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The right to enjoy the benefits of scientific progress: in search of state obligations in relation to health

Yvonne Donders

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Abstract After having received little attention over the past decades, one of the least known human rights—the right to enjoy the benefits of scientific progress and its applications—has had its dust blown off. Although included in the Universal Declaration of Human Rights (UDHR) and in the International Covenant on Economic, Social and Cultural Rights (ICESCR)—be it at the very end of both instruments—this right hardly received any attention from States, UN bodies and programmes and academics. The role of science in societies and its benefits and potential danger were discussed in various international fora, but hardly ever in a human rights context. Nowadays, within a world that is increasingly turning to science and technology for solutions to persistent socio-economic and development problems, the human dimension of science also receives increased attention, including the human right to enjoy the benefits of scientific progress and its applications. This contribution analyses the possible legal obligations of States in relation to the right to enjoy the benefits of scientific progress and its applications, in particular as regards health.

Keywords Human Rights · International Human Rights Law · Universal Declaration of Human Rights · International Covenant on Economic, Social and Cultural Rights · Right to Enjoy the Benefits of Scientific Progress · Right to Health · Scientific Progress · Health

Introduction

After having received little attention over the past decades, one of the least known human rights provisions in international human rights law—the right to enjoy the benefits of scientific progress and its applications—has had its dust blown off (Chapman 2009; Claude 2002; Schabas 2007; Weeramantry 1990).¹ Although included in the Universal Declaration of Human Rights (UDHR) and in the International Covenant on Economic, Social and Cultural Rights (ICESCR)—be it at the very end of both instruments—this provision hardly received any attention from States, UN bodies and programmes and academics. The role of science in societies and its benefits and potential danger were discussed in various international fora, but hardly ever in a human rights context. Nowadays, within a world that is increasingly turning to science and technology for solutions to persistent socio-economic and development problems, the human dimension of science also receives increased attention. One of the avenues to reinforce the link between science and human rights is the elaboration and implementation of the human right to enjoy the benefits of scientific progress and its applications.

Earlier studies clearly show the link between the right to enjoy the benefits of scientific progress and other human

¹ UNESCO commissioned papers and organized an experts' meeting on this right at the University of Amsterdam, The Netherlands, in June 2007, see <http://www.jur.uva.nl/aciluk/events.cfm/1360295A-9406-4614-B50B6F12F49B743F>. This process was continued with follow up meetings in Galway (November 2008) and Venice (July 2009), where the Venice Statement on the REBSP was adopted, see http://shr.aaas.org/article15/Reference_Materials/VeniceStatement_July2009.pdf.

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rights, notably the right to health.² The *Universal Declaration on Bioethics and Human Rights* (2005) also confirms this link and the International Bioethics Committee has formulated guidelines on social responsibility and health with references to the role of science and technology [Report of the International Bioethics Committee of UNESCO (IBC) 2010]. The advancement of the right to enjoy the benefits of scientific progress is, however, hindered by lack of clarity on the normative content and corresponding State obligations of this human rights provision. Most human rights provisions in international legal instruments are formulated in rather general and broad terms. Elaboration and clarification of the normative content and corresponding State obligations are therefore needed, so that individuals and communities could learn what they are legally entitled to, States know what kind of legal obligations they have in relation to the implementation of these rights and supervisory bodies can monitor the performance of States in this regard.

This contribution analyses the possible legal obligations of States in relation to the right to enjoy the benefits of scientific progress and its applications, in particular as regards health. The starting point is international human rights law, in particular the provisions on scientific progress and health in the Universal Declaration of Human Rights and the International Covenant on Economic, Social and Cultural Rights. These international instruments are widely accepted and ratified by States, which thereby undertake to implement the human rights provisions and accept legal obligations in this regard.

Below, first the scope and normative content of the right to enjoy the benefits of scientific progress and its applications in relation to health are analysed. Then several general approaches concerning legal obligations of States in relation to international human rights law are applied to this right. The legal analysis of the human rights provisions is carried out in accordance with the treaty interpretation methods described in the Vienna Convention on the Law of Treaties (adopted in 1969, in force since 1980). According to Articles 31 and 32 of this treaty, provisions of international treaties should be interpreted according to the ordinary meaning of the wording of the provisions, in their context and in light of their object and purpose. Context, object and purpose can be determined on the basis of subsequent international legal instruments, as well as the work of international independent bodies supervising the treaties. In addition to these sources, academic literature has also been used for this contribution.

