

## A Risky Business: Saving Money and Improving Global Health through Better Demand Forecasts

Whether poor people in developing countries receive adequate health care depends in part on whether they have access to crucial medical technologies, such as drugs, vaccines, and diagnostics. Despite increased donor funding and an array of new products, weak links in the global health supply chain continue to greatly restrict access to essential health products, including those needed to prevent and treat AIDS, malaria, TB and other deadly diseases. One of the weakest links is in demand forecasting—the process of predicting, often more than a year in advance, which products will be purchased in what quantities.

Predicting demand is tricky: it means figuring out ahead of time how much of which products governments, private consumers and donors will want to buy, and how much they will be willing to pay, often even before these decisions have been considered. It is made trickier by the recent entry of many new sources of funding and advice, a broad range of new products, and new actors in procurement. The lack of accurate forecasts has several damaging effects. It increases risks for suppliers, resulting in higher costs and supply shortages. It discourages firms from investing in research and development (R&D) for new health products that poor people need. And it creates obstacles for donors and national governments as they seek to spend aid effectively to improve health and save lives.

This brief reviews the findings of CGD's Global Health Forecasting Working Group, which was first convened in early 2006 to study the challenges surrounding demand forecasting. The group concluded that better forecasting requires wider sharing of the risk involved in producing drugs, and aligning incentives among those who influence market dynamics. The group offered three key recommendations:

- Improve the capacity to develop credible forecasts by acting in specific ways to **take forecasting seriously**;
- Mobilize and share information about product demand in a coordinated way through the establishment of an **infomediary**; and
- Share risks and align incentives through a broad range of **contractual arrangements**.

### The Changing Global Health Marketplace

As official development assistance and philanthropic efforts aimed at improving health in the developing world are increasingly focused on essential medical technologies (including drugs, vaccines and diagnostics), the global supply chain has struggled to catch up. New risks for manufacturers, funding and technical agencies, developing country health systems, and—most importantly—patients have emerged, and new approaches are needed to ensure that those risks are effectively managed so that access to new and lifesaving products is not compromised.

Compared to a mere five years ago, the market for global health products—and both the difficulty and importance of forecasting demand for them—has changed dramatically. Major changes include:

- **More and increasingly diverse products** are being developed and delivered, some with long production lead times and short shelf lives. Many of these are still under patent, have few suppliers and high prices per dose. Costs are further driven up by the technological complexity of the new drugs and vaccines; opportunities for recouping investments through sales in

wealthy markets are limited for those, such as anti-malarials, that can expect virtually no consumption in the US and Europe. These products have the potential to save millions of lives, but without a continuous supply, treatment can be interrupted, leading to patient death and the emergence of drug resistance.

- **More money and greater dependence on donors** as governments and foundations have increased attention and resources for global health. Billions of dollars in donor funding is now focused on infectious diseases, and much of it flows through new financing mechanisms such as the GAVI Fund, the International Finance Facility for Immunization, Advance Market Commitments, the President's Emergency Plan for AIDS Relief, the Global Fund to Fight AIDS, Tuberculosis and Malaria, and UNITAID/International Drug Purchasing Facility. In addition, the higher costs of new products and treatments mean that donors shoulder a larger portion of the financial burden.
- **More and different suppliers and emerging business models** are new features in the market. For example, some

multinational companies have agreed to set prices to recover costs or to license production in developing countries to respond to urgent public health needs. A range of product development partnerships have also been created to accelerate innovation to address neglected diseases.

- **New buyers and intermediaries** have entered the market at the country- and global-level, some with very limited experience in forecasting, procurement and delivery.

