Globalization and Health: The Role of Knowledge in an Interdependent World

Julio Frenk, M.D., M.P.H., Ph.D.*

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* Dean, Harvard School of Public Health, Boston, Massachusetts

I would like to begin by thanking the National Institute of Dental and Craniofacial Research and the Fogarty International Center for inviting me to deliver the 2009 David E. Barmes Global Health Lecture. I would especially like to thank Larry Tabak, Roger Glass, and Lois Cohen.

It is a privilege to have Francis Collins here with us. We all know that he has included the promotion of global health as one of the five platforms on which he plans to continue enriching the extraordinary legacy of the National Institutes of Health. As leader of the Human Genome Project and throughout his remarkable career, he has tasted the fruits of global scientific collaboration. I am personally grateful to him for his invaluable advice in setting up the National Institute for Genomic Medicine of Mexico during my tenure as minister of Health there. From my current position in a U.S. academic institution I further applaud this global vision, since I am convinced that no individual country —no matter how well endowed with human and financial resources— can generate on its own an effective response to the most pressing health challenges of our times.

It is an additional privilege for me to deliver a lecture that honors the many contributions of David Barmes. He was not only an outstanding expert in dental and public health, but also an energetic global leader who devoted enormous efforts to improving the health of the most disadvantaged people in our planet.

This is a timely lecture. The world is going through one of the most radical health transformations in history. During the past few years, health matters have stopped being the exclusive concern of domain experts. Instead, health has come to occupy a central place in the most pressing dimensions of the global agenda: economic development, national security, democratic governance, human rights.

The growing recognition of the importance of health has been associated with an extraordinary expansion of development assistance for health, which increased from US$10.7 billion in 2000 to US$21.8 billion in 2007.[1] It has also led to the creation of a whole set of new forms of organization, to the point that there are now close to 120 multilateral agencies and partnerships active in health. After 25 years in this field, I believe that we are at the threshold of a new global health era, which poses additional challenges but also offers fresh opportunities.

The main message of my lecture is straightforward: If we are to meet the challenges and reap the opportunities of an increasingly interdependent world, we need to renew global cooperation in health. In this renewal process science plays an absolutely critical role.

In order to elaborate on this notion, I will divide my presentation in four parts. We need a new way of thinking a about global health, which will be addressed in the first part. Based on this conceptual foundation, I will then set the context of growing complexity that characterizes the global health field.

Knowledge occupies center stage in this field, so the third part will examine the use of knowledge to improve the health of populations, not only through specific technologies but also through policy innovations based on scientifically derived evidence. In the final part I will discuss the false dilemma between local and global research, and the role of institutions such as the NIH in the renewal of global cooperation for health.

As mentioned before, global health is experiencing a moment of unprecedented attention and expansion. Yet, despite its increasing importance, global health has developed in the absence of a conceptual foundation that can guide its efforts to generate knowledge and lead its practical applications.

Several definitions of global health have been proposed. Some of them emphasize certain types of health problems (communicable diseases), or certain populations of interest (the poor), or a geographical focus (the "Global South"), or a mission (equity). While global health does encompass all of these dimensions, each of them in isolation offers only a partial perspective and therefore limits a comprehensive understanding of the field.

In my view, global health should be defined first and foremost by its population level of analysis.[2] The distinctive feature of global health is that it involves the entire population of the world, along with the subjects of the international community, namely nations, with cultural and territorial identity; states, as the political organizations of these nations; various bodies comprising multiple nation-states, such as economic and political blocs or multilateral organizations; transnational corporations; global civil society movements; and, very importantly, academic institutions charged with the production of knowledge-related global public goods.

The contents of the concept of global health should be distinguished from those traditionally attributed to the term "international health." Coined around the creation of the International Health Commission in 1913 by the Rockefeller Foundation,[3] this term was identified with the control of epidemics across borders and in sea ports, and with the health needs of poor countries, mostly communicable diseases and maternal and child health.[4]

Despite the appearance of originality, very often the expression "global health" simply repackages the old meaning of international health, in a case of mere linguistic updating that is not accompanied by true conceptual renewal. Not only in popular media but also in scientific literature and in several major initiatives, global health is being again identified with problems that are supposed to be characteristic of the developing world.

Global health, however, is not "foreign health," nor is "global" the opposite of "domestic." Instead, global health should be centrally concerned with the **interdependence** among all countries, regardless of their geographical position

or stage of development, including the distribution of health challenges around the world, which gives equity a key place in the global health agenda.