The normative framework of the rights to science and health

UN instruments on science: prevention of harm

In the beginning of the 1970s—just before the ICESCR came into force in 1976—States adopted several international documents focusing on the duties of States and scientists to promote, conduct and use science in a responsible way. For example, the *Charter of Economic Rights and Duties of States*, adopted by the General Assembly in 1974, contains a right of States—not of individuals—to benefit from scientific advancement and developments in science and technology. It also includes that States should promote international scientific and technological co-operation and the transfer of technology to developing countries, as well as facilitate access of developing countries to the achievements of modern science and technology (Article 13).

In 1975, the General Assembly adopted the *Declaration on the Use of Scientific and Technological Progress in the Interests of Peace and for the Benefit of Mankind*. This document concentrates on the possible abusive use of science contrary to human rights. It is acknowledged in the preamble that scientific and technological achievements could on the one hand improve the conditions of peoples and nations, but they could, on the other hand, cause social problems or threaten human rights and fundamental freedoms. Other issues in this document include non-discrimination and international cooperation to ensure that the results of science and technology are used in the interest of peace and security and for the economic and social development of peoples. It is further laid down that States should prevent the use of scientific and technological development to limit the enjoyment of human rights and protect the population from possible harmful effects of the misuse of science and technology (Article 2). Both these documents do not include a specific reference to health.

Two decades later, two other international instruments on science were adopted with particular relevance for health: the *Universal Declaration on the Human Genome and Human Rights*, adopted by UNESCO's General Conference in 1997 and endorsed by the UN General Assembly in 1998, and the *International Declaration on Human Genetic Data*, adopted by the General Conference of UNESCO in October 2003. The Declaration on the Human Genome mainly focuses on the potential abuse of science and research and does less address (sharing of) its potential benefits. It includes, for instance, that researchers have special responsibilities in carrying out their research, including meticulousness, caution, intellectual honesty and integrity (Article 13). It also includes that persons have the right to be informed about research on their genome and that such research should in principle not be carried out

² But also the rights to education, food and information. See the studies for and the outcome of the meeting in Amsterdam, *supra* note 1.

without a person's consent. If such consent is not possible, research should be carried out only for the person's health benefit or the health benefit of others (Article 5). Furthermore, the applications of research, including genetics and medicine, shall seek to improve the health of individuals and humankind (Article 12). The Declaration also urges States to promote international dissemination of knowledge, in particular between industrialized and developing countries (Article 18). This idea of *sharing* the benefits of science is more clearly present in the Declaration on Human Genetic Data. Benefits of science, including access to medical care, the provision of new diagnostics, facilities for new treatments or drugs deriving from research and support for health services, should be shared with the society as a whole and with the international community (Article 19).

It should be noted that these international instruments—being declarations and not treaties—are not legally binding upon States. They reflect principles or political norms to be respected by States. Although these instruments do not always explicitly address the human rights dimension of scientific progress, they reflect several principles, such as the prevention of harm and the equal sharing of benefits, which are directly relevant for the advancement of the right to enjoy the benefits of scientific progress in relation to health.

Science in universal human rights instruments: sharing the benefits

Article 27 of the UDHR includes the right to share in scientific advancement and its benefits. The right to enjoy the benefits of scientific progress and its applications is included in the ICESCR in Article 15(1)(b). The full provision reads as follows (underline added by author):

- 1) The States Parties to the present Covenant recognize the right of everyone:
 - a) To take part in cultural life;
 - b) To enjoy the benefits of scientific progress and its applications;
 - c) To benefit from the protection of the moral and material interests resulting from any scientific, literary or artistic production of which he is the author.
- 2) The steps to be taken by the States Parties to the present Covenant to achieve the full realization of this right shall include those necessary for the conservation, the development and the diffusion of science and culture.
- 3) The States Parties to the present Covenant undertake to respect the freedom indispensable for scientific research and creative activity.

- 4) The States Parties to the present Covenant recognize the benefits to be derived from the encouragement and development of international contacts and co-operation in the scientific and cultural fields.

