FORUM 2009 IN HAVANA, Cuba, proved to be a landmark event in global health. Hundreds of researchers, policymakers, lay public, media, professionals from the biopharma industry, and activists gathered together on this Caribbean island to learn about ‘Innovating for the Health of All’, to share experiences, and to plan collaborations.

They did this in the setting of a country that has used innovation to deliver ‘first world health indicators in a third world country’. A country that has demonstrated that GDP per indicator is not the only determinant of health status. A land that has used social and technological innovation to make the change.

They also learned of the critical part played by social determinants of health in health status and quality of life. Of the importance of social mobilization at community and national level in sustaining health programmes. Of the roles of preventive, promotive, therapeutic and rehabilitative medicine in health care.

Much was discussed of the place of civil society not only in health programmes, but also in setting the agenda for and conducting research for health.

Visits were organized to polyclinics and biotech laboratories and manufacturing plants to see at first hand, evidence of this social and technological innovation. Stirring speeches were delivered from the podium; and delegates took time to enjoy Cuban hospitality; listen and dance to Cuban rhythms; and learn of the history of this country since the revolution six decades ago.

Once again the Global Forum for Health Research demonstrated its unique role in the global health community of identifying gaps and priorities in research for health; and then promoting the research and innovation to fill those gaps. Its singular function was bringing together a wide range of stakeholders in research for health to debate, review and plan research for the health of all across the world.

Prof Anthony D Mbewu
Executive Director
Global Forum for Health Research
INTRODUCTION

1. WHAT IS INNOVATION?
   Changing The Paradigm
   Why Is Innovation Needed For Health?

2. INCENTIVES FOR INNOVATION
   Technological Innovation
   Social Innovation
   Box 1: Social Entrepreneurs As Catalysts For Innovation

3. KEY INNOVATION GAPS
   Health Systems Innovation
   Box 2: Innovation To Fight Climate Change
   Climate Change

4. INNOVATION SUCCESSES
   Mobile Health Technology
   Cuba And Innovation
   Box 3: Media Visit. A Glimpse Into Cuba’s Health-care System
   Innovative Ways Of Financing Health care

5. CHALLENGES TO INNOVATION
   Funding Shortfalls
   Box 4: Monitoring Financial Flows
   R&D For Global Health
   Concentrated Funding
   Political Will
   Global Health Diplomacy

6. BOOSTING INNOVATION
   Collaboration
   South-South Initiatives
   Stimulating Investment
   Scientists Of The Future

CONTENTS

INTRODUCTION 2

1. WHAT IS INNOVATION? 4
   Changing The Paradigm
   Why Is Innovation Needed For Health?

2. INCENTIVES FOR INNOVATION 7
   Technological Innovation
   Social Innovation
   Box 1: Social Entrepreneurs As Catalysts For Innovation

3. KEY INNOVATION GAPS 11
   Health Systems Innovation
   Box 2: Innovation To Fight Climate Change
   Climate Change

4. INNOVATION SUCCESSES 13
   Mobile Health Technology
   Cuba And Innovation
   Box 3: Media Visit. A Glimpse Into Cuba’s Health-care System
   Innovative Ways Of Financing Health care

5. CHALLENGES TO INNOVATION 22
   Funding Shortfalls
   Box 4: Monitoring Financial Flows
   R&D For Global Health
   Concentrated Funding
   Political Will
   Global Health Diplomacy

6. BOOSTING INNOVATION 28
   Collaboration
   South-South Initiatives
   Stimulating Investment
   Scientists Of The Future
INTRODUCTION

Too often, innovation in health care is only focused on wealthy, developed countries. This means innovation.

THE HEALTH OF LOW- and middle-income countries (LMICs) features much higher on the global agenda than ever before. Governments, aid agencies and philanthropic organizations continue to pour billions into tackling the health problems of these least developed nations. Yet money is not enough. Lavishing resources on weakened health systems, or supplying cheap drugs to areas where there is virtually no distribution network to get those medicines to patients is pointless. It is time to improve global health care from the inside out. This means building better health-care systems and developing better treatments for neglected diseases. This means innovation.

Too often, innovation in health care is only focused on wealthy, developed countries - cutting-edge surgical techniques, for example, or better drugs for chronic illnesses such as heart disease. But innovation holds so much more promise to achieve health equity for poor and disadvantaged populations. There is ample scope for low-tech innovation to put the know-how we already have to new use in low-income settings.

FORUM 2009 was designed to bring together diverging strands of expertise and knowledge about innovation, to distil inspirational ideas for future action and future generations. The Forum attracted over 900 delegates from more than 80 countries. These were key stakeholders in public health: ministers of health; researchers; health care workers; educators; representatives of the public; social entrepreneurs and journalists.

Many experiences were shared and explored including case studies from social entrepreneurs and innovative approaches to priority setting and health systems strengthening. Participants had several issues to tackle – how can we stimulate innovation? What can drive technology transfer between developing countries? And how can the public and private sector work better together?

During the Forum, what became clear was that it is essential for technological and social innovation to happen in tandem. After all, the best vaccine in the world is ineffective if there is no delivery mechanism to get the drugs to those who need them. Different types of innovation also require different incentives, and understanding what those incentives might be requires careful analysis, investment and collaborative thinking.

As a setting for thinking about innovation in the developing world, we could not have chosen a better location than Cuba. This is a country that has struggled through difficult circumstances to develop world-class R&D facilities. As an example, out of the 13 vaccines administered to protect children from childhood diseases, 11 are produced domestically.

The Cuban Health System has been strengthened by investment in research and innovation and strong political will. These facilities were opened up to journalists and scientists during the forum. Participants were also shown Havana’s polyclinics that offer free health care for all Cubans. This is inspiring proof of what can be done on a shoestring budget if the political will is there. As Professor V Ramalingaswami said, “it’s not just about more money for health, but more health for the money.”
1. WHAT IS INNOVATION?

INNOVATION is the lifeblood of human progress. It breathes new life into any field of endeavour from economics to engineering to education. Since innovation is so broad and cross-cutting, it is often misunderstood. For example, innovation, which is the implementation of a new idea, is not the same as invention, which is the creation of a new idea. Confusingly, the term may be applied both to the process of innovation (e.g., creating a new drug) and to the end product of that process (e.g., the licensed drug), which itself may not be tangible.

