



# International cooperation for science and technology development: a way forward for equity in health\*

*Priscila Almeida Andrade*

Professor, Universidade de Brasília.  
Campus Ceilândia – Centro Metropolitano, conjunto A, lote 1  
72220-900 – Brasília – DF – Brazil  
priscila@unb.br

*Denise Bomtempo Birche de Carvalho*

Professor, Universidade de Brasília.  
Campus Universitário Darcy Ribeiro – Decanato de  
Assuntos Comunitários  
70910-900 – Brasília – DF – Brazil  
denisebomtempo@terra.com.br

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## Abstract

Since 1990, international organizations have been increasingly involved in building an international sub-regime for research, development and innovation in health. This article analyzes the priorities of developing countries in health since the 1990s. It is a descriptive and analytical study that investigates the literature and contributions of key informants. Calling for the end of global inequities in the support for science and technology in health, international organizations recommend that developing countries focus their efforts on neglected diseases and operational research, an insufficient agenda for science and technology cooperation to effectively overcome the vulnerabilities between countries.

Keywords: international organizations; international relations; equity; national health systems.

Globalization is a multidimensional process that includes economic, political, cultural, social, technological-scientific, and populational-migratory aspects. Knowledge and technology can easily be spread by countries, whose national borders have become permeable to these flows, favoring the expansion of new markets (Keohane, Nye, 2001). Research, development and innovation (RD&I) in health is also part of this movement of global interactions, although an asymmetrical power structure in the ambit of international relations governs access to it and its management.

In view of this scenario of global interdependence, governments, civil society and industry can promote the emergence of new organizations, networks, processes, agreements and norms through diplomatic relations with a view to implementing science and technology cooperation activities designed to minimize the vulnerabilities and inequities between countries (Kickbusch, Berger, 2010). International organizations (IOs) enable and empower interactions between the actors involved, underpinning the negotiation process and the “power play” concerning specific questions. The role of these agents in international politics has grown since the twentieth century.

Herz and Hoffmann (2004, p.17) identify two types of IO: ones formed by nation-states, and ones that represent civil society, corresponding to intergovernmental organizations and international nongovernmental organizations (INGOs), respectively. Within the ambit of the global public agenda, the Oslo Declaration, approved in 2007, identifies governments, foundations, public-private partnerships, the World Bank, INGOs and intergovernmental organizations – especially the World Health Organization (WHO) – as these strategic actors. Their action is interdependent, generating a dynamic movement that fluctuates between synergies and conflicts (Fidler, 2011).

In view of the interdependency between the domestic and foreign planes, national health policies must also consider how IOs act and how priorities are set in international agendas. Kickbusch and Berger (2010, p.22) state that foreign policy and diplomacy offer important tools for dealing with this growing interdependence, operating as extensions of national policy initiatives. Alignment between economic, social and diplomatic interests in developing countries has the power to help reduce their vulnerability vis-à-vis developed countries and to promote equity in the realm of science and technology for health. RD&I in health lies at the heart of this debate.

According to Lopes (2005, p.30), holders of science and technology knowledge occupy higher positions in the international community. They boast comparative advantages as they concentrate knowledge and information – intangible assets – and can decide what to produce, what to divulge, who to, and at what cost. One issue is that RD&I in health is strongly concentrated in certain areas by a restricted group of institutions from the production sector, with industry constituting the main locus of such activities.

Although access to knowledge is controlled by those who own it, a precondition for promoting the advance of science, and winning or maintaining space on the market in a given segment is that this knowledge be spread through the global network of interacting players. Specifically in the area of health, the process of generating and incorporating results of RD&I is increasingly intense. The WHO estimates that around 50% of therapeutic advances now available are the result of scientific and technological progress made since 1990 (Conass, 2007).

When it comes to international cooperation in this field, the most recent maps of global flows of resources for RD&I in health, from 2007, estimate an investment of US\$ 21.8 billion in the health sector in developing countries, US\$ 1.1 billion of which is for funding RD&I (Global..., 2009). These investments are still incipient, but with the potential to contribute to reducing inequities in health, provided national health, economic and diplomatic priorities are aligned. For this, the recommendations of the actors, especially IOs, about what developing countries should prioritize in RD&I in health must be identified. This is the objective of this article.

The issues presented already indicate the importance of the subject, which is itself part of the broader debate on intervention bioethics. This branch of bioethics argues that globalized capitalism is marked by inequalities in the relationships between developed and developing countries because of persistent problems arising from economic globalization, international asymmetries, and exclusion of access to the results and products of science and technology development (Porto, Garrafa, 2005).

Our initial assumption is therefore that the domestic and foreign planes interact. Understanding the movement of the related actors may help qualify the actions of developing countries to minimize their vulnerability in science and technology cooperation processes in health. The fact that this subject receives little attention in the scientific literature indicates that there are research gaps which merit more in-depth debate. To develop the argument, this article is structured in three parts. The first presents some ideas from international relations theory, especially institutionalism and constructivism, to help understand the role of IOs in the harmonization process and in setting priorities for global agendas. The second part shows the actions of these IOs and the priorities set in the global health agenda for developing countries in the field of RD&I since the 1990s. The third presents some reflections about international science and technology cooperation and its role in overcoming inequity in health, correcting the 10/90 gap.

