Countries*. 2nd ed. (Washington, DC: World Bank, 2006). p. 44.
- 3 Throughout this brief, "life-years" and "year of life" consistently refer to disability-adjusted life-years (DALYs).
- 4 Owen Barder & Ethan Yeh The costs and benefits of front-loading and predictability of immunization, CGD Working Paper 80. (Washington, DC: Center for Global Development, 2006). <http://www.cgdev.org/content/publications/detail/6178>.
- 5 Peter Lorentzen, John McMillan, and Romain Wacziarg. "Death and Development," National Bureau of Economic Research Working Paper 11620. <http://www.nber.org/papers/w11620>.
- 6 H M Treasury and DFID, The International Finance Facility, September 2005 [http://www.hm-treasury.gov.uk/media/837/60/IFF\\_proposal\\_Sep\\_05.pdf](http://www.hm-treasury.gov.uk/media/837/60/IFF_proposal_Sep_05.pdf).
- 7 Owen Barder & Ethan Yeh (2006) op cit.
- 8 Owen Barder & Ethan Yeh (2006) op cit.
- 9 William Muraskin (2002) "The last years of the CVI and the birth of the GAVI." In *Public-private partnerships for public health*. Edited by M Reich. Cambridge, Massachusetts; Harvard Center for Population and Development Studies; 2002:115-68.
- 10 Owen Barder, Michael Kremer, Ruth Levine and the Advanced Market Commitment Working Group (2005) *Making Markets for Vaccines*, Washington, DC: Center for Global Development.

## About the Global Health Policy Research Network

The Global Health Policy Research Network (GHPRN) brings together leading experts in public health, economics and other social science and technical fields to develop original, focused research on high-priority global health policy issues. The GHPRN seeks to improve the outcomes of donor decision-making in global health by:

- Providing a rich evidence-base about policy opportunities and constraints to effective public and private aid in the health sector;
- Bringing new people and perspectives—both multidisciplinary and global—into health policy analysis to increase the robustness of the debate; and
- Supporting the development of innovative solutions to global health financing and other policy problems.

The GHPRN seeks opportunities to contribute analyses about better ways to stimulate and support innovation in products, effective public health practices and delivery strategies; to ensure equitable access over the long-term to key health services; and to better understand how investments in the health sector effects both health conditions and broader economic and social development. In addition to Advance Market Commitments, other GHPRN Working Groups have explored:

- How to identify examples of 'what works?' in global health and the factors that contribute to those successes;
- How to build a comprehensive, credible base of information about financial flows to global health, which is responsive to advocacy, program and policy data needs;
- How to stimulate development agencies to conduct rigorous impact evaluations of major development projects, so that they contribute to global knowledge about what works;
- How to measure a government's commitment to health;
- How to effectively harness performance-based incentives in health;
- How to increase access to pharmaceutical products through better demand forecasting;

The Center for Global Development leads the GHPRN with support from the Bill & Melinda Gates Foundation. For more information on CGD's Global Health Policy Research Network, please visit [www.cgdev.org/globalhealth](http://www.cgdev.org/globalhealth)

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