We define it as encompassing the entire process, from the generation of new ideas, to their transformation into useful services, products, methods, management practices and policies, to their implementation via public procurement and distribution, and private markets.

In healthcare especially, innovation tends to be thought of in restrictive, narrow terms – the development of a new drug or medical technique, for example, which often becomes tightly bound up in patent protections or accessible only by privileged nations. Such technological innovation, which produces new products that are more cost-effective than existing interventions, is just one side of the coin.

On the flip side, health also needs social innovation to ensure the development and efficient distribution of essential goods and services. These include new ways to organise human resources, information, and decision-making in health systems. Thus, technological and social innovations should be thought of as complementary rather than parallel processes.

Health also needs social innovation to ensure the development and efficient distribution of essential goods and services.”

Changing the Paradigm

How countries think about health innovation is important. Borrowing terminology from economics, such as “innovation systems” is a useful way of thinking about how to implement innovation. Complex systems, from living cells to national economies, share a common trait: the functioning of the system as a whole, and its ability to adapt to change, is affected by the rules and feedback loops that govern their individual components. In other words, changing just one factor can have an enormous ripple effect on other parts of the innovation process.

For example, with health systems, innovation in one area will inevitably affect, and be affected by, changes in another area. Pushing for reform and innovation in intellectual property, for example, may do little if the regulatory system is weak or difficult to enforce. Thus, new health policies change the rules that govern the components of a health system, by changing the process of drug procurement, for instance. Every new health policy or initiative is, essentially, an experiment, that may or may not work. Whether or not stakeholders recognize this, the actions of each global, regional and national actor affects those of others.
INNOVATING FOR THE HEALTH OF ALL

Why is Innovation Needed for Health?

“A girl born today in Japan can expect to live more than 80 years, while a girl born today in Sierra Leone is lucky to live to be 40,” said Stephen Matlin, former Executive Director of the Global Forum for Health Research, presenting at the opening of Forum 2009.

Such a huge disparity in life expectancies is an illustration of the enormous health inequities that exist, not only due to lack of income, but also to a lack of technological progress. People are dying every year of diseases such as dengue fever for which there are no vaccines. They are also dying of neglected diseases such as African trypanosomiasis or sleeping sickness, for which treatment is outdated and fairly toxic. Nearly 50,000 people die of sleeping sickness each year, and nearly 100 million people become infected with dengue fever. For example, for sleeping sickness, patients are still relying on drugs that were developed between the 1920s and 1950s. One of these, melarsoprol, is an arsenic-based drug that kills about one in every 20 people who take it. Since there is little profit in R&D for diseases of the poor, however, drug innovation in this area has stagnated. As Oyewale Tomori, Professor at Redeemer’s University, Nigeria, put it: “We have seen over 30 new viral diseases in the last 30 years. It is time to stop burying our heads in the sands of selfish smugness. We must collaborate together to develop antiviral therapies.”

Innovation is urgently needed to make health systems robust enough to withstand catastrophe, both in the form of epidemics and natural disasters. Several LMICs have had their trajectories toward development abruptly cut short by diseases such as HIV/AIDS, by natural disasters like earthquakes and hurricanes, or by manmade ones which have devastated Sudan and the Democratic Republic of Congo for decades. Boosting health systems in LMICs needs a particularly inventive approach because the systems are perpetually underfunded, short of trained medical staff and poorly resourced – given these constraints, innovative thinking is needed to devise ways to strengthen these ailing health systems.

2. INCENTIVES FOR INNOVATION

Technological Innovation

Technological innovation requires strong incentives. During Forum 2009, participants examined “push and pull incentives” for technological innovation that would steer it in a direction that would benefit disadvantaged people and improve health equity. Innovation can be pushed by funding research grants, providing tax breaks for private-sector R&D, or by strengthening the capacity of the technology managers who facilitate university-industry R&D partnerships; it can be pulled by prizes, by guaranteeing a market for products, or by streamlining the approval process for safe and effective drugs.

The problem is that for a great number of diseases of the developing world, there are too few incentives to stimulate innovation. Even when efforts are made to spur innovation, there may not be enough funds. Rifat Atun, Director of Strategy, Performance and Evaluation Cluster at the Global Fund to Fight AIDS, TB, and Malaria (GFATM) - which says it has saved 4.9 million people through programmes it has funded - quantified this dilemma. “In the last eight to ten years there has been a huge increase in public-private product-development partnerships that encourage investment in neglected diseases beyond HIV and malaria and tuberculosis,” he observed. However, he said, much of this investment focuses on Phase I and Phase II clinical trials, and drops off before the study reaches later phases. “There is little available for commercialization and getting through the regulatory process, and then almost nothing for Phase IV [post-marketing surveillance for adverse reactions], which is critically important.”

Innovation is urgently needed to make health systems robust enough to withstand catastrophe, both in the form of epidemics and natural disasters.”
In order to bridge this gap, Atun said that procurement mechanisms, such as the GAVI Alliance and the GFATM, are providing important “pull” mechanisms for innovation to address the health needs of LMICs. For example, the Global Fund allows countries to use unspent grant funds to shift from older single-drug anti-retroviral therapies to more effective – and less toxic – dual or triple-drug therapies for HIV.

It also has become clear that different actors – whether big pharmaceuticals or small biotech companies – need different incentives. Incentives must also vary with the disease, scientific challenges, market dynamics and the cost of capital for producing different products.

Melinda Moree, Chief Executive Officer for BIO Ventures for Global Health, a non-profit organization in the USA, gave examples of different types of “pull” incentives. The organization itself runs a Pool for Open Innovation against Neglected Tropical Diseases to stimulate innovative and drug discovery by opening up access to intellectual property in neglected tropical disease research.

Melind said that the start of a Phase III clinical trial of a malaria vaccine in Tanzania was a telling example of how “pull” incentives can work. “One of the greatest untold stories over the past decade is the increase of clinical-trial capacity in the developing world, largely spurred by the product-development partnerships, which have made a big difference,” she said. “Ten years ago you could not have done a licensed clinical trial in Africa; five years ago, you could not have done it; now it is totally possible.”