This is a qualitative, exploratory study of a descriptive, analytical nature. The data collection procedure was based on primary and secondary sources. Content analysis was the method chosen to treat the information collected from interviews with key informers. The proposal is to identify and reflect on the content of the central ideas contained in the technical and scientific literature and the messages communicated in the interviews in order to compare and contrast and obtain as much information pertaining to the topic of the article as possible (Bardin, 2011).

The first step for selecting the research subjects involved identifying some strategic actors at IOs involved in the debate about support for science and technology in health. The interviews, started after approval was given by the research ethics committee, made it possible to analyze in an integrated and complementary way the contributions of the interviewees in question, who hold different positions in the selected institutions.

During the interviews, the research subjects were given free rein to express their opinions. To ensure confidentiality, only the job title and institution are used to refer to them in the article. Seven people were interviewed in this study:

- a consultant from the WHO working in the Department of Equity, Poverty and Social Determinants of Health at the headquarters in Geneva, Switzerland;
- a former consultant for the Pan-American Health Organization (PAHO/WHO) who worked at the headquarters in Washington for 20 years, also on health and poverty-related issues;
- leaders of the INGOs Global Forum for Health Research and Council on Health Research for Development (COHRED);
- former director of the WHO's Special Programme for Research and Training in Tropical Diseases (TDR/WHO);
- former coordinator of the Alliance for Health Policy and Systems Research;
- former consultant of the World Bank, who also sat on the WHO's Ad Hoc Committee on Health Research Relating to Future Intervention Options ("Ad Hoc Committee on Health Research").

Once the interviews had been held, the recordings were transcribed. The resulting consolidated text was then subject to content analysis, extracting the central ideas, the issues that were repeated, the complementarities between what the different interviewees said, and the divergences and convergences between the interviewees' opinions and the bibliographical references consulted. Then, the information collected was treated in the following steps recommended by Bardin (2011, p.100-101):

- thematic analysis, to identify the central points raised in the messages communicated;
- analysis of the characteristics associated with the central theme to observe the set of meanings, principles, values and interests each interviewee expressed in the content of their message;
- sequential analysis, to organize the content in the sequence presented, making it easier to identify the primary themes and repeated messages that appear throughout each interview.

Using this procedure, each interview was summarized in such a way as to highlight its central messages. By systematizing the content in this way, the interviews could then be compared to find similarities and differences, contrasted with the literature consulted, and the main messages could be identified to constitute the findings of this study.

The secondary data are based on a literature review and the analysis of documents. A wide-ranging literature review on the dynamics of the international health agenda and the importance of IOs for cooperation processes was conducted. International reports on science, technology and innovation in health were also consulted. In other words, this article bases its arguments on a blend of primary and secondary data.

### **The role of international organizations in the formulation of global agendas**

The 21<sup>st</sup> century has been called the knowledge era, which makes RD&I in health so important for cooperation on the global ambit. Control of the production, development and spread of knowledge and technologies influences geopolitics, affecting the strategic position of countries in the international system (Santana, 2011; Miranda, Zaman, 2010). The future

of a country as a sovereign nation also depends on the course taken by national science and technology development and to what extent its priorities are incorporated into the global agenda of bilateral and multilateral cooperation (Alcoforado, 1997).

In view of the complexity of the issues at play in the contemporary scenario, there is a need for closer and broader dialog between public health, bioethics and international relations, addressing the international cooperation agenda for RD&I in health. In this context, IOs have a key role to play in harmonizing expectations and settling agreements between countries. The reflections of different schools of international relations can shed light on the movements of IOs and how they set their priorities for the global agenda of a sector such as research, development and innovation in health.

In the light of international relations theory, it is possible to analyze the interface between national and international political agendas in different sectors and the influence of government actors and IOs in setting priorities and implementing the policies made (Castro, 2001). In international relations theory, a given topic is addressed from different perspectives according to the school in question. Aware of the limitations of each one, here the central idea about the role of IOs in international cooperation is addressed, as conceived from the perspectives of institutionalism and constructivism. The combination of these contributions will provide the basis for the analysis of the object of this study.

The institutionalist approach concentrates on institutions and interests. It argues that institutions exert influence on political situations through the mediation of actors, whose moves are guided by intentionality and rational choice. This school focuses the debate on the analysis of the work of IOs – the rise, modification and substitution of international regimes, which legitimize the expectations of the international community about the policies and leaders in a given sector. Keohane and Nye (2001) are two leading authors in institutionalist theory. They see the current scenario as being marked by complete interdependence, whose dimensions – sensitivity and vulnerability – need to be considered to understand the changes in relations between the actors. Sensitivity to change has to do with alterations in national agendas and public policies in response to new conditions abroad, while vulnerability refers to the social, political or economic costs arising from the modifications introduced to domestic public policies and agendas in response to stimuli and expectations of international actors.