The paragraphs of this provision address the two main dimensions of this right: the right of individuals to enjoy the benefits of scientific advancement and the rights of scientists to freely conduct science and to have the results of their work protected. This last issue concerns intellectual property rights, a topic which falls outside the scope of this contribution.³ This contribution focuses on the legal obligations of States to ensure the dimensions of to 'conduct' and to 'enjoy'.⁴ The right of scientists to freely conduct science implies, for instance, the right or freedom to assess and choose the preferred path of scientific and technological development. The right of individuals to enjoy the benefits of scientific advancement implies, for example, the right of access to scientific and technological advancement. Cross-cutting components of the right to enjoy the benefits of scientific progress and its applications are the protection from possible harmful effects of science and international cooperation. These elements are further addressed below (see also Chapman 2009).

The right to health in universal human rights instruments

Apart from being an important area of scientific progress, health is itself also a human right. The right to the highest attainable standard of health is included in many human rights instruments at universal, regional and national level, and much elaborative work on its normative content and State obligations has been done, which is useful in relation

³ In a statement on intellectual property and human rights, adopted in 2002, the Committee on Economic, Social and Cultural Rights, the UN body composed of independent experts supervising the implementation of the Covenant, stated that intellectual property rights must be balanced with the right to enjoy the benefits of scientific progress and encouraged the development of intellectual property systems and the use of intellectual property rights in a balanced manner that would provide protection for the moral and material interests of authors, and at the same time promote the enjoyment of these and other human rights. See UN Doc. E/C.12/2001/15, *Human Rights and Intellectual Property, Statement by the Committee on Economic, Social and Cultural Rights*, 14 December 2001. The Committee on Economic, Social and Cultural Rights has adopted General Comment No. 17 on Article 15(1)(c), UN Doc. E/C.12/GC/17, 12 January 2006.

⁴ As these obligations are analysed from the perspective of Article 15(1)(b) ICESCR, formally speaking, these obligations only apply to States that have ratified the ICESCR and thereby have become parties to this treaty. A large majority of States (160), from all regions of the world, has ratified the ICESCR (last updated March 2011).

to the analysis of the right to enjoy the benefits of scientific progress (Chapman 2002; Toebes 1999).⁵ The most comprehensive provision on the right to health is included in Article 12 ICESCR.⁶ This provision reads as follows:

1. The States Parties to the present Covenant recognize the right of everyone to the enjoyment of the highest attainable standard of physical and mental health.
2. The steps to be taken by the States Parties to the present Covenant to achieve the full realization of this right shall include those necessary for:
 - (a) The provision for the reduction of the stillbirth-rate and of infant mortality and for the healthy development of the child;
 - (b) The improvement of all aspects of environmental and industrial hygiene;
 - (c) The prevention, treatment and control of epidemic, endemic, occupational and other diseases;
 - (d) The creation of conditions which would assure to all medical service and medical attention in the event of sickness.

The right to health does not mean the right to *be healthy* (UN Committee on Economic, Social and Cultural Rights 2000, para. 8). There are evidently non-medical factors and/or factors beyond the control of the State that influence one's health, including natural factors, education and income, as well as one's own behaviour. The right to health mainly means that States should create conditions in which everyone can be as healthy as possible. Such conditions may vary from ensuring the availability of health services, vaccines and medicines, to healthy and safe working conditions, adequate housing and nutritious food. All these aspects have a direct link with scientific progress. The freedom to conduct science and the right to enjoy the benefits of science and its applications are crucial for the implementation of the right to health.

⁵ See also the work of the UN Special Rapporteur on the Right to Health at www.ohchr.org as well as the work done by the World Health Organization (WHO) at www.who.org.

⁶ The right to health is further included in the Convention on the Elimination of All Forms of Discrimination Against Women (1979, Article 12); the Convention on the Rights of the Child (1989, Article 24); the International Convention on the Protection of the Rights of All Migrant Workers and Members of Their Families (1990, Article 28); the European Social Charter (1996, Article 11), the Convention on Human Rights and Biomedicine (1996, Article 3), the American Declaration of the Rights and Duties of Man (1948, Article XI), The Additional Protocol to the American Convention on Human Rights in the Area of Economic, Social and Cultural Rights (Protocol of San Salvador, 1988, Article 10), and the African Charter on Human and Peoples' Rights (1981, Article 16).