Most of the energy and creative thinking poured into creating better incentives for health-care innovation has centred on stimulating R&D into neglected diseases, but little thought has gone into ways to stimulate social innovation.

Joe Madiath is the Executive Director of Gram Vikas, in India, which receives funding from the Schwab Foundation for Social Entrepreneurship and the Skoll Foundation, among many others. With the help of government funding and community participation, his organization (whose name means ‘village development’) has built gravity-fed water systems to provide sanitation to more than 800 Indian communities. According to him, more than 80% of all diseases in rural India are caused by poor quality water. Madiath, who set up Gram Vikas, has been working since 1979 to bring sustainable improvements in the quality of life in poor rural communities. Madiath traced the water-quality problem to human waste being improperly disposed of and contaminating water used for drinking and bathing. He dispelled the idea that in developing countries there is the feeling that “poor people need poor solutions and that very poor people need absolutely pathetic solutions”. “Sanitation is more about dignity than human waste,” he said.
Keely Stevenson, Investment Executive at Bamboo Finance, in Switzerland, provided some insight into the kind of innovative financing used by social entrepreneurs, and the barriers they face. Bamboo Finance set up a venture-capital private equity fund in 2007 that raises capital from private companies and invests it in enterprises that provide services, such as water or energy, to low-income communities. Health care, she said, has become almost 50% of her company’s portfolio. She described an equity investment in a company called Access to Energy that provides liquefied petroleum gas to health-care clinics, businesses and low-income households in remote areas of northern Mozambique. As the gas company expanded transportation systems into the area, it also enabled movement of vaccines to health clinics and, as a result, has increased the vaccination rate over the past seven years to 95% from 68%. Mozambique’s Ministry of Health has now taken over the programme, enabling gas services to low-income households that have traditionally used charcoal and wood for indoor cooking and, thereby, reducing health risks from smoke that can cause respiratory illnesses, particularly for women and children.

Despite these successes, Stevenson underscored the local legal problems that social entrepreneurs sometimes have with barriers to innovative financing and suggested that a hybrid between non-profit and for-profit businesses might be a solution.

Incentives, whether for social or technological innovation, need to be skilfully marketed to have their desired effect. Laurie Garrett, Senior Fellow for Global Health, at the Council on Foreign Relations said that when she was a laboratory researcher, ‘I wouldn’t even have known about some prize somewhere, and it would not have made any difference in incentivizing what creatively and intellectually I focused on.’ She added: “We need to incentivize bench scientists.”

Innovation incentives also need to target both big and small innovators. Chris Earl, former chief executive of BIO Ventures for Global Health, USA, said that the world needs “a much more nuanced, complex ecosystem where things such as civil society can trip you up if you are trying to implement this big programme” from the top down. He said large donors tend to deal mainly with large-scale mechanisms for innovation, such as partnering with pharmaceutical companies, “so what is needed are portfolio managers at the micro level who can deal with the nuance and create other ways to incentivize all the players.”

Iqbal Nandra

Health systems are exacerbated by “brain drain”: 25% of practising physicians in the USA, and 30% in the UK’s National Health Service come from developing countries.

HEALTH SYSTEMS INNOVATION is urgently needed to improve the health systems of developing nations, a theme that recurred throughout the Forum. The changes needed often differ across LMICs and beyond that, as each country has its own unique set of challenges. Some themes are, nonetheless, universal. Most health systems have too few trained doctors and nurses, poor access to modern equipment, and inadequate supplies of drugs. Even when a clinic or hospital does function well enough, patients in rural areas face great challenges in accessing urban-centred care. According to Zafrullah Chowdhury, who runs the non-governmental organisation Gonoshasthaya Kendra in Bangladesh, the inadequacies of health systems are exacerbated by “brain drain”: 25% of practising physicians in the USA, and 30% in the UK’s National Health Service come from developing countries.

At Gonoshasthaya Kendra, Chowdhury rallies communities to take ownership of their health care by training some local villagers in basic health-care techniques such as taking blood pressure or doing ultrasound examinations. Some of these healthcare workers have even been trained to perform surgical procedures such as laparotomies that previously were only performed by doctors, and their skill seems to stand up to scrutiny.

In this context, health systems innovation could mean devising ways to scale up access to treatment with HIV or malaria, or for maternal and child health services. Many health systems are hampered by a lack of technical or communication capacity, so innovation could help here too.

Most health systems have poor access to modern equipment, and inadequate supplies of drugs.”
Climate Change

These ailing health systems are set to face another enormous challenge: climate change. Climate change in the form of more frequent severe weather events and failing crop harvests is mainly being caused by the emissions and lifestyle of individuals in rich countries, but most of the health effects will be felt in the most vulnerable countries. These effects include an increase in food and water insecurity as rainfall and temperature become more extreme and unpredictable. Weather changes are also likely to change transmission patterns of vector-borne diseases such as dengue fever, which mostly affect nations in tropical zones. All this will exert a heavy toll on health systems, which will get pushed to their limits and, in some cases, may not be able to provide assistance to those in need.

ONE OF GLOBAL HEALTH’S successes over the past few years has been the advent of public-private product development partnerships. They are non-profit organizations explicitly modelled on private sector biotech companies. Their most important innovation — new for the public sector — is to manage a portfolio of candidate products through the development process rather than to work on one drug or vaccine at a time, as academic researchers might do.

4. INNOVATION SUCCESSES

75% of drug-development projects for neglected diseases involved PDPs.

Chen Zhu, Minister of Health of the People’s Republic of China

The question remains whether PDPs can deliver breakthrough technologies — we remain hopeful.”

Gilma Mantilla, Senior Staff Associate at the International Research Institute for Climate and Society (IRI), Columbia University, USA, stressed the importance of having detailed data on climate from specific regions. Data available right now is often far too broad to be of much value in implementing local policies. Mantilla said that health professionals are increasingly concerned about the potential impact that climate variability and climate change could have on public health. Tools such as risk maps, a malaria early warning system, and a weather/climate forecast programme could enable decision-makers to identify needs specific to different regions, and allow for quicker and more effective responses.