Interdependence is marked by the existence of multiple channels linking different countries, from informal interactions between public and private actors to formal intergovernmental relations, and the absence of hierarchy between the issues of the different sectors in the international agenda. Dilemmas and discordance of interests may emerge, first causing conflict and then cooperation, which is needed to minimize vulnerability, reduce uncertainty, galvanize efforts, and share collective goods, like scientific and technological knowledge in health (Castro, 2001).

However, situations may arise in which certain actors do not benefit from or cannot cover the entirety of the costs of their own actions. This may become an incentive for countries to accept certain limitations in their individual decision-making capacity in favor of collective cooperation mechanisms, in which IOs have a strategic role (Keohane, 1984). For the actors to face this situation of interdependence, it is recommended for them to coordinate joint

positions in order to favor the emergence of global patterns in the formation of public policies and agendas in different sectors.

As such, national public policies may suffer external interferences when they take into account the expectations and interests of a set of IOs. Furthermore, national interests may also intervene in the negotiations and choices made in international forums, influencing global agendas. By promoting a network of interactions, globalization drives the redefinition of the role of the state, which starts to incorporate global rules, values and behaviors, while formulating public policies that incentivize negotiations and interchange in favor of different kinds of bilateral and multilateral cooperation (Cervo, 2001).

In this context, the competencies of IOs expand beyond traditional state functions in their responsibilities on a national ambit. Herz and Hoffmann (2004, p.55) note that institutionalists highlight the importance of IOs in minimizing conflicts, reducing uncertainty, and mediating negotiations with the objective of establishing international cooperation. In fact, as Castro (2001, p.22) points out, since the end of the Second World War, the winning powers have woven a complex web of IOs devoted to promoting multilateral cooperation in diverse areas, such as science and technology development. This process has been accompanied by a quantitative increase in and strengthening of non-state agents in the international system, like INGOs and transnational companies, operating, for instance, in the pharmaceutical industry.

Each IO generates its own set of ideas, interests and values, which may sometimes be mutually conflicting. Some political, economic and social issues from the national sphere may therefore be better understood in their entirety if the influence of these actors is considered. Another element in this debate is the importance of the construction, rise, change and substitution of international regimes, a set of implicit or explicit principles, norms, rules and decision-making procedures around which international actors' expectations converge in a given area. Principles are beliefs of fact, while norms are standards of behavior defined in terms of rights and obligations. Meanwhile, decision-making procedures are prevailing practices for making and implementing collective choice (Krasner, 1982).

International regimes are specific to one area and interface with other sectors, also forming international sub-regimes. They can foster the creation of other institutional structures to facilitate global governance in order to harmonize conflicts of interest existing at the overlaps between different sectors (Castro, 2001). Thinking of the health sector, this argument could be illustrated by the interface between the global health agenda and the development agenda, where intellectual property impacts on the development of science and technology for health. As such, the interests involved in RD&I in health require the consolidation of an international sub-regime in close articulation with other sectors, harmonizing the expectations of the different actors about the social and economic issues at stake, such as the monopoly of intangible assets and global access to priority health technologies.

Herz and Hoffmann (2004, p.20) further observe that the creation of international regimes may result in the emergence of IOs. They may be formed as a result of the recommendation and common expectations of the actors, and once created may themselves serve as agents in the development and maintenance of the international regimes that spawned them. For Keohane and Nye (2001, p.48-49), international regimes set the acceptable limits for behavior about different issues: they recognize the standards of practices and ideas that define

the “rules of play,” making it possible for the behaviors expected by international actors to be reproduced on a national level through public policies and legislation. In this sense, international regimes may facilitate agreements between countries, promoting cooperation beyond a single actor’s individual pursuit of its own interests.

The other school of international relations theory this research is based on is constructivism, which contributes to the discussions about the importance of ideas and lessons learnt from actors as drivers of cooperation. Constructivism seeks to foster an understanding of the process of arguing, dispute and negotiation between members of the international community. According to Herz and Hoffmann (2004), this approach interprets the collective construction of identities, rationale, symbols, images, conceptions, world views and preferences, which come together in the formation of social compacts. For constructivists, IOs have a fundamental role in spreading, influencing and transforming ideas and interests by influencing the priorities of countries and incorporating them into the national sphere.

The international relations theories mentioned, notwithstanding their respective limitations, have the potential to inform the public health debate about the dynamics of the international community in setting priorities for the global health agenda based on the actions of IOs in mediating this process. An understanding of this movement reinforces the importance of the interface between public health and foreign policy, and the need to expand the actions of developing countries in international arenas, since the priorities of the global health agenda and the recommendations of IOs about the role of developing countries in RD&I in health are a reflection of the expectations shared by the international community, a topic to be discussed in the next section.