State obligations of the right to enjoy the benefits of scientific progress in relation to health

The enjoyment of human rights law requires an entity that implements these rights. The entity responsible for the promotion and protection of international human rights law is first and foremost the State. Although the role of non-State actors in the advancement of the right to enjoy the benefits of scientific progress in relation to health is also relevant—for example in relation to pharmaceutical companies—the focus in this contribution is on the legal obligations of States, based on them being parties to human rights treaties.⁷ The “State” includes all three branches of the State—the executive, the legislator and the judiciary—at national, regional and local level.

The Committee on Economic, Social and Cultural Rights (the Committee), the UN body composed of independent experts that monitors the implementation by States of the ICESCR, has tried to clarify several provisions of the Covenant by adopting guidelines for States on how to report on the implementation of the Covenant (UN Committee on Economic, Social and Cultural Rights 2001), as well as adopting so-called General Comments that elaborate the normative content and State obligations of specific provisions. The General Comments are based on the work and experience of the Committee in relation to the assessment of State compliance with the Covenant. Although they are not legally-binding upon States, General Comments form an authoritative source of interpretation of the provisions of the Covenant.

The Committee has adopted General Comments on, *inter alia*, the nature of States' obligations under the Covenant (UN Committee on Economic, Social and Cultural Rights 1990) and also on the right to health (UN Committee on Economic, Social and Cultural Rights 2000). No General Comment has been adopted on the right to enjoy the benefits of scientific progress.

⁷ The issue of the responsibilities or obligations of multinational corporations in relation to human rights is the subject of extensive debate among human rights scholars and UN bodies and agencies. See, *inter alia*, Ph. Alston (ed.), *Non-State Actors and Human Rights*, Oxford University Press, Oxford, June 2005; A. Clapham (ed.), *Human Rights Obligations of Non-State Actors*, Oxford University Press, Oxford, April 2006. See, also, UN Doc. E/CN.4/Sub.2/2003/12/Rev.2, Norms on the responsibilities of transnational corporations and other business enterprises with regard to human rights, adopted by the Sub-Commission on the Promotion and Protection of Human Rights, 26 August 2003. See also the work of the Special Representative of the Secretary-General on human rights and transnational corporations and other business enterprises, Mr John Ruggie (USA) at <http://www2.ohchr.org/english/bodies/chr/special/themes.htm>.

Progressive realization and maximum available resources

As the right to enjoy the benefits of scientific progress (as well as the right to health) is laid down in the ICESCR, it follows the specific legal regime of that treaty. The key provision in the ICESCR with regard to State obligations is Article 2(1), which lays down the principle of progressive achievement conditioned by the availability of resources. It says that each State Party "...undertakes to take steps, individually and through international assistance and co-operation, especially economic and technical, to the maximum of its available resources, with a view to achieving progressively the full realization of the rights recognized in the present Covenant by all appropriate means, including particularly the adoption of legislative measures." Article 2(2) of the ICESCR obliges States to take measures to immediately ban *de jure* discrimination in the enjoyment of the rights in the Covenant. The idea of progressive realization is not applicable here, since the term 'to ensure' is used.

In its General Comment on Article 2, the Committee stated *inter alia* that the obligation to take steps or measures as laid down in Article 2(1) has an immediate character. States should take steps "...within a reasonable, short period of time..." after the Covenant has entered into force for them (para. 2). Furthermore, taking the appropriate measures implies not only legislative measures, but also administrative, financial, educational, social and other measures, including judicial remedies (para. 5). States are free to determine which measures they consider best to implement the material provisions of the ICESCR, whereby the Committee, as monitoring body, determines whether the State has, in fact, taken the appropriate measures (paras. 4 and 7).

The Committee further states in this General Comment that the duty to 'progressively realize' is closely related to the availability of financial and economic resources. According to the Committee, States parties should start the implementation immediately and should move as fast as possible towards the end of total realization (para. 9). States should, regardless of their level of economic development, do the maximum possible to ensure the enjoyment of economic, social and cultural rights. The Committee further determined that retrogressive measures need to be fully justified by reference to the totality of the rights in the ICESCR and in the context of the full use of the maximum of available resources (para. 9).