These changes in the global health marketplace intensify the volatility of donor aid, introduce new sources of risk that affect the willingness of manufacturers to engage in developing country markets, and constrain the availability of essential medical technologies in poor countries, thereby increasing the health costs of supply chain failure. While there are many manifestations of these risks, the one that affects critical decisions, from whether to invest in R&D for future products to how to guard against stock-outs of antiretrovirals in health facilities, is shortcomings in *demand forecasting*. With a collective and cooperative effort by

## The Costs of Poor Forecasting: the Case of Malaria

Every year, over a million people die from malaria—most of them children—and hundreds of millions more suffer from disease and disability. Along with the devastating human toll, the economic costs to many African countries are massive. The malaria burden has increased in recent years, in part because inexpensive and widely available anti-malarials such as chloroquine are no longer effective in many regions due to rapidly emerging drug resistance. As a result, in early 2004 the World Health Organization (WHO) recommended that countries adopt a new class of drugs called artemisinin-based combination therapies (ACTs).

The cost of production, and hence the price of ACTs (even on concessional terms) are significantly higher than traditional malaria treatments: 10 cents for an average dose of chloroquine compared to \$1 or more for ACTs. An important contributor to the high costs of ACTs is the long (14-month) production cycle, which depends on the agriculture production of a key component, artemisinin, which is then combined with a second compound to hasten recovery and delay the onset of artemisinin-resistant parasites.

While several manufacturers packaged the different drugs together, until early 2007 Novartis was the only company that co-formulated two drugs into a fixed-dose pill (under the brand name Coartem). Under an agreement with WHO, they sold Coartem to developing country governments and international donors at a price set to recover the cost of production; in exchange, they relied on WHO to provide demand forecasts. The long production cycle coupled with a very short shelf life of only 24 months

make accurate demand forecasts essential. Unfortunately, the forecasts provided to the manufacturer from the international community—which were estimates more of need than of effective demand—proved to be off by orders of magnitude.

The story started in 2004, when Novartis suffered public recrimination because it was unable to produce enough Coartem to meet an unexpected surge in demand after major funding sources, most notably the Global Fund to Fight AIDS, Tuberculosis and Malaria, suddenly reversed their policies on using grants for procurement of ACTs. So when WHO forecast demand for 55 million courses of Coartem for 2005, Novartis invested in scaling up its production capacity accordingly, and produced 30 million treatments. But, in part because national governments were unprepared to make the switch and were unsure of long-term funding prospects, uptake was slower than anticipated; only 9 million treatments were sold that year. Novartis experienced even larger surpluses and excess inventory in 2006 as the uptake at the country-level continued to be significantly slower than expected. Today, while Novartis has scaled-up its production capacity to produce 120 million treatments (based on the initial WHO forecast in 2004), the realized sales continue to be about 60 million. In the meantime, millions of dollars, many doses and considerable good will have been wasted while malaria patients continue to die without access to treatment. For those working for greater engagement by commercial pharmaceutical firms in developing country markets, this is not the stuff of which good business cases are made.

funding agencies and manufacturers, however, demand forecasting can be improved.

## Five Critical Functions of Demand Forecasting

Demand forecasting serves five critical functions in the market for global health products and the effective delivery of medicines and supplies. Together, these five functions save lives.

- 1. Essential products are available because there is enough supply to meet demand.** Demand forecasts allow manufacturers to plan and invest in manufacturing capacity while taking advantage of production efficiencies, ensuring sufficient supply to meet demand.
- 2. New products are developed because there is a realistic picture of future markets.** Demand forecasts provide manufacturers with information about new market potential, permitting them to efficiently allocate resources to develop, produce and commercialize new products that respond to developing country opportunities, thereby accelerating the pace of product availability.
- 3. Supply chain capacity is increased so products can get to people who need them.** Demand forecasts enable those working on health systems strengthening in developing countries to plan expansion of their capacity to deliver products patients, matched to the scale and mix of products required.
- 4. Funders plan purchases and make the most of the money available.** Demand forecasts allow donors and national governments to efficiently allocate their resources by fostering appropriate prices and adequate supplies of products.
- 5. The public health community sees bottlenecks and understands opportunities to expand use.** Demand forecasts highlight key demand- and supply-side constraints, and can guide policy and advocacy efforts to reduce those constraints and achieve broader access; this can even include influencing the characteristics of future products to respond to potential demand.