### **Priorities of developing countries for science and technology in health**

Analyzing the trajectory of public health priorities on a global level and considering the actions of IOs and how they interact with national health agendas is a major challenge for the twenty-first century (Pires-Alves, Paiva, Hochman, 2008). According to the interviewees (Almeida-Andrade, 2007, p.91), the 1990s were marked by intense international debate about the role of national health systems in promoting science and technology, especially due to the enduring asymmetries in the flows of resources between countries for RD&I in health. This scenario illustrates the contradictions that exist between investment priorities and resolving the health problems of the global population.

In this period, the Commission on Health Research for Development, the Task Force on Health Research for Development, the World Bank, the WHO’s Ad Hoc Committee on Health Research Relating to Future Interventions Options, and the Global Forum for Health Research all made significant efforts. The initiatives they led are recorded and legitimately recognized by the international community through the publication of their respective reports:

- *Health research: essential link to equity in development*, in 1990, by the Ad Hoc Committee on Health Research;
- *Essential National Health Research (ENHR): a strategy for action in health and human development*, in 1991, by the task force;

- *Investing in health: world development indicators*, in 1993, by the World Bank;
- *Relating to future interventions options: investing in health*, in 1996, by the WHO's Ad Hoc Committee on Health Research.

According to the interviewees, these documents are the institutional frameworks that have driven the strengthening of RD&I in the global health agenda since the 1990s. By understanding this international movement, we can also better comprehend the principles and interests around which the actors' expectations concerning the role of developing countries in RD&I in health converge, legitimized by IOs. This is an area marked by conflicts of interests due to its social and economic dimensions.

The interviewee from TDR noted that in the 1990s the World Bank's role in the global field of health grew, and that investments by groups of donors were redirected to structure other INGOs, as they would be able to act with greater agility and flexibility. This paved the way for the debate about RD&I in health to expand to different forums, resulting in the WHO losing its hegemony in setting the global agenda. Alongside internal and external tensions at the WHO, the interviewee highlighted the HIV/Aids pandemic and conflicts of interests in the debate about intellectual property in the field of health in this period as forces that galvanized actors to reflect about the challenges and prospects for promoting science and technology development in health.

In its 1990 report, the Commission on Health Research for Development pointed out the main problems facing the field of science and technology in health worldwide. It found that there was a traditional concentration of investments in biomedical and experimental research (preclinical and clinical phases), to the detriment of studies into health management, policies, systems and services. The Commission noted the existence of asymmetries, dividing the globe into two groups. It defined developed countries as having expertise, experience, science and technology infrastructure, consolidated regulatory frameworks, and sufficient financial resources, while developing countries were those that had institutional weaknesses, financial instability, limited scientific and production capacities, and the migration of researchers to developed countries.

In its studies of financial flows, the Commission tracked global investments in RD&I in health, estimating that they summed approximately US\$ 30 billion in 1990. Of this total, developing countries, especially their governments, only earmarked an estimated US\$ 680 million for RD&I in health. The most significant contributions were made by developed countries, especially pharmaceutical companies, public funding agencies and IOs. This study also found that multinational drug companies invested US\$ 13 billion, but of this only around US\$ 300 million went to RD&I for areas of interest to developing countries – production of vaccines for malaria and schistosomiasis, medications to combat parasitic diseases, and insecticides for vector control. International investments were therefore made in their vast majority in areas of priority to developed countries (Commission..., 1990).

This investment mapping helps identify the existence of deep-seated inequities in the field of science and technology in health, a situation the Commission called the 10/90 gap. This means that less than 10% of global funds for RD&I in health from private and public sources is devoted to 90% of the world's health problems (Global..., 2004).



The Commission explained that the reasons behind this gap included the fact that developed countries prioritized their own governmental agendas when it came to funding RD&I in health, serving the needs of their own people – something not seen so strongly in developing countries. The 10/90 gap came to epitomize the inequity arising from asymmetries between national capacities and cooperation processes between developed and developing countries for science and technology in health (Global..., 1999). As a result of this effort, the Commission (1990, p.88-89) proposed an agenda for action for the international community made up of the following recommendations:

- that Essential National Health Research (ENHR) be adopted, especially in developing countries. This involves structuring national systems for research in health that prioritize operational investigations in policy science and management;
- at least 2% of the health budget should go towards strengthening national research capacity in health and supporting RD&I in health. Governments should provide tax incentives to attract private investments to the area;
- at least 5% of financial resources invested by IOs should be for research and research capacity strengthening in health in developing countries;
- the criteria of technical and scientific capacity and health priorities should be adopted for investments in RD&I in health;
- international partnerships should be strengthened, especially international assistance and north-south cooperation, to support science and technology as a strategy for reducing inequality in health;
- investments should be increased in the research programs of the WHO and its Ad Hoc Committee on Health Research;
- an independent IO should be created to monitor progress in RD&I in health;
- science and technology development should be prioritized in diarrheal diseases, acute respiratory infections, reproductive health, tuberculosis, micronutrient deficiencies (vitamin A, iodine and iron), mental health, health and the environment, occupational health, risk factors for non-communicable diseases, health policies, management, systems and services;
- studies should be funded to design and assess behavioral interventions, reduce injuries, sexually-transmitted diseases and substance abuse;
- support should be given by countries with an installed scientific and technological capacity for research into diabetes, coronary heart disease, hypertension and cancer. The focus of this RD&I should be on developing or adapting technologies, producing medications, drugs, vaccines, diagnostic kits and other strategic health inputs.