Neither should global health be identified exclusively with communicable diseases, important as they are. The times of simple and clear-cut priorities are gone. Today, the rapid shift in the patterns of disease, disability, and death has added new layers of complexity, and this leads me to the second part of my remarks.

We are in the midst of a **tense** and **intense** health transition unlike anything the world has seen before, which is linked to broader demographic, social, and economic transformations.

There has been a fundamental transformation in the nature of both death and disease. To begin with, during the 20th century the world as a whole experienced a larger gain in life expectancy than in all the previously accumulated history of humankind. Life expectancy was only 30 years in 1900. By 1985 it had more than doubled to 62 years. In 2009 the average estimate for the world is 66.6 years, but with huge regional differences, ranging from 82 years in Japan to scarcely 32 in Swaziland.

The dramatic increase in life expectancy at birth is only one of a series of demographic changes that are happening as we speak. Because they are not cataclysmic, we tend to lose sight of them, but that does not make them any less important. As Joel Cohen points out, during the opening decade of the 21st century there have been three firsts in the history of humankind:[5]

- In the year 2000, for the first time in history, older people outnumbered young people.
- In 2007, the urban population outnumbered the rural population, again for the first time ever.
- In 2003, the world as a whole reached replacement fertility, that is to say, an average of 2.1 children per woman. This means that the average woman started having just enough children during her lifetime to replace herself and the father in the following generation. There are, of course, huge differences among countries, from 7.75 children per woman in Niger and 6.53 in Afghanistan to 1.09 in Singapore and 1.23 in Lithuania.

From a health perspective, the most fundamental change refers to the shift in the dominant patterns of disease. The relative weight of different causes of death has been moving along two dimensions: towards higher age groups and towards chronic conditions, whether communicable (like AIDS) or non-communicable (like cancer, diabetes or cardiovascular diseases).

In fact, the whole meaning of illness has been transformed. Previously, the experience of disease was marked by a succession of acute episodes, from which one either recovered or died. Now, people spend substantial parts of their

lives in less than perfect health, coping with a chronic condition. Illness may not always kill us, but it always accompanies us. It has therefore become a condition of living, often stigmatized. To use Susan Sontag's image, we all now have dual citizenship, both in the kingdom of the healthy and in the kingdom of the sick.[6]

In sum, we are in the midst of a profound health transition characterized by a quantitative reduction in the levels of mortality and by a qualitative increase in the complexity of the dominant patterns of disease. Problems only of the poor, like malaria or maternal mortality, are no longer the only problems of the poor.[7]

In fact, most developing countries are facing a **triple** burden of ill health: first, the unfinished agenda of common infections, malnutrition, and reproductive health problems; second, the emerging challenges represented by non-communicable diseases, mental disorders, and injury; third, the health risks associated with globalization, including the threat of pandemics like AIDS and influenza, the trade in harmful products like tobacco and other drugs, the health consequences of climate change, and the dissemination of harmful lifestyles leading to the silent epidemic of obesity, which someone has called "globesity," precisely to underscore its link with globalization.

The concept that best fits this dynamic picture is the "global transfer of health risks."[8] At its heart lies the interdependence of the health of populations,[9] the fact that many health problems spread mostly through processes created to support production, trade, and travel worldwide, and are common to developed and developing nations, although with a very unequal distribution both of problems and of resources to deal with them.

But just like there is a global transfer of risks, there is also a global transfer of opportunities, which is powered mostly by the expansive benefits of knowledge. This is the focus of the third part of my lecture, to which I turn next.

We now understand that most of the health gains achieved since the 20th century can be attributed to the advancement of knowledge.[10] Most of us will agree that research is a value in itself, an essential part of human culture. At the same time, knowledge has an instrumental value as a means to improve health. There is a **cycle of knowledge** involving its production, through research; its re-production, through education and training; and its translation, which, when subject to scientific evaluation, feeds back into the production of new knowledge.

Knowledge translation is another of the priority platforms defined by Francis Collins for the NIH. Translation is important because it provides the three main mechanisms through which knowledge improves health. First, knowledge gets translated into new technologies, such as vaccines, drugs, and diagnostic methods. This is the best known mechanism through which it improves health. But, second, knowledge is also internalized by individuals, who use it to

structure their everyday behavior in key domains like personal hygiene, feeding habits, sexuality, and child-rearing practices. Finally, knowledge becomes translated into evidence that provides a scientific foundation both for health care and for policy formulation.