A good example is the case of tuberculosis (TB). The development of TB drugs involved technological innovation. However, Directly Observed Treatment Short course or “DOTS”, the method approved by the World Health Organization to deliver TB drugs in developing countries, was a social innovation developed by the Tuberculosis Research Centre in Chennai, India several decades ago. However, DOTS requires six months of closely watching the patient take his or her pills every day. This social innovation turned out to be costly and difficult to deliver and compliance was disappointingly low. Consequently, this drove the Rockefeller Foundation and other donors to create a PDP called the TB Alliance in 2000 to develop new drugs that could shorten the course of treatment to 1-2 months. Currently the TB Alliance has three drugs in clinical trials.
However, it has become clear that PDPs today are facing challenges that stem from their rapid proliferation as well as the recent global financial crisis. The issue now is how to evaluate the effectiveness of PDPs; who should do the evaluation, and whether that evaluation can lead to strengthening capabilities and collective thinking. During the Forum, some agreed that it would be advantageous if there were a way to measure the effectiveness of PDPs quantitatively; others said the best way might be qualitative evaluation through case studies. Still others called for econometricians to develop an appropriate metric for evaluation. The fact, nevertheless, was that a measurable evaluation of the impact of such partnerships is a demand from civil society.

Cheri Grace, lead specialist at the Health and Life Sciences Partnership (HLSP), in the UK, voiced some scepticism about the future of PDPs. “The PDPs collectively delivered nine new products to market between 2004 and 2009, so they are delivering but most of those products are low-hanging fruit,” she said. “The question remains whether PDPs can deliver breakthrough technologies – we remain hopeful.”

While PDPs have perhaps been one of the most high-profile innovations to drive global health research, a WHO Expert Working Group on R&D Financing has found that other mechanisms hold similar promise. One approach that has been particularly successful is in providing direct grants or contracts to small and medium-sized enterprises to drive R&D in areas of health where other funding is non-existent. Projeto Inovar (Project Innovate) in Brazil, for example, promotes the development of small and medium-sized businesses.

James Love, Director of Knowledge Ecology International, a US-based NGO, pointed out that traditional research grants are still important incentives; they focus the attention of researchers and, therefore, influence the direction of patents. “The challenge,” he said, “is to redesign incentive systems so they don’t sabotage access.” Love asked: “Where is the sustainable alternative-reward system that is not linked to prices?” Prizes for innovation, as a “pull” incentive, can accomplish this, he believes.
MOBILE HEALTH TECHNOLOGY

Some of the world’s populations that need the greatest help from research and innovation are those in remote areas, where it is a challenge to receive information of any kind. Internet (e-Health) and mobile health (m-Health) innovations are set to change that. Mobile devices such as cell phones, patient monitoring devices, PDAs (personal digital assistants) and other wireless devices have the ability to collect community-health data as well as to deliver health-care information to practitioners, researchers and patients.

During Forum 2009, participants discussed different uses for mobile phones, which have become widely available in LMICs. They also examined the behaviour changes that accompany the use of mobile devices, and explored the possibilities for telemedicine, data collection and surveillance. Participants urged each other to think creatively, beyond the use of SMS and voice messages, to think how health professionals and community workers could use mobile tools effectively.

Al Hammond at Ashoka, provided insight into new approaches to solve the shortage of doctors in rural areas via the Internet. “It’s not widely understood that within five years, rural broadband will be available practically everywhere there’s a telephone; that means you can have video links between a doctor and a patient,” he told a plenary audience. In addition to telemedicine, he described a number of innovative diagnostics, including strip tests for major diseases and inexpensive “lab-on-a-chip” devices that have sophisticated capabilities. Low-cost generics have been available and widespread, but access has been a problem in many rural areas. Now, Hammond says, a new concept – “telepharmacy” – makes generics not only available, but affordable. This would allow pharmacists to remotely dispense medicines from automated machines.

Jaspal Sandhu, Design Researcher at the University of California Berkeley, in USA, said that solutions need to be designed to fit existing problems. “We don’t need to be taking phones or PDAs or web applications and whacking people over the head with them. We need the use of these technologies to be more demand-driven, to put something out there and let the latent demand drive what people do with it.”

So far, these entrepreneurs have been working in isolation, and in an ad hoc manner. A common concern was that better coordination is needed among donors and projects to avoid duplication of efforts and to share what works. Karl Brown, Associate Director at the Rockefeller Foundation, pointed out that this is the role of the mHealth Alliance, formed by the United Nations Foundation, the Rockefeller Foundation and the Vodafone Foundation in 2009.

He explained that the mHealth Alliance has been discussing the development of a “mHealth Toolkit” to provide a common technical architecture and a platform for those planning to implement mHealth programmes. “A generalized tool that can be used by anyone is essential”, added Joel Selanikio, Director, Datadyne.org, USA, because if individual governments must approve the technology, “you’ve lost the battle.” The existence of free technology platforms enables programmes to focus on developing health content.

Many challenges remain, including the issue of equity: how to reach people in places with no network coverage and how to overcome the high costs of setting up a network. There is also an age issue: could bespoke programmes be designed and aimed at specific age groups who will be using technology?

Chair of the discussion on innovation for remote populations, Patricia Mechael, mHealth and Telemedicine Advisor, Columbia University, USA, commented that the session had included an “incredibly diverse set of participants.” She encouraged them to move forward with the discussion by joining a mobile metrics and evaluation group that she has helped organize. It is important, she said, to develop standard ways of evaluation so everyone is moving “toward the same measures and goalsposts, contributing to what is starting to be a growing evidence base in this area. "In the next few years we won’t be talking about "mHealth," Mechael concluded, it will just be “health.”
Cuba and Innovation
Cuba has long been held up as an example of creating a robust health-care system from virtually nothing. Carlos Morel, Director of the Centre for Technological Development in Health (CDTS), Oswaldo Cruz Foundation, in Brazil, described such progress under constraint as “scarcity-induced innovation”. Power cuts are frequent, internet access is limited and international relations are fraught. But Cuban researchers’ isolation from the rest of the world has forced them to search for innovative solutions.