The Commission on Health Research for Development argued that the results of these RD&I activities were transferrable to many countries, no matter where and at what institution the knowledge and technology was produced, for the health problems affecting the global population. However, its arguments failed to consider whether there was sufficient capacity to transfer the products and results of RD&I in health and have them used consistently,

whatever the local reality in each country. Other issues not mentioned are the costs, time and mechanisms that could assure the conciliation of this process, especially in view of the patent protection provided for innovations in health.

Panisset (1992, p.175), building on this argument, mentions that for science and technology to be transferred between different parts of the globe, developing countries must be equipped with local research and industrial production capacity. This is fundamental for the production, incorporation and use of methods, procedures and practices, and the handling of equipment and technologies. This relationship between provider and recipient nation often means the collaboration itself fosters dependence, setting up power relations around the mastery and control of knowledge and technological resources.

Chaves et al. (2007, p.265) highlight another question that has to do with transformations in the international intellectual property system, prompting changes in the economic, scientific and technological development of countries and the dynamics of international trade. Today, this system increasingly favors the interests of patent holders, including in the realm of health, benefitting holders of scientific and technological knowledge in health and constituting a new means of controlling production media. These arguments converge in the conception of a Marxist school of international relations theory about international cooperation processes.

It seems that although the Commission's first efforts were worthwhile, its recommendations did not foster a scenario for international science and technology cooperation that reduced the longstanding vulnerabilities in developing countries. To implement its agenda for action, the commission had its recommendations incorporated into the resolution of the 43<sup>rd</sup> World Health Assembly of the WHO, approved in 1990. It was an important step forward that consisted of the recognition of national health authorities as key commissioners, funders, inducers and users of RD&I in health.

Another upshot of the Commission's work was the creation of a new IO in 1990, the Task Force on Health Research for Development. This INGO's main challenge revolved around preparing an action plan for the Commission's recommendations, by running pilot projects in different countries, including Brazil (Task, 1991). According to a former director of TDR, Brazil was one of the countries chosen because its national research capacity in the area of health was more advanced than that of other developing countries. Fiocruz was the institution picked to lead the formation of consensus in the country because of its many years in the production of science and technology in health.

This movement also resulted in the creation of another INGO, COHRED. This actor was formed on the initiative of a number of IOs, the World Bank included, which decided to found a permanent institution to support the structuring and strengthening of national systems for health research (Global..., 1999). According to the interviewee from COHRED, this new entity was given the mission of supporting developing countries in the implementation of the Commission's recommendations through their national health ministries, universities and NGOs. However, the TDR interviewee argues, COHRED's actions in Latin America and the Caribbean only gained more force in 2005, when representatives from this region were admitted to its board, effectively geographically redirecting the priorities of COHRED's international agenda.

Another important pillar for strengthening RD&I in the global health agenda, the interviewees note, is the work of the World Bank. Its analysis of international investments in health was published in the *World Development Report 1993: investing in health – world development indicators* (World Bank, 1993). Although the international community already recognizes its influence in the field of health, mainly because of its economic power, it involves the WHO in its initiatives because of its technical capacity and technical and political stature, particularly when working with the ministries of health of its member states, which are mostly developing countries (Brown, Cueto, Fee, 2006). The report sets forth the World Bank's vision about the relationship between health and development, including a topic on the importance of promoting science and technology. Upon analyzing the content of the document, it is clear that the central idea does not associate health with the conception of a social right or citizenship. Rather, the bank recognizes health as a global public good that is essential for a country's development.

Adopting the concept proposed by Smith (2003), for a good to be public its benefits must not be restricted to a specific group and it must not be for consumption by an individual or a nation. A global public good must provide collective benefit, and cannot exclude or generation competition between consumers for access to this good on a global level. From this perspective, health is not a national or global public good. The authors highlight that in the case of health, the benefits to the collective are restricted only to the results of the actions of health surveillance, particularly for the control of communicable diseases that affect developed and developing countries at the same time. Health promotion and disease prevention and treatment are not available to all, reinforcing existing inequities.

Defending the idea that health is a global public good, the World Bank founds its proposals on a biomedical and technical perspective, disregarding the importance of the social determinants of health and diseases. With this thinking, it associates improved health conditions for a population primarily to access to technologies, medications and healthcare services. According to the interviewee from the WHO, the World Bank must be understood as aligning itself with the expectations and interests of finance ministers, who are responsible for deciding how much a country should invest and in what.