Elements of Article 2 ICESCR relevant to the right to enjoy the benefits of scientific progress are 'non-discrimination', the 'availability of financial and economic resources' and 'international cooperation and assistance'. Non-discrimination is the central principle of international

human rights law. States should provide equal treatment and opportunities for all, based on ability and competence. In implementing the right to enjoy the benefits of scientific progress, States have the immediate obligation to eliminate all forms of discrimination, in law (*de iure*) and in fact (*de facto*). In order to obtain factual equality, different treatment or special measures may be needed for certain groups. In human rights law, differentiation does not automatically constitute discrimination. As long as there is an objective and reasonable justification for different treatment or special measures, it is not in violation of the non-discrimination principle. Accordingly, the right to enjoy the benefits of scientific progress may imply special measures for certain vulnerable or disadvantaged groups, such as women, minorities, indigenous people, people living in poverty, etc. Special measures may be needed, for example, to encourage women to take part in scientific research, because they are still underrepresented in sciences. Such measures are also required under Article 3 ICESCR, which includes the general principle of the equal right of men and women to the enjoyment of the rights in the Covenant. In the General Comment on Article 3, the Committee emphasized that States should overcome institutional barriers and other obstacles that prevent women from fully participating in science education and scientific research (General Comment No. 16 on Article 3 of the Covenant, 2005, para. 31). It also indicates that States should direct resources to scientific research relating to the health and economic needs of women on an equal basis with those of men. Special measures can also be envisaged for people living in poverty, in order to provide them with access to scientific progress in the field of health, notably medicines and vaccines.

As regards (limited) resources, it is true that science and technology may be costly. Advancement in these areas may require enormous investments that some States may not have. Moreover, in terms of priorities, States may argue that science is not on the top of their list of human needs. However, it should be noted that scientific and technological advancement are crucial in human development and poverty reduction. The development of vaccines and medicines against widespread diseases has done much to improve life expectancy. Science and research in the field of information technology, including mobile telephones, internet and satellite television, have accelerated the flow of information throughout the world, which has proven particularly beneficial to developing countries. In the past, for example, education and research were often hindered by poor library resources. Nowadays, much academic research is internet-based, making academic cooperation and the exchange of knowledge easier. It is therefore crucial that States invest, to the maximum possible, in scientific and technological advancement and share the benefits.

Moreover, they are legally obliged to do so, if they are parties to the ICESCR.

Article 2(1) further mentions international cooperation, which is also reflected in the fourth paragraph of Article 15. There is still a great divide in the equal participation in, access to and use of science and technology. In general, many people from developing countries do not benefit from scientific and technological advancements, because only a fraction of the knowledge and technology is available or accessible in these countries. International cooperation and solidarity are crucial in this regard. The Committee has in its General Comment on Article 2 indicated that ‘available resources’ refers to both the resources existing within a State and those available from the international community through international cooperation and assistance. It is underlined that in accordance with international law in general and international human rights law in particular, international cooperation for development and thus for the realization of economic, social and cultural rights is an obligation of all States. “It is particularly incumbent upon those States which are in a position to assist others in this regard” [UN Committee on Economic, Social and Cultural Rights 1990, paras, 13 and 14 (citation)]. In the General Comment on the Right to Health the Committee also indicates that economically developed States parties have a special responsibility to assist the poorer developing States, especially in times of emergency, in obtaining international medical aid, distributing and managing resources, such as safe and potable water, food and medical supplies (UN Committee on Economic, Social and Cultural Rights 2000, para. 40).

Positive and negative state obligations

Generally speaking, State obligations can be divided into negative and positive obligations. Negative obligations imply that the State should refrain from action, whereas positive obligations require a State to act. The right to enjoy the benefits of scientific progress can, in principle, imply negative as well as positive obligations for States. Some of these obligations are enumerated in the various paragraphs of Article 15(1) ICESCR. For example, paragraph 3 of Article 15 includes that States should respect the freedom indispensable for scientific research, which is a negative obligation. It means that the State has a legal obligation, for instance, not to interfere with choices and priorities decided by scientists and not to impose a certain topic or method of research on the academic community.