Cuba’s economy is relatively poor: its GDP in 2009 was $111.1 billion, making it the 65th largest economy in the world, putting it well behind countries like Bangladesh, Iran and Pakistan. Nevertheless, since coming to power in 1959, the Castro government has made free universal public health care a national priority and there has been an emphasis on cultivating human resources to achieve both public health and technological goals. During the 1960s, despite stiff political and trade obstacles, the government established the first polyclinics in Havana, an innovation that would soon extend throughout the country. In the 1970s, these polyclinics began to emphasize community care focusing on prevention, rehabilitation and vaccines.

As the network of polyclinics in Cuba grew, so did the number of universities and hospitals where doctors could be trained. An outreach programme was established in the 1960s that has since sent thousands of doctors to help low-income countries all over the world, especially those struck by natural disasters, such as the recent earthquake that devastated Haiti. With the creation of the Latin American School of Medicine (ELAM) in Havana in 1999, an institution was established to ensure sufficient doctors could be trained to serve both the island nation and other LMICs in need. Today Cuba’s medical assistance extends to 76 countries in Latin America, Africa and Asia. At least 11 000 doctors from 105 countries have been trained in Cuba, 8 000 of them in ELAM. Sixty-seven per cent of Cuban doctors remain in Cuba. Vaccines have also played an important role in Cuba’s public-health efforts. A national immunization programme against smallpox was implemented in 1962, and different vaccination strategies have continued since. A vaccine programme now protects Cuban children from 13 diseases, and has eradicated polio, diphtheria, measles, rubella and mumps from the island. Eleven of the 13 vaccines are produced in Cuba. Cuba was the first country in the world to produce a meningitis B vaccine, developed to address a serious local health problem and now exported to many other developing countries.

VALUE CHAIN

In the 1980s, the government began to invest heavily in biotechnology through the creation of the Centre for Genetic Engineering and Biotechnology and the Centre of Molecular Immunology. These research institutions were followed by others specializing in, for example, heart and kidney transplantation.

Concepción Campa Huergo, President, Instituto Finlay, Cuba, explained that the obstacles regarding access to technology had stimulated creativity and innovation in Cuba because it forced the country to find local solutions. She emphasized the relevancy of Einstein’s phrase: “crisis gives rise to creativity.” The results of an innovative highly integrated system have contributed to the success of the health-care programmes.

According to official government statistics, mortality from infectious diseases has fallen dramatically since the 1960s, and now accounts for only 1% of total mortality in Cuba. In 2003, Cuba had the lowest HIV prevalence in the Americas and one of the lowest in the world, according to the International AIDS Society. Tuberculosis has been largely eliminated as a health problem. The same chronic diseases that dominate mortality in richer, more developed countries now cause most deaths in Cuba: cancer, cardiovascular and respiratory illness. Obesity and hypertension are among the country’s greatest challenges.
The Forum, in collaboration with the Cuban government, offered journalists and scientists a rare glimpse into the country’s laboratories, science centres and research facilities. Journalists were from local Cuban media, as well as from prominent media outlets, including the BBC, CNN and Al Jazeera.

Polyclinics are integral to Cuba’s health-care system, and visitors were able to look around the Policlínico Comunitario Héroes del Moncado, established in 1969, and located in an old colonial house in Havana. The polyclinic provides services to 27,000 people in the neighbouring area.

Yadira Olivera Nodarse, director of the clinic, explained that a patient in need of specialized care is referred to the polyclinic by a family doctor who is typically responsible for five or six blocks of houses. The family doctor visits every person in the assigned blocks at least once a year, those who are especially at risk are checked more often. Family doctors also provide primary health care from their offices, called consultorios; there are nine consultorios in the area covered by Policlínico Héroes de Moncado. House visits serve two purposes: to provide health care and to determine which illnesses are most prevalent in each area. This disease-surveillance function provides feedback both to the doctor and to the larger health-care system.

Journalists were also taken to the Finlay Institute, Centre for Vaccines Research and Products. Since its establishment in 1991, the institute has been equipped as a centre of excellence in developing vaccines and in the treatment of diseases. As a result, the institute has become a centre of excellence in developing vaccines and in the treatment of diseases.

Innovative Ways of Financing Health Care

Bridging the financial gap in health is a major challenge over the next few years. Setting up established initiatives had their funding affected by the recent economic crisis. The role of innovation as a way to maximize outcomes from existing investments in health has become a central element in the debate on how to overcome the inequalities in health care.

During the Forum, delegates discussed ideas to solve this problem, drawing on success stories in health care financing. Armin Fidler, Lead Advisor for Health Policy and Strategy at the Human Development Network, at the World Bank asked whether channeling resources directly to poor populations or advocating for universal health coverage would be a more effective way to reach the poor?

A number of experiences showed that the issue of prioritizing those in need did make a difference in some countries. Joseph Kutzn, head of WHO’s Barcelona Office for Health Systems Strengthening, suggested that a universal health system might not be equitable and that one should instead target poor populations directly. Based on his experience, George Gotsadze, Director of Curatio International Foundation, Georgia, also advocated for health care specifically targeting impoverished communities. The universal health-care system implemented during Soviet rule did not deliver, he said, in part due to the absence of incentives. More recently, Georgia has adopted a demand-side coverage system that both increases access to and lowers the costs of health care.

Not all voices supported such an approach. Claudio Schuфан of the People’s Health Movement, a non-profit global network of grassroots health activists, civil society and academic institutions, especially from developing countries, criticized the method of directly targeting the poor for health-care services. He argued that doing so only further stigmatizes an already vulnerable part of the population.

Moreover, he said, “While we are discussing pro-poor interventions, nobody is talking about how to change the system that perpetuates poverty.”

A broader approach on how to deal with the issue of access to services was presented by Raquel Asencios Angulo, assistant at the Regional Environmental Center in Hungary. Using Peru’s integrated health insurance project as an example – which specifically targets the poor – she pointed out the need to have a two-step approach. First, targeting the poor is a necessary first step towards the creation of a universal health-care system. Second, the efforts would target the consolidation of a universal system that can deliver health care with quality.