From the World Bank's perspective, governments are responsible for driving diversity and competition in the health market – service providers and producers of medications, equipment and immunological products. It is also the state's responsibility to attack any market crises and flaws in order to assure economic stability and incentives for industry. Meanwhile, the market has responsibility to invest in RD&I in health. For this international organization, holding private industry accountable for issues involving increased investments and risks is one strategy that can be employed to optimize the allocation of state resources in order to assure equity as the guiding principle for health actions. The World Bank also recommends that developing countries with scarce financial resources apply for loans or grants from the international community. Interestingly, this IO also reinforces the role of international assistance and north-south cooperation.

As a result, the ideas and interests mentioned above also permeate the World Bank's thinking about science and technology development in health. Aligning itself with the 1990 commission's agenda, it recommended the following priority areas for producing knowledge in

developing countries: women's health, user satisfaction assessments, cost-effectiveness analysis of health interventions, evaluation of medical practices, and studies into pharmaceutical assistance, also addressing self-medication and antimicrobial resistance (World Bank, 1993). Operational research is still understood as strategic for this group of countries. This IO further proposed that the international community create institutional arrangements, such as initiatives and global funds. The aim was to fund biomedical and experimental research, focusing on developing health technologies whose benefits could transcend national borders.

From this perspective, private sector funding would be the main source of basic research and technology development. However these activities would need government support, through subsidies or interventions to minimize market risks and uncertainties. For the World Bank, the knowledge and technology generated by RD&I in health are also understood as global public goods. Even without going any deeper into the debate about intellectual property rights, the World Bank argues that after a patent expires, the scientific and technological knowledge in health will be widely available for the population at large.

From this perspective, protecting an intangible asset for a limited time period is understood as an important mechanism for encouraging the market to invest in the area with an assurance of future profits. The restricted access by certain population groups to the benefits of this RD&I for a time period – the period of patent protection – is, in the World Bank's view, a fair price to pay. In this sense, it is up to developing countries to attack the knowledge gaps through public-private partnerships, encouraging RD&I in areas traditionally overlooked by the market, like ailments that mostly affect people living in poverty – such as neglected diseases. In line with this thinking, the World Bank also recommends that developing countries adopt the following agenda of priorities for RD&I in health (World Bank, 1993, p.152):

- diphtheria, polio, tetanus, diarrheal diseases;
- cost-effective diagnostic kits and vaccines for pneumonia;
- diagnostic kits, instrument for monitoring antimicrobial resistance and new medications for treating tuberculosis;
- diagnostic methods for strokes and ischemic heart disease.

Despite the mobilizations seen, the WHO is still on the margins of the process. Paradoxically, says the interviewee from TDR, the World Bank is the main funder of the WHO's research program, maintaining the financial autonomy and decentralization of TDR's activities, for instance. The bank's support for TDR specialists has helped the negotiation process with the WHO at times of greater institutional instability, the interviewee explains, adding that there are contradictions intrinsic to the political orientation of the WHO, because even though it participated in and supported the prior initiatives, funding for science and technology in health was not yet a priority in its institutional agenda. The World Bank representative said that funding and developing research was not a priority on the WHO's agenda, exception being given to a few specific programs like TDR, which focuses on a portfolio of diseases and training for researchers.

Faced with this challenge, the TDR interviewee says (Almeida-Andrade, 2007, p.118), an alliance took shape inside the WHO that defended the importance of RD&I for disease control and strengthening health systems. Thanks to this initiative, the WHO's Ad Hoc Committee

on Health Research was restructured, incorporating strategic actors like researchers from the World Bank, who also led the writing of the 1993 report. It is believed that by strengthening this entity, the debate about RD&I in health can be extended inside and outside the WHO.

Based on its analyses, the committee reiterated the priorities of the 1993 report and defined the topics of the unfinished health agenda of the international community. This effort is systematized in the publication, *Relating to future interventions options: investing in health*, which recommends promoting science and technology in health in the following areas (Ad Hoc..., 1996, p.XXXVII-XXXVIII):

- infant and maternal morbi-mortality;
- antimicrobial resistance, focusing on *Mycobacterium tuberculosis*, *Streptococcus pneumoniae*, *Plasmodium falciparum* and HIV;
- health equity and the efficiency of health systems and services;
- non-communicable diseases and injuries, especially heart disease, mental illness, neoplasia, and chronic respiratory diseases, due to the need to develop more cost-effective interventions to prevent, diagnose and treat these conditions.

The committee stresses the role of developed countries in RD&I for this area.

The main idea also reinforced the argument that it was down to developing countries to focus their efforts on operational research, which could limit their action in RD&I in health and therefore the creation and production of health technologies. Faced with this impasse, the international community broadened the discussion about the role of developing countries in technology-intensive research in health, says the TDR interviewee (Almeida-Andrade, 2007, p.121). The committee also highlighted for the international community the need to create another IO capable of promoting dialog between the actors and developing studies into the global disease burden and global flow of funds for RD&I in health. This resulted in 1998 in the Global Forum for Health Research, as a development of the expectations of the international actors.