Each of these mechanisms is being tested by the complexity discussed earlier. The resulting gaps should inform the global research agenda. The persistence of both old and emerging causes of disease burden can be due either to a lack of fundamental knowledge and a corresponding paucity of tools or to a failure by populations and providers to use existing tools.[11] These two sets of gaps point to distinctive research needs. It is beyond the scope of this lecture to enumerate specific priorities –a daunting task when addressing the leaders of the premier research organization in the world. Let me simply say that I remain fundamentally optimistic about our capacity to face the increasingly complex set of health challenges. This is because the new era in global health that I spoke about before is being fueled by five simultaneous revolutions:

- First is the revolution in the **life-sciences**, especially in genomics, to which Francis Collins and the NIH in general have contributed so much. From my own experience in a developing country, I am persuaded that advances in the life sciences are essential to provide better understanding about differential disease patterns in a way that generates solutions suited to resource-constrained settings.
- Second is the revolution in **telecommunications**, which is opening exciting new avenues for expanding access to care by underserved populations. In particular, mobile phones are rapidly becoming the communication technology of choice in all countries, including the poorest.[12] There are 2.2 billion mobile phones in the developing world and by 2012 half of all individuals living in remote areas of the planet will have regular access to this technology.[13] Due to this amazing level of penetration, mobile phones are being increasingly used in the developing world to support public health and clinical care projects. Leapfrogging innovations are empowering both populations and health workers throughout the world.
- Third is the revolution in **systems thinking**, which is allowing us to comprehend and transform complexity.
- Fourth is the revolution in **knowledge management**, which is generating evidence to provide a scientific foundation for behavior modification on the part of people, for quality improvement on the part of providers, and for more enlightened decisions on the part of policy makers.
- Last but certainly not least, there is what Michael Ignatieff has called the **rights** revolution, which is turning abstract declarations into concrete entitlements that persons can be empowered to demand.

Further progress in global health will depend on our capacity to integrate these five revolutions. A first level of integration must occur across disciplines. Already the most exciting advances in science are taking place at the interface among traditional disciplines, as exemplified by genomics and bioinformatics. But we need to go further. There is also a need to integrate across levels of analysis, so that we may examine specific health problems from the gene to the globe. Another domain of integration is between the values of excellence and relevance, which means that while we pursue the highest standards of scientific rigor, we are at the same time providing solutions to the most pressing health challenges of our times.

I would like to illustrate the enormous potential of this last type of integration with the experience of the comprehensive reform that I was privileged to lead as minister of Health of Mexico, which began with scientifically derived evidence and culminated with rigorous evaluation. More than the specific content of the reform, the attempt to ground it on knowledge may be relevant to the intense debate currently taking place in the United States.

I will not go into the details of the Mexican reform, which has been the subject of a series of seven articles in *The Lancet*.[14,15,16,17,18,19,20] For the purpose of this lecture, it will suffice to mention that this reform is probably a textbook case of evidence-based policy, since it was designed and implemented making use of the best available knowledge.

Thus, a series of careful studies revealed alarming rates of catastrophic and impoverishing health expenditures as a result of the fact that approximately half of the population, 50 million people, lacked health insurance. This analysis brought to light an unacceptable paradox: We know that health is one of the most effective ways of fighting poverty, yet medical care can itself become an impoverishing factor for families when a country does not have the social mechanisms to assure fair financing that protects the entire population.

The reform was designed to correct this paradox through the introduction of universal health insurance. The vehicle for achieving this aim is a public scheme called *Seguro Popular*, funded predominantly through federal and state subsidies to means-tested family premiums. The program has elicited an enthusiastic response from the population, so that by June of 2009, 30 million people were enrolled in it, and the country is on track to achieving the goal of universal coverage by 2011.[21]

What I would like to emphasize is the decision, from the very beginning of the program, to evaluate its effects using a randomised design. Due to budgetary and logistical constraints, it was impossible to enrol all eligible families simultaneously. It was therefore decided to phase in enrolment. For evaluation purposes, eligible communities were matched on the basis of socioeconomic and demographic characteristics. They were then randomly allocated to receive insurance coverage either in a first stage (the “treatment

group") or in a second stage (the "control group"). In the matched sets of communities a sample of around 36,000 households was surveyed at baseline to collect information on several expected outcomes, focusing initially on financial protection.

Barely ten months later, the first follow-up measurement showed a significant reduction in catastrophic expenditures, especially among poor households.[22] In addition to observational studies, further measurements within the framework of the experimental design will determine the effects of universal insurance on service utilization and, ultimately, on health outcomes.