Proposals to fund health-care programmes were discussed in order to achieve the goals of universal care. Laurence Lannes from the London School of Economics and Political Science (LSE), UK, presented two innovative financing mechanisms that have been introduced by health sector reform in Rwanda: community-based health insurance (CBHI) and performance-based financing.

Scaling-up of CBHI led to a significant increase in the proportion of population insured (from 7% in 2003 to 85% in 2008) and resulted in increased demand for quality health services. On the supply side, performance-based financing stimulated providers to supply more and higher quality services.

Both these innovative financing mechanisms were initiated by international donor agencies, but subsequently were incorporated into the national policy of Rwanda. Lannes viewed Rwanda’s health-reform process as an example of a project that was successfully scaled-up. After adapting a successful performance-based financing mechanism to certain regions, the government rapidly integrated the reforms into its public sector.

Anthony Mbowa, then member of the Global Forum’s Foundation Council and since January 2010, Executive Director at the Global Forum for Health Research, explained how local academies of science and medicine could make major contributions in health-care systems. Members of the African Academy of Sciences and the Academy of Sciences for the Developing World, for example, are outstanding scientists, as well as respected by policy-makers and the public.

“Furthermore, they are independent, they can express objective, unbiased and evidence-based opinion on critical issues,” he said. These qualities are especially advantageous in dealing with controversial areas of global health. “As we attempt to build research and innovation for health, particularly in low-income countries, we should tap those resources - the brain trusts of the academies of science in low-income countries.”
5. CHALLENGES TO INNOVATION

Funding Shortfalls
There are specific funding gaps in innovation for health care. Budgets to provide research grants and support infrastructure at universities and academies of science are increasingly being squeezed. Biomedicine still dominates research funding, which leaves very little with which to study the social determinants of health. This is a reality in the developed world too. Emily Connelly, Director at the Science Policy and Outreach, Research!America, expressed concern about the relatively small amount of money the United States currently invests in R&D. From a total of US$ 2.4 trillion spent on health in 2008, she said only US$ 131 billion (5.5%) went to R&D: less than six cents of every dollar. Connelly urged the US government to invest more heavily in research, pointing out that both pharmaceutical and biotechnology industries have outspent the federal government on research for health.

Monitoring Financial Flows
The Global Forum’s influential Monitoring Financial Flows report 2009 was launched at the Forum. As well as a special focus on public investments in health research in selected Latin American countries, the Report contains a chapter called “2009 Report Card” which reviewed the targets and commitments for investment in development, health and research made by countries worldwide. The report reveals that few countries are on target - of 26 high-income countries, only five have met UN set targets. Above all, the needs of LMICs are not being met.

"Biomedicine still dominates research funding, which leaves very little with which to study the social determinants of health.”

Stephen Matlin launches 2009 Report Card
R&D for Global Health

Too little is invested in health research and development as a whole. Latin America is a good example. Daniel Maceira, Senior Researcher at the Department of Economics at the Centre for the Study of State and Society (CEDES), in Argentina, pointed out that biomedical research receives about 75% (US$ 65 million) of the total amount invested in health research in the countries studied in that region, while public health research receives less than 10% (US$ 8 million). These were some of the conclusions of FISAL, a project that compares public funding of health research across much of Latin America (Uruguay, Paraguay, Argentina, Chile, Bolivia).

Concentrated Funding

Funding also tends to be highly concentrated. This means that most of the money for global health research is spent on diseases such as HIV/AIDS and malaria. The concentration of funding also means that money directed towards R&D for neglected diseases comes from just a handful of sources.

Javier Guzman, Director of Research of the Health Policy Division at the George Institute for International Health, in Australia, presented the results of the organization’s latest G-FINDER report showing the split in sources for R&D funding for neglected diseases. The report assessed funding for 30 neglected diseases, by type of product (drugs, vaccines) and by type of research (basic, preclinical). G-FINDER surveyed over 150 organizations from 43 countries, including pharmaceutical companies.

70% comes from public funds, 20% from the private not-for-profit sector and 10% from the pharmaceutical industry. Of the funding provided, 60% comes from just two sources – the Bill & Melinda Gates Foundation, a private philanthropic organization, and the US government’s National Institutes of Health (NIH). Guzman expressed concern that because the bulk of the funding is in the hands of very few donors, there are serious risk management implications.

Public funding is also highly concentrated, not only in terms of funders, but also in terms of diseases and product types. In 2007, US$ 2.5 billion was invested in R&D for diseases that largely affect the developing world but 80% of the funding went to just three diseases: malaria, TB, and HIV/AIDS. Five other disease groupings, including those of high-mortality such as pneumonia/meningitis, diarrhoeal illnesses and helminth infections together received only 5.2% of global public funding.

Neglected diseases clearly need more resources, but how best to allocate these resources? Guzman suggests examining the severity of the need and the measures necessary to control the disease. For example, he believes diarrhoea could be controlled without a vaccine, but malaria or TB could not. He also advocated investing in diseases such as sleeping sickness that especially require medical research to find better drugs but are currently underfunded.

“Less than 5 per cent of global R&D funding is aimed at the most neglected diseases.”

R&D for neglected diseases is desperately lacking in innovation. The G-FINDER is a survey of global investment into R&D of new products for neglected diseases. The Report showed that less than 5 per cent of global R&D funding for these diseases is aimed at the most neglected diseases such as sleeping sickness, visceral leishmaniasis, and Chagas. More than 500 million people are at risk from these three parasitic diseases alone.

“More than 500 million people are at risk from parasitic diseases like sleeping sickness, visceral leishmaniasis and Chagas.”

“80% of funding went to just three diseases: malaria, TB, and HIV/AIDS.”

Five diseases – leprosy, Buruli ulcer, trachoma, rheumatic fever and typhoid and paratyphoid – received less than US$ 10 million or 0.4% of total global investment each. The report also showed that for most diseases, funding was well below what was needed to create even one new product. Non-traditional funders played a notable role despite their significantly lower per capita GDPs, including Brazil (the sixth largest government funder) and Russia (the tenth largest).