Historically, RD&I efforts in health have been poorly coordinated, with little space for visibility and negotiation. The conjunction of different actors from the public and private sectors, principally health and the economy, is fundamental for discussing global issues and challenges in the field of science and technology. According to the interviewees from the World Bank and the WHO, the creation of the Global Forum for Health Research and global investment funds for R&D has been crucial for structuring institutional arrangements with the purpose of reducing global inequality in the area of health (Almeida-Andrade, 2007, p.123). The Global Forum for Health Research (1999, 2004) stresses that it is possible to correct the 10/90 gap, proposing that developing countries make the following agenda a priority for their RD&I in health: neglected diseases; relationship between health policies and health research systems; effective strategies for reducing malnutrition; reproductive health; cardiovascular disease; mental health and traffic injuries; domestic violence; prevention and treatment of substance abuse.

Another important move in the international context in the 1990s was the expansion of the interface between the development and global health agendas, led by the World Trade Organization and the WHO, respectively. This prompted new challenges, demanding new

reflections about the formulation of the international sub-regime, related to science and technology development in health and involving new challenges for national, regional and international health agendas, like intellectual property in health, regulation, and incentives for RD&I.

This negotiation process marked the 2000s, after the approval of new international mandates based on converging expectations on the part of the actors involved, mediated by IOs. Key amongst these new institutional frameworks were the agreement about Trade-Related Aspects of Intellectual Property Rights and Public Health; the Global Strategy on Public Health, Innovation and Intellectual Property; the Oslo Declaration; the WHO's Strategy on Research for Health; and the WHO/PAHO Policy on Research for Health.

In particular, it is worth highlighting the approval of the Global Strategy and Plan of Action on Public Health, Innovation and Intellectual Property at the 61<sup>st</sup> World Health Assembly in 2008. This was a historic milestone for developing countries, with Brazil taking an important role in the international negotiations. It was another effort that mobilized the foreign community for the formulation of an international sub-regime for RD&I in health to help reduce inequities in health through the articulation of health and development agendas and international cooperation. In this agreement, the actors formalize the convergence of their expectations in an agenda that seeks to consolidate the promotion of science and technology in health management, consisting of the following actions:

- setting priorities for and promoting RD&I in health;
- building and improving research capacity;
- transfer of technology;
- management of intellectual property in health;
- improving the delivery of and access to the results of RD&I in health;
- promoting sustainable financing mechanisms;
- establishing monitoring and reporting systems for RD&I in health.

An investment of US\$ 147 billion is estimated for the implementation of the strategy between 2009 and 2015. Of this total, US\$ 5 billion should be invested each year in RD&I for the health problems of developing countries (Global..., 2009). This overview of the movement of IOs helps reveal the efforts of the actors to consolidate an international sub-regime for RD&I in health with the potential to reduce asymmetries in cooperation in science and technology for health. A more in-depth debate must still be conducted to ascertain whether the amounts mobilized are enough to redress the imbalances arising from the 10/90 gap. Below, we set forth a few reflections about this issue.

### **Correcting the 10/90 gap: dream or reality?**

Faced with the asymmetric interdependence between countries, as discussed in the first part of this article, international cooperation activities designed to strengthen the research capacity of developing countries seem to be contradictory. Even understanding the complexity and non-linearity of the knowledge production process, as Guimarães (2005, p.243) notes,

research is the basis for the development of technologies and innovations. These three components – research, technology and innovation – form interdependent systems that need to be integrated with a focus on national interests and the areas in which the country can interact with the international market. Innovation and research are interdependent, and in the case of health, innovation also means access (Comisión..., 2006, p.23).

According to the participants from the PAHO and WHO, it does not interest the actors whether developing countries are self-sufficient, mainly when it comes to the creation and production of health technologies. Incentives for the development of vaccines and medications for neglected diseases derive from the existence of a persistent knowledge gap caused by market flaws. Furthermore, the interviewees stress that it is of interest to developed countries, especially their industries, to conduct stages of their research in developing countries, particularly because the production costs are lower and there is more flexibility at some institutions and in some legislations for the evaluation of ethical aspects of health research.

Developed countries benefit when they use the knowledge and RD&I capabilities of developing countries as a mechanism to reduce the risks of transnational pharmaceutical companies in pre-clinical and clinical trials and to reduce costs when scaling up the production of health technologies. Developed countries have no interest in qualifying or producing future competitors in the international health market, say the interviewees from the PAHO and WHO (Almeida-Andrade, 2007, p.142). However, developing countries must have a minimal science and technology capability to be able to export the results from clinical and pre-clinical trials in their territory to developed countries.

This process optimizes the production of transnational companies and shares the risks and costs on a global level. For the interviewees, there is no competition, because the critical stages of research needed for the creation of patents remain protected in developed countries. This knowledge generated in RD&I in health can be transferred to developing countries, except that it is industry, especially from developed countries, that has the final say. This sets up a cycle of interdependence which generally results in high economic and social costs for developing countries – adds the consultant from the PAHO/WHO (Almeida-Andrade, 2007, p.142).