Article 15(1) ICESCR further shows that the right to enjoy the benefits of scientific progress also implies positive State obligations. Firstly, the right itself should be recognized, as indicated in Article 15(1)b. This means that the State should adopt or adjust national legislation as well

as legal, administrative procedures in order to ensure recognition of this right in the national legal order. Secondly, paragraph 2 speaks of “steps to be taken by the States Parties”, which is a clear indication of positive measures to be taken by the State. As stated above, such steps not only include legislative measures, but also measures to be taken in the administrative, financial, educational and social field. According to paragraph 2 these steps “...shall include those necessary for the conservation, development and diffusion of science...” These items again require the State to take all kinds of measures, legal as well as administrative or procedural, to ensure that scientific achievements are preserved, developed and distributed. It should be noted that these items also demand the State not to interfere in the ways and means that the scientific community itself develops, preserves and distributes scientific achievements, which is in turn a negative obligation.

Tripartite typology: obligations to respect, protect and fulfil

An important theory, developed within the UN system and by human rights scholars, further refining the concept of positive and negative obligations is the tripartite typology of State obligations. This theory claims that the implementation of human rights provisions may, in principle, imply three types of State obligations, namely, to respect, to protect and to fulfil (Eide 1987). The so-called tripartite typology is a functional way of clarifying State obligations in relation to human rights law and has gained international recognition. It has been used by the Committee in its General Comments on substantive provisions of the ICESCR and can be found in many scholarly publications on international human rights law.

The *obligation to respect* means that States should refrain from interfering with the enjoyment of the right, in other words, the State should itself not violate the right. The *obligation to protect* means that the State should take the necessary measures to prevent violations of the right by third parties, including other individuals or private entities. The *obligation to fulfil* means that the State should take measures to realise and ensure the right.

Applying the tripartite typology to the right to enjoy the benefits of scientific progress, in particular in relation to health, examples of all three types of obligations could be envisaged. Academic freedom implies an obligation of respect; the protection from harm implies obligations to protect and fulfil; and the right to access and participation imply obligations to respect, protect, and fulfil. In more detail, these obligations entail, *inter alia*, the following:

The *obligation to respect* means that States should respect scientific freedom and choices of subjects and methods of research. It implies that States should not

unjustifiably interfere in science. However, the State *should* interfere in cases where science is dangerous to people(s), society or the environment. States should further acknowledge scientists and not unjustifiably interfere with their material interests to make a living. States should respect access and participation in science, including access to important sources such as libraries and the Internet. From an international perspective, States should refrain from obstructing the collaboration among scientists across borders and their free exchange, as well as the free flow of information and dissemination of scientific results. In relation to the right to health and science, States should not deny equal access to health care services and medicine, not apply coercive medical treatment, nor limit access to contraceptives and prevent the pollution of water and soil.

The *obligation to protect* not only refers to protection from violations of the right to enjoy the benefits of scientific progress itself, including by non-State actors, but also from the use of this provision to limit or violate other human rights. Accordingly, it implies that the State should prevent third parties from blocking scientists claiming ownership of research and from unauthorized use of science, which is linked to intellectual property schemes. But the State should also protect people from potential scientific harm, by State organs and by third parties, for instance pharmaceutical companies. Interestingly, the protection from harmful applications of science in relation to health is also included in the right not to be subjected to torture or inhumane or degrading treatment (Article 7 of the International Covenant on Civil and Political Rights, adopted in 1966), which includes that "...no one shall be subjected without his free consent to medical or scientific experimentation." Such involuntary treatment would be considered degrading or inhuman. In other words, under various provisions on international human rights law, States have the legal obligation to protect people(s) from being used or exploited for scientific experiments that may be harmful.

The *obligation to fulfil* implies that the State puts in place the infrastructure in order for scientific research to take place, which includes legislation, administrative and financial measures and the establishment of institutions. It also means that the State should establish and support science education and should provide assistance to and acknowledgement of persons taking part in science. The State should further ensure access to scientific and technological knowledge, including through access to the Internet, provide information on scientific progress and ensure the widest participation possible. The State should also facilitate the creation of professional associations of scientists, at national as well as international level, and let scientists take part in public affairs and decision-making processes. In relation to health, obligations to fulfil include, for example, providing immunization programmes against

major infectious diseases, providing sexual and reproductive health services, and promoting health education.