Neglected diseases clearly need more resources, but how best to allocate these resources? Guzman suggests examining the severity of the need and the measures necessary to control the disease. For example, he believes diarrhoea could be controlled without a vaccine, but malaria or TB could not. He also advocated investing in diseases such as sleeping sickness that especially require medical research to find better drugs but are currently underfunded.
Political Will
Governments in developing nations play a key role in enabling innovation through policies that incentivize innovative thinking and encourage intersectoral collaboration.

Sania Nishtar, President and Chief Executive Officer at Heartfile, a non-profit think tank in Pakistan that focuses on catalyzing change within health systems, explained why it is important for governments to take the lead in connecting various points in the chain. “People who have the know-how and do community interventions don’t have the resources,” she said, “and those who have the fiscal resources do things completely out of touch with reality.” She added: “I do think the responsibility falls on governments.”

Too often in global health, governments in LMICs have taken a backseat in actively being involved in driving innovation. In technological development, many of the incentives or funding comes from aid agencies that deal directly with researchers or academics. Social innovation, meanwhile, has tended to be driven by entrepreneurs who would prefer to deal with as little bureaucracy as possible. Governments should wrest control over the type of innovation done, not to constrain it, but to ensure that both technological and social innovation are undertaken in ways that complement each other.

Global Health Diplomacy
Increasingly, it’s clear that governments need to collaborate much more closely with other nations, and with different sectors within those countries. In Forum 2009, this idea was captured in a number of sessions that discussed the concept of a new type of political engagement: global health diplomacy. In basic terms, this is a mix of scientific collaboration and international relations.

“In practice, this is a new way for LMICs to relate to each other, and to other developed nations. More than ever, scientific endeavour must be a collaborative global effort, but complexities around intellectual property, scientific competition, and emerging economies mean that the relationships need to be handled with transparency and care.

While the concept is appealing, and garnered much support from delegates at the Forum, there are still barriers to health diplomacy. According to Halla Thorsteinsdóttir, Assistant Professor at the McLaughlin-Rotman Centre for Global Health, in Canada, analysis shows that private South-South interactions remain limited. Among companies, most partnerships involve only end-stage collaboration, i.e., local marketing and distribution, while collaboration on actual R&D is still lagging. Thorsteinsdóttir noted that only 27% of surveyed companies in the South collaborate with other partners in the South, while 53% have interactions with the North.

Solomon Nwaka, at Drug Discovery, TDR, a WHO Special Programme for Research and Training in Tropical Diseases, presented results from a study by the African Network for Drug and Diagnostic Innovation (ANDI) showing that only 5% of all collaborative publications in sub-Saharan Africa were between African partners; 95% were still with institutions in the North. This was mainly attributed to a lack of funding for such collaborations. The greatest challenges still facing South-South collaboration appears to be immature national regulatory systems, logistical problems in crossing borders and the limited scope of many South-South partnerships. While there has been much focus on evidence-based approaches to evaluation of models of research and health, an evidence-based appraisal of different South-South interaction models were conspicuously lacking.

“27% of companies in the South collaborate with partners in the South, while 53% have interactions with the North.”

In practice, this is a new way for LMICs to relate to each other, and to other developed nations. More than ever, scientific endeavour must be a collaborative global effort, but complexities around intellectual property, scientific competition, and emerging economies mean that the relationships need to be handled with transparency and care.

While the concept is appealing, and garnered much support from delegates at the Forum, there are still barriers to health diplomacy. According to Halla Thorsteinsdóttir, Assistant Professor at the McLaughlin-Rotman Centre for Global Health, in Canada, analysis shows that private South-South interactions remain limited. Among companies, most partnerships involve only end-stage collaboration, i.e., local marketing and distribution, while collaboration on actual R&D is still lagging. Thorsteinsdóttir noted that only 27% of surveyed companies in the South collaborate with other partners in the South, while 53% have interactions with the North.

Only 5% of all collaborative publications in sub-Saharan Africa were between African partners; 95% were still with institutions in the North.”
Collaboration
Traditionally, collaboration that enables knowledge transfer has happened uni-directionally from rich to poor countries. These relationships are still important since developed countries are often at the cutting edge of innovation. The nature of these collaborations have started to become more equal, but more could be done to ensure that developing countries have equal ownership of any partnership. Robert Ridley, Director of the TDR (UNICEF/ UNDP/WHO/World Bank Special Programme for Research and Training in Tropical Diseases), said that evidence suggests that when research is done within lower-income countries, with local leadership and ownership, it generally has greater impact than when it is driven from outside those countries.

Many governments of developing economies are starting to realize this. Many countries have launched cooperation strategies that try to ensure that local ownership does exist in a project and that transfer of technology is part of any initiative. Bernard Pécoul, Executive Director of the Drugs for Neglected Diseases Initiative (DNDI), emphasized the fact that a model of cooperation will only be sustainable if technology can be transferred to developing countries and their research capacities strengthened.

There also needs to be stronger links and more equitable power relations between civil society organizations (CSOs), academics and funders. CSOs, it was proposed, could act as brokers between health organizations and government in two ways:

1. defining research agendas in response to community needs rather than funders’ priorities
2. by engaging with researchers early in project conceptualization and data collection, as well as in dissemination and implementation of research findings.

The economic and social advancement of the BRICS countries - Brazil, Russia, India, China and South Africa - however, is starting to change the equation. These emerging economies are becoming successful innovators in their own right, which means that they are now repositories of information. Thus, a complex world is emerging, where not all borders are well defined, nor all solutions come from one side of the planet.

Kiran Mazumdar-Shaw, Chairman of Biocon, India

India alone needs to quadruple the number of its doctors and health-care professionals as well as add two million new hospital beds.”

BUILDING LEADERSHIP IN INNOVATION

South-South Initiatives
Developing countries are diverse in their needs, and can in no way be thought of as a homogenous group. Nevertheless, emerging economies have unique insights and experiences that they can pass on to other developing nations. Innovation in developing countries is also often tailored to conditions that exist in those countries. For example, health-care innovation may be needed to devise ways to transport drugs without refrigeration.

Mohamed Hassan, President of the African Academy of Sciences, described these linkages between developing nations as “science diplomacy.” For example, various African countries are collaborating with India in telemedicine and tele-education, and with Brazil to establish master’s degree programmes in health sciences.

Regional initiatives are also an important aspect of cooperation. José Luis Di Fabio, Manager for Technology, Health Care and Research at the Pan American Health Organization (PAHO), in Washington DC, explained why it is so important for Latin America. Countries in the region have all the resources required to complete the process from research to product development. The key, he stressed, was regional cooperation. For example, a collective of countries could be better placed to negotiate affordable drug prices with a supplier. PAHO, thus, would be acting as a platform to facilitate cooperation among actors in social networks, and to encourage capacity development and knowledge sharing. In this way it could improve efficiency, promote technological innovation and facilitate access to medicine.
**Stimulating Investment**

Collaboration can drive research and innovation forward, but it can achieve little without funding. Wim Leereveld, Founder and Chairman of the Access to Medicine Index (ATMI), in the Netherlands, said that the lack in funding in R&D would only be addressed by engaging the private sector even more closely. In an attempt to increase incentives, the Access to Medicine Index ranks pharmaceutical companies according to their contributions to improving access to global health care: the highest overall scoring company in 2008 was GlaxoSmithKline, the lowest was Schering-Plough.

The Index may have had an effect. Rogerio Ribeiro, President and Area Director Latin American and Caribbean at GlaxoSmithKline (GSK), told the audience that GSK has established special R&D centres to engage in preferential pricing, community investment and innovative partnerships.

**Scientists of the Future**

Innovation needs to become a key part of future research for health care. Young scientists, the future of innovation, need to be encouraged to think creatively. Among the 900 participants at the meeting in Havana was a special group of Young Voices, professionals under 30 who had entered an essay competition co-sponsored by the Global Forum for Health Research and The Lancet.

The Young Voices initiative is designed to:
- **Encourage** the next generation of researchers to consider the range and complexity of issues involved in research for health;
- **Create an understanding** of equity-based and pro-poor research priorities;
- **Inspire many to action** through provocative, idealistic and passionate ideas;
- **Foster a network of young voices** who will interact and mutually support one another as they succeed to influential positions; and
- **Facilitate the networking** of Young Voices with (senior) decision-makers who participate in the Global Forum’s meetings.

Two of this year’s Young Voices considered education as a key way to improve health care coverage. Fabio Mendes Botelho, a medical student from the Federal University of Minas Gerais, Brazil, proposed introducing a public-health course in schools in Brazil to address the lack of public-health knowledge in his country. According to Botelho: “It is time to believe and invest in education.” Bianca Brinath, a doctoral researcher at Monash University, Australia, also urged strengthening the link between education and health. In her essay, she proposed giving pens to children to facilitate education and thereby improve public health.

Another recurring theme was frustration. Rebecca Lacroix, currently working with the Fondation Sentinelles in the Democratic Republic of Congo, admitted that her essay was mainly about frustration. She observed that the discourse on innovation “can create the illusion that things get done.” She proposed innovation using common sense. Brenda Ogembo, a doctoral student at the University of Ottawa, Canada, admitted: “I don’t know how much my essay would really be an innovation, but it is written out of a frustration about the amount of talking we do while not taking enough action.” She highlighted the shortage of over four million health workers in the world and stressed the lack of discussion about their role as actors of innovation. She advocated for an increase in pay for health workers and improvement of their conditions, saying: “We need to act now!”

The audience appeared inspired by these presentations and senior figures from the world of research for health offered encouragement and questions. Peter Ndimbe, Dean of the Faculty of Health Sciences, University of Busa, Cameroon, urged the students “to fight the temptation of becoming angry and approach the establishment in the manner that permits you to accomplish your goals.” This thought was reiterated by a Young Voice from a previous year, who appealed to the 2009 Young Voices to look at international organizations that are doing good things. Frustration can lead to inspiration, she said, but also to depression. Sarah Walpole, of the UK-based Climate and Health Council, reminded the audience of their privileged position of being at Forum 2009, and encouraged them to think about ways to include marginalized groups. Robert Ridley, Director of TDR, urged the Young Voices to not forget that innovation and inquiry “encourage an element of play.”

When asked whether they were committed to go forward with the ideas they had presented, many of the Young Voices had ready responses: Brenda Ogembo is planning to work with her university to give agency to front-line workers; Luz Lopez Samaniego wants to become a policy-maker and help that way; Fabio Mendes Botelho said he had already tried to teach public health at schools, but authorities had not let him. With a little more practice and experience, these Young Voices may grow louder.

Ribeiro stressed that GSK is not doing this from a philanthropic standpoint but because the company aims to create a sustainable economic model by doing good business. He said the investment in R&D centres, which currently is not profitable, has been made with an eye on emerging markets and that 80% of the global population lives in the developing world.

"Access to Medicine Index (ATMI) ranks pharmaceutical companies according to their contributions to improving access to global health care: the highest overall scoring company in 2008 was GlaxoSmithKline, the lowest was Schering-Plough."
ACKNOWLEDGEMENTS

We are grateful to a wide variety of parties for their part in the success of Forum 2009.

Special thanks go to the Cuban Ministries, institutions and organizations who worked with us over several months to make the meeting in Havana possible. With their help, exclusive access to the country’s medical services, research facilities and centres of excellence was granted for participants to observe and understand the innovative Cuban health-care system.

We would also like to thank Stephen Matlin, then Executive Director of the Global Forum for Health Research, and the Secretariat for their part in organizing the meeting. The work and efforts of Charles Gardner, Senior Innovation Specialist, deserve to be highlighted; his expertise and knowledge in the subject area was paramount in developing the program and coordination of sessions.

Warm thanks also go to Beverly Peterson Stearns, Barbara Kennedy and Colette van Der Ven.

Finally, we would like to thank the participants for travelling to Cuba to take part in Forum 2009. Their contributions to debates, and sharing of experiences, meant others could be inspired from the successes and learn about the challenges of using innovation in health settings.

Written by Priya Shetty
Edited by Natalie Boudou, Iqbal Nandra and Louise Hughes
Design by INFONAUTS.in