### Improved forecasting would benefit many stakeholders—so why hasn't it been fixed?

Part of the problems with demand forecasting can be traced to the fact that major changes in funding, products and other factors are relatively recent, and there has not yet been a corresponding improvement in forecasting methods or institutional roles. The bigger problem, however, is that risks are unequally shared across key actors whose decisions affect supply of and demand for products. Pharmaceutical companies shoulder the largest burden of risk, as they must invest upfront in treatments for which there is no guaranteed buyer. Patients, who directly experience and suffer the consequences when vital medicines are not produced, are not in a position to reduce the risks. The institutions that could reduce risks—funders and

intermediaries—only feel the consequences of bad forecasts indirectly, and thus lack the incentive to change. Across the actors in the supply chain, incentives to share high-quality information about both supply of and demand for products are misaligned.

Moreover, because of the limited market potential in developing countries, the private sector invests little in market research and the development of other sources of information that are common in developed markets. If not corrected, the misalignment of incentives will continue to constitute a major barrier to equitable and sustainable access to essential medicines.

## Global Solutions

Improvements in demand forecasting depend on progress toward better sharing risk and aligning incentives among those who influence the market. This can be achieved by three simultaneous changes that are mutually reinforcing:

### Taking Forecasting Seriously

Agencies affecting procurement at global, regional, national and sub-national levels should imbed quality demand forecasting in all efforts to increase access to essential medicines and technologies. This requires:

- A clear understanding of what is meant by *demand* forecasting and how it differs from estimating *need* or from advocacy and demand creation activities. Need means how many people need a product, whereas demand refers to how much of a product will actually be purchased.
- Universal adoption of a common set of basic forecasting principles to ensure that forecasting processes are credible and use the most appropriate, evidence-based methodologies.
- Investing in technical forecasting capacity and creating models specific to forecasting for developing world health products.

### Create a Global Health Infomediary

Up-to-date, credible and comprehensive information is essential to good forecasting, but requires that key organizations and individuals collect and share high quality data. Currently, funding agencies, procurement agents, technical agencies, global health partnerships, and national buyers each have access to several important data elements but do not systematically share them or invest sufficiently in the focused market research required to build accurate forecasts. This is a result of the uneven distribution of risk. While funders and intermediaries have access to data, they suffer few if any consequences for poor forecasting and thus lack an incentive to share information and to assure its quality. Manufacturers, who directly bear a financial risk for inadequate forecasting, have a disincentive to share information that could make them vulnerable to competitors or to anti-trust allegations.

The resulting opacity of data increases demand uncertainty and its associated risks. This suggests the need for an

## Principles of Demand Forecasting

*Customer-Focused Principles* help to ensure that forecasts will meet the needs of customers and have the greatest impact on the decisions they are intended to inform:

1. Identify the principal customers/decision makers of the forecast and clearly understand their needs.
2. Understand and clearly communicate the purpose of the forecast and the decisions that it will affect.
3. Create a forecasting process that is independent of planning and target-setting.
4. Protect the forecasting process from political interference and ensure it is transparent.

*Process- and Context-Focused Principles* help to create a credible forecasting process and to develop, present and understand the forecast in relation to the overall market and public policy environment:

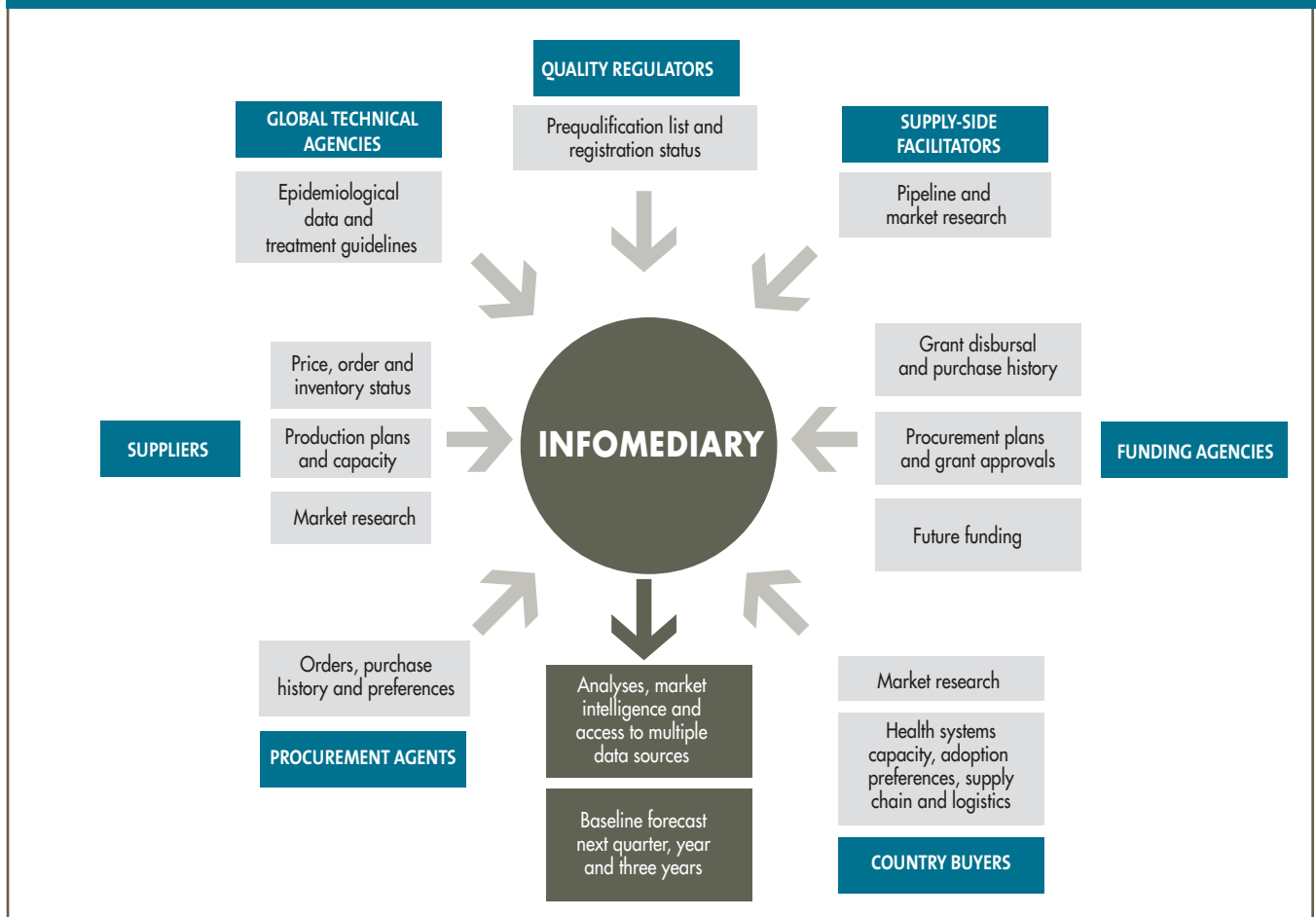
5. Embed the forecast into the broader environment taking into account market conditions, public policy, competitive forces, regulatory changes, health program guidelines, etc.

6. Create a dynamic forecasting process that continually incorporates and reflects changes in the market, public policy and health program capabilities.

*Methodology- and Data-Focused Principles* help to select the right methods for the nature of the forecast being developed and effectively incorporate qualitative and quantitative information:

7. Choose the methodologies most appropriate to the data and market environment. Obtain customers' /decision makers' agreement on the methodologies.
8. Keep the methodologies simple and appropriate to the situation. Don't introduce too much complexity, but include sufficient detail to address the level of investment risk and accuracy required.
9. Make forecast assumptions clear and explicit.
10. Understand data and their limitations. Use creativity and intelligence in gathering and introducing data into forecasts.