This is an example of the possibility of applying the most rigorous research designs to advance knowledge on large-scale social interventions. It also illustrates the way in which translation can close the knowledge cycle by leading to the production of new scientific evidence.

Furthermore, the international dissemination of the *Seguro Popular* evaluation and its influence on other reform initiatives throughout the world clearly show that the dilemma between local and global research is a false one. The process of globalization can turn knowledge into an international public good that can then be brought to the domestic policy agenda in order to address a local problem. Such application, in turn, feeds back into the global pool of experience, thus generating a process of shared learning.

In fact, awareness about the importance of the systematic application of research findings and the dissemination of evidence-based practices lies at the heart of what has been called "implementation science."[23] As you know, Roger Glass and the Fogarty International Center have been active in promoting the rational adoption of good practices in global health.[24]

This is just one of the latest initiatives of the Fogarty International Center at the NIH, a center that was created with the clear conviction that support to international research would benefit both developing societies and the citizens of the United States, since knowledge, the main product of research, is the quintessential global public good.

As the largest research organization in the world, the NIH has been at the forefront of creating that public good and has a crucial role to play in any further global effort. And this leads me to the final part of my lecture. In addition to strengthening global coordinating mechanisms, there is an urgent need to upgrade research capacities in low- and middle-income countries. This is, of course, a very heterogeneous group of nations, so any coherent strategy should be adapted to the stage of research development by deploying three levels of intensity: capacity building, capacity strengthening, and performance enhancement.

As the name implies, capacity building applies to countries where research infrastructure is very weak. It is mostly focused on the development of human

resources in order to generate a critical mass of health researchers. It also requires the establishment of new institutions capable of embracing those researchers.

Capacity strengthening implies support for the expansion and diversification of existing research infrastructure. This kind of support is usually provided to scientists and institutions in developing countries that are already involved in research activities, and its purpose is to enhance the research environment through construction of appropriate facilities for research, financial support to projects, access to scientific literature, twinning arrangements with stronger institutions, and creation of stable career paths for researchers.

Finally, performance enhancement is applied in settings where capacity is relatively strong but can still benefit from catalytic investments to promote collaborative linkages between research institutions in developed and developing countries.

In all cases —whether it is capacity building, capacity strengthening or performance enhancement— the important thing is to focus on **institutions**. Development is always accompanied by an effort to build strong institutions, which introduce certainty to transactions and articulate incentives. Institutions represent the vehicles to transcend the inevitably temporal presence of each individual by catalyzing the talents of many around shared goals and values.

I have to say that one of the main key lessons of the Mexican health reform experience is that there is no substitute for long-term investments in institution building to improve research capacity. The current reform has reaped the benefits of 20 years of sustained efforts to establish and nurture organizations such as the National Institute of Public Health and the Mexican Health Foundation. These centers of excellence have produced relevant research and policy analysis, trained researchers who occupy key policy-making positions, carried out independent and credible evaluations, and greatly enriched the quality of information.

Let me conclude by reminding you that next year we will be celebrating the 20th anniversary of the landmark report of the Commission on Health Research for Development, which coined the concept of essential national health research, based on the premise that every country, no matter how disadvantaged, should have at least some research capability, since this is the only way to partake of the global knowledge commons and to realize the potential benefits of research for development.[25] Every country should have access to global knowledge repositories, along with the capacity not so much to **adopt** evidence as to **adapt** it to local circumstances. This anniversary offers an opportunity to relaunch a movement around research as a crucial ingredient for the renewal of global cooperation in health. Now, 20 years later, we can take advantage of the opportunities opened up by globalization to create broader

networks of collaboration, for example, through consortia of national and regional centers of excellence.

I began my lecture by referring to the tension and the intensity of the present global health transition. I would like to end by invoking the wise words of the Nobel laureate Amartya Sen at the International Symposium on Human Security, held in the year 2000:

> "We live in a world that is not only full of dangers and threats, but also one where the nature of the adversities is better understood, the scientific advances are more firm, and economic and social assets that can counter these menaces are more extensive. Not only do we have more problems to face, we also have more opportunities to deal with them." [26]

As we enter a new era of global health, knowledge will continue to be the key asset to sharpen our understanding of problems and to create novel solutions. In our turbulent world, still scarred all too often by intolerance and exclusion, science remains as the most powerful force for enlightened social transformation. I thank you for the honor you have bestowed on me by inviting me to speak at this most distinguished house of enlightenment.

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