The interviewees from the PAHO and WHO (Almeida-Andrade, 2007, p.142) add that some developing countries like Brazil have significant science and technology capabilities, industrial output and regulatory frameworks for innovation and ethics in health research. However, their funding for experimental studies tends to focus only on the initial pre-clinical phases, mainly because of funding gaps and the lack of coordination of public policies from different sectors essential for the development of RD&I in health: industry, science, technology and innovation, education and health.

These considerations are consistent with the reflections of Panisset (1992), who argues that as the international arena is inherently conflicting and has no authority higher than the nation-state, unilateral transfer of knowledge from developed to developing countries could exacerbate the asymmetries of power in the scientific and technological dimension of globalization. In fact, there is strong market interest in health; the challenge for governments is to bring the economic and social interests involved in this sector into convergence.

The asymmetries intrinsic to the capitalist system may exclude great swathes of populations from access to the benefits of RD&I in health, which could stand in the way of equity in health. Smith (2003, p.475) follows this rationale, adding that although IOs argue that science and technology knowledge is a global public good, the restrictions placed by the intellectual property system, for instance, end up privileging restricted groups over long periods of time. The biggest beneficiaries of these ideas are the sections of the population with the highest levels of income and the group of countries that already have a high research and innovation capacity.

This imbalance in investments, production and access to the products of RD&I in health could hamper the consolidation of universal, comprehensive national health systems and the ability to overcome inequities in health. Correcting the 10/90 gap has to do with finding more symmetry and equality of opportunities and access to the benefits generated by science and technology in health (Miranda, Zaman, 2010). In this scenario, equity is also becoming the main guiding principle for the allocation of resources based on the recognition of different needs in view of the unequal capabilities and opportunities of different population groups and countries. Equality consists of the result of equity, which results in social justice and the assurance of human rights, including the right to health (Garrafa, Oselka, Diniz, 1997, p.30). Based on this logic, it could be said that correcting the 10/90 gap in the contemporary context could be beyond our reach, but it is an incentive to galvanize the international community to reduce the vulnerabilities of developing countries compared to developed countries generated through cooperation processes.

In this sense, we would argue that universality should also be a guiding principle of RD&I in health, as we believe that together with equity, it is possible to expand access to the benefits of the new knowledge created to the population living in poverty. International organizations are strategic actors that can stimulate reflections and catalyze negotiations about the issues identified in this study as gaps in the international debate:

- monitoring actions and advances in overcoming inequities in health in developing countries, reviewing the RD&I priorities in health;
- taking the epidemiological transition of developing countries into account in the priorities of the global public health agenda for RD&I;
- analyzing and following up on the priorities pushed particularly by developed countries in cooperation activities with developing countries;
- devising cooperation strategies and mechanisms to assure developing countries access to the results of RD&I in health produced by developed countries in view of the intellectual property system;
- strengthening the principles of equity and universality in the international intellectual property regime and RD&I sub-regime in health;
- addressing the agenda of priorities of transnational biotechnology and pharmaceutical companies.



## Final considerations

Since the 1990s there has been a multiplicity of international organizations taking the lead in international cooperation for the development of science and technology in health in developing countries. With the growing involvement of the World Bank in issues relating to global health, the WHO has ceased to be the hegemonic actor. This has also contributed to the emergence of new actors in the debate about RD&I in health, like COHRED and the Global Forum for Health Research. The IO movement has also mobilized the WHO, which has started to take a more active role in negotiations and initiatives related to the construction of the international sub-regime for RD&I in health.

There is an expectation shared by the international community that is expressed in the calls for the global imbalance in investments in priority RD&I areas in developing countries – the 10/90 gap – to be overcome. Faced with this scenario, IOs have charged developing countries with responsibility for investing in RD&I into neglected diseases and health management. Meanwhile, developed countries are expected to prioritize initiatives relating to non-communicable diseases and others of interest to transnational companies, as well as transferring the results of RD&I activities to developing countries through international cooperation agreements.

Nonetheless, the asymmetries in the power relations, especially in the economic, scientific and technological domains, between developed and developing countries tend to interfere in cooperation processes. In fact, there is a strong local market in developed countries interested in RD&I activities even though this area cannot only be considered economically as a ratio between exporting and importing knowledge and technologies, because it also has a social dimension.

The imbalances intrinsic to the capitalist system may exclude large swathes of the population from access to the benefits of research and the products deriving from RD&I in health, which could hamper the achievement of equity in health in developing countries. The correction of the 10/90 gap does not seem feasible; however, minimizing inequities in scientific and technology cooperation agreements between countries is one potential route forward. For this, equity and universality must be adopted as principles to guide the international cooperation activities between the different actors.

## NOTE

\* This article is based on master's research conducted at the University of Brasilia, Social Policies Program, which resulted in the dissertation, *Análise da Política Nacional de Ciência, Tecnologia e Inovação em Saúde (1990 a 2004): a influência de atores e agendas* [Analysis of the National Policy for Science, Technology and Innovation in Health (1990 to 2004): influence of actors and agendas] (2007).

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