## Global Health Infomediary



information intermediary, or *infomediary*, for global health to effectively gather and analyze data needed for demand forecasts across a variety of important diseases and products and to make this information widely available to all stakeholders (see figure).

The key functions of the infomediary would be to:

1. **Serve as a central repository of all relevant demand and supply data** by collecting, synthesizing and disseminating information related to forecasting that individual organizations may be unwilling or unable to share independently.
2. **Ensure data integrity** and perform the labor-intensive tasks of cleaning and analyzing data received from multiple sources.
3. **Establish a mechanism for ongoing, continuous gathering and updating of core forecasting information.**
4. **Generate transparent baseline aggregate forecasts** by product category based on the information sets provided, to serve as the common starting point for stakeholders to produce their own forecasts. Build aggregate and country-level models for generating demand forecasts that consider the unique developing country environment.
5. **Incorporate information from specific market research studies** that are either conducted by the infomediary or other market research firms and stakeholders, to provide a more complete data repository and refine assumptions for forecasts.
6. **Serve as a neutral party** responsible only for information collection and generating baseline forecasts, and separated from demand generation, advocacy, target setting or other functions that could compromise the integrity and independence of activities. Maintain strong relationships with public and private supply chain partners and establish credibility with stakeholders.

### Sharing Risk and Aligning Incentives through a Broader Menu of Contracting Options

An important and immediate opportunity exists to better align incentives and share risks through restructuring contractual arrangements (see box for examples of three approaches; others are described in the Working Group report). Effective contracting is also critical for ensuring that pooled purchasing mechanisms, which are being considered by some funders, achieve their objectives. However, global health funders in general have made only limited use of the wide range of risk-sharing arrangements.

No single contracting option is optimal across all types of products and situations. Rather, a range of approaches could and should be considered to shift the current problematic risk allocation.

## Examples of Contracting Arrangements

**Minimum Purchase Commitments:** Minimum purchase commitments require that a buyer agrees in advance to purchase a specified quantity of product, either in a single transaction or over a period of time. By accepting some of the supplier's risk for production, the buyer has an incentive to accurately forecast demand. Typically, suppliers offer incentives to buyers to take on this risk through reduced prices for the minimum purchase commitment. Suppliers are not committed to producing above the specified amounts, so this arrangement works best for the purchaser in cases where the long-term market demand is stable, there are substitutable products that prevent the risk associated with stock-outs, or opportunities exist to off-load excess inventory.

**Quantity Flexibility Contracts:** When demand is highly uncertain, buyers may prefer committing to a lower level of demand while retaining the flexibility to purchase more to guard against the consequences of stock-outs. Quantity flexibility contracts allow the buyer to commit to a minimum amount at a certain price, while at the same time binding the supplier to make a specified quantity of product above that amount available at a premium price if additional demand arises.

**Buyback Contracts:** Buyback contracts are useful in situations where demand is unstable but the risk of stock-out is unevenly distributed among the stakeholders and has significant public health consequences. They are often used when the production cycle is long and it is difficult to scale up supply rapidly if demand is higher than expected or where the presence of supply can stimulate demand.

## An Agenda for Stakeholders

Achieving better demand forecasts for—and better access to—critical medical technologies in the developing world requires collaboration and investment from all of the key stakeholders in the value chain, and will benefit each of them in turn. The three specific recommendations developed by the Working Group are feasible in the near term, with relatively modest financial resources. While the broader global health community plays a critical role in advocating for the importance of taking forecasting seriously, coordinating information and sharing risk, success ultimately depends on the actions of donors, industry, national health programs and those charged with generating demand forecasts.

**Donors & Funding Agencies:** Donors and funding agencies such as the US Agency for International Development, the UK Department for International Development and the Bill & Melinda

Gates Foundation, as well as their beneficiaries (such as the Global Fund and GAVI, among others) are in the business of saving lives and place great value on using their aid dollars effectively. But only with better forecasting and efficient contracting will efforts to develop new products actually translate donors' aid investment into improved health.

Donors have opportunities to support multi-product, systemic improvements by committing start-up funding to a global health infomediary. These funds would go toward developing an electronic repository to gather and house data; providing initial analyses and forecasts; populating the repository with available data and creating interfaces to update this data on an ongoing basis; and incorporating new data and market research studies into the repository as they are conducted. The immediate step toward this end would be to develop a request for proposals that would outline the key functions of the infomediary, its business model and the qualifications of a host institution.

Armed with better information from the infomediary, funders could then increase access to critical medical technologies—and reduce their hidden costs—by assuming a greater share of the financial risk currently borne by suppliers; this can be achieved through the adoption of efficient contracting mechanisms.

**Suppliers:** Suppliers of drugs, vaccines and diagnostics serve as good global citizens by providing access to life-saving products in developing countries; while they do this, they are exploring new markets and protecting their corporate interests. Through collaboration with international donors and technical agencies, it is possible to produce better demand forecasts that can reduce and share risk in these markets, which in turn can encourage investment in R&D for and manufacture of developing country products.

Suppliers can participate with technical and financial inputs for the creation of a global health infomediary, and can provide both public and proprietary data to such an entity; in turn, they can commit to purchase information and baseline forecasts to inform their internal decision-making processes. Suppliers can also contribute by sharing their technical forecasting expertise with other global health stakeholders through forums, online tutorials or other platforms.

**National Health Programs:** Developing country governments, and ministries of health in particular, are charged with the essential task of delivering health products to their citizens within the context of constrained health system capacity and limited financial resources. Getting district- and country-level demand forecasts right is critical to prevent both product shortages and waste at the point of delivery, as well as to informing decision making further upstream in the supply chain. To achieve this, national program managers can adopt principles of good demand forecasting, including increasing transparency of the demand forecasting process. Above all, the forecasting process must be independent, free from political interference, and separate from advocacy and target setting.

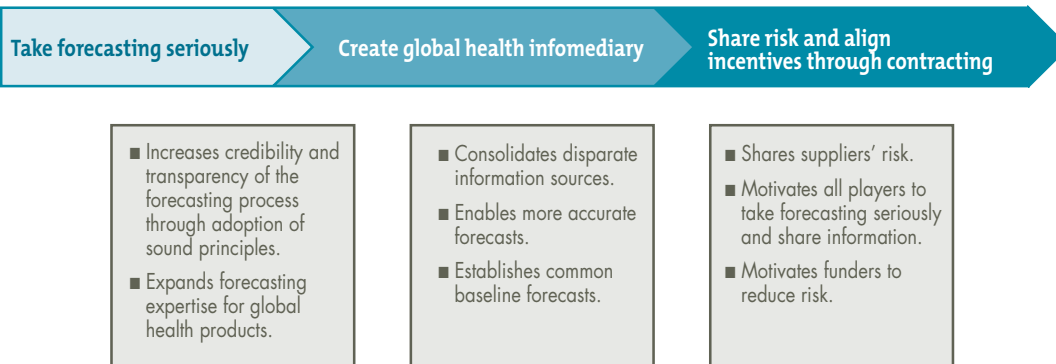
**Global Technical Agencies and Intermediaries:** Many organizations generate demand forecasts as part of their broader mandate to improve access to medical products. To ensure that their forecasts reduce overall market uncertainty and contribute to better matching of supply and demand, these organizations can adopt principles of good demand forecasting, including ensuring transparency and political independence of forecasting processes and a clear separation from advocacy and target setting.

## Conclusion

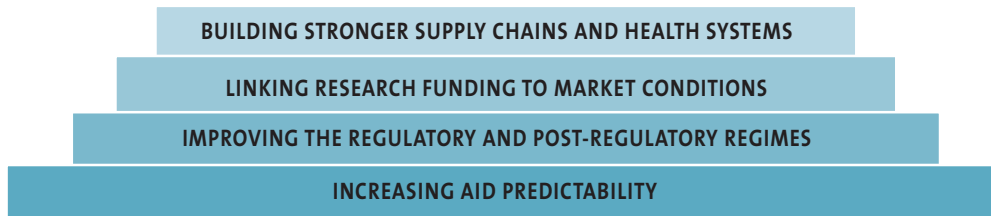
The international community's ability to forecast demand has not caught up with its ambition to reach those in need with life-saving medical technologies. The inability to accurately predict demand has exacerbated risks for suppliers, resulted in higher costs, supply shortages and concerns about the long-term viability of investing in R&D for health products that benefit the world's poor. It has also limited the ability of donors and national governments to use their aid dollars effectively to improve public health and save lives. Improvements in demand forecasting depend on progress toward better risk sharing and aligning incentives among those who influence the market. Implementation of the Global Health Forecasting Working Group's recommendations—taking forecasting seriously, establishing a global health infomediary, as well as sharing risk and aligning incentives through a broad menu of contracting options—would greatly enhance the relationships among funders, suppliers, intermediaries and users of health products, and induce alignment across participants in the global health value chain that is essential for long-term improvements in access to quality products. Far from being small technical patches, these recommendations would contribute to improving the efficient functioning of the global health market, making the new monies and new products realize their potential in better health outcomes in the developing world.

The recommendations are mutually reinforcing. Armed with better information from a credible infomediary and the adoption of key principles of forecasting, funders will be able to comfortably assume a greater portion of the risk currently borne by suppliers, which will allow for a greater return on their aid investment in the form of improved public health outcomes. Efficient contracting arrangements, in turn, will establish the incentives to improve the forecasting process itself, creating a virtuous cycle. Fully implemented, these recommendations can save lives by dramatically improving aggregate demand forecasts for critical medical technologies at the global level, and will lay the groundwork for a broader and longer-term agenda of strengthening health systems and building supply chain capacity in-country; increasing the market-orientation of product development; enhancing the regulatory regimes and enforcement for global health products; and improving the predictability of donor funding.

## Recommendations at a Glance



## BUILDING A FOUNDATION FOR LONG-TERM ACCESS



## ABOUT THE GLOBAL HEALTH FORECASTING WORKING GROUP

CGD convened the Global Health Forecasting Working Group in early 2006 under the auspices of the Global Health Policy Research Network. Comprised of 26 experts from industry, public-private partnerships, funding agencies, and other backgrounds, the Working Group addressed the challenge of aggregate demand forecasting for “new products and new markets” by focusing on the nature and distribution of underlying risks faced by the pharmaceutical industry, regulatory and purchasing intermediaries and funders in light of the new global health environment of more money, new products and a more complex international market.

Over the course of one year, the Working Group examined the ways in which better forecasting could contribute to improved

short- and long-term access; developed an understanding of market-related risks for global health products that combines an economic conceptualization of risk with supply chain theory; identified the ways that asymmetrical burden of risk across stakeholders results in misaligned incentives for producing optimal demand forecasts and achieving broad access; and advanced a set of specific recommendations for “here and now” actions that would help to reduce overall risk and correct those misalignments, within a long-term agenda of work on health systems, regulatory regimes, technology development and predictable international financing for health. Their findings and recommendations are summarized here; a more detailed analysis is presented in the final report ([www.cgdev.org/forecasting](http://www.cgdev.org/forecasting)).

The **Center for Global Development** is an independent, non-partisan, non-profit think tank dedicated to reducing global poverty and inequality through policy oriented research and active engagement on development issues with the policy community and the public. A principal focus of the Center's work is the policies of the United States and other industrialized countries that affect development prospects in poor countries. The Center's **research** assesses the impact on poor people of globalization and of the policies of governments and multilateral institutions. In collaboration with civil society groups, the Center seeks to identify **policy alternatives** that will promote equitable growth and participatory development in low-income and transitional economies. The Center works with other institutions to improve **public understanding** in industrialized countries of the economic, political, and strategic benefits of promoting improved living standards and governance in developing countries.

## 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 Global Health Forecasting, 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 create incentives for companies to increase investment in research, development, and manufacturing capacity of vaccines for developing countries;
- 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.

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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