Core obligations

The Committee has also developed the concept of 'core obligations', which correspond to the implementation of the minimum essential level of the rights, without which they would lose their 'raison d'être'. Core obligations refer to what States should immediately and always realise, irrespective of their available resources and their political, economic and social situation (UN Committee on Economic, Social and Cultural Rights 1990, paras. 10 and 11).⁸

The core obligations of the right to health, as enumerated in the General Comment on this right, are broad and include the following: to ensure the right of access to health facilities, goods and services on a non-discriminatory basis; to ensure equitable distribution of all health facilities, goods and services; to ensure access to the minimum essential food and freedom from hunger; to ensure access to basic shelter, housing and sanitation and an adequate supply of safe and potable water; to provide essential drugs; and to adopt and implement a national public health strategy addressing the health concerns of the whole population (para. 43). The Committee further identified several other key obligations of the right to health: to ensure reproductive, maternal and child health care; to provide immunization against the major infectious diseases occurring in the community; to take measures to prevent, treat and control epidemic and endemic diseases; to provide education and access to information concerning the main health problems in the community; and to provide appropriate training for health personnel, including education on health and human rights (para. 44). Although no direct link is established with science, for most of these issues, scientific and technological progress, as well as the sharing of its applications, is crucial.

Core obligations of the right to enjoy the benefits of scientific progress and its applications could include: respect for the freedoms indispensable for scientific research; promotion of access to the benefits of science and its applications on a non-discriminatory basis; prevention of harmful effects of science and technology; strengthen international cooperation, including respect for collaboration of scientists across borders (Venice Statement 2009).

⁸ The Committee has used the concept of core obligations in several General Comments: see General Comment no. 3 (1990) on the Nature of State Parties Obligations, para. 10; General Comment No. 12 (1999) on The Right to Adequate Food, para. 8; General Comment No. 13 (1999) on the Right to Education, para. 57; General Comment No. 14 (2000) on the Right to the Highest Attainable Standard of Health, para. 43–45.

These core obligations are not necessarily very costly and could be immediately guaranteed.

Limitations to the enjoyment of the right

The right to enjoy the benefits of scientific progress and its applications is, just as most other human rights in international law, not absolute. States may, under certain circumstances, limit the enjoyment of human rights. For example, States may limit scientific freedom to prevent harmful effects of science. Such measures could be taken within the framework of the general limitations clause as laid down in Article 4 ICESCR. Limitations of the rights in the ICESCR should be "...determined by law only in so far as this may be compatible with the nature of these rights and solely for the purpose of promoting the general welfare in a democratic society." In other words, States have to adopt national laws including the scope of the limitation. There should further be a legitimate aim, for example the protection of public order or security, or the protection of the rights and freedoms of others, and the limitation should be proportionate and appropriate to serve this aim. States may use this clause to adopt specific measures to limit the conduct of science or the dissemination of scientific results in order to prevent harm or disrespect of other human rights.

A-scheme

The content of several rights in the ICESCR and their corresponding obligations have also been explored through the so-called 4A-scheme, which is composed of four elements: *Availability*, *Accessibility*, *Acceptability* and *Adaptability*. These items elaborate on the conditions under which the right could be best enjoyed. The 4A-scheme thereby provides an important way of elucidating State obligations. It is well-known in relation to the right to education (Tomasevski 1998), but has been applied in several General Comments on other rights, including the one on the right to health, whereby the fourth A of 'adaptability' was changed into 'quality' (UN Committee on the Elimination of Discrimination Against Women 1999, paras 6-13; UN Committee on Economic, Social and Cultural Rights 2000, para. 12; UN Sub-Commission on the Promotion and Protection of Human Rights 2003, para. 12). It is interesting to note that in relation to the quality of health, specific references to science were included.

The A-scheme of the right to health includes the following:

- *Availability*, which means that the object of the right, notably health services, goods and facilities, should be made available in sufficient quantity.

- *Accessibility*, which means that health services, goods and facilities have to be accessible to everyone, without discrimination. Accessibility has four overlapping dimensions:

- Non-discrimination, with special attention to vulnerable groups;
- Physical accessibility, within safe physical reach.
- Economic accessibility, which means that it has to be affordable to all.
- Information accessibility, which means the right to seek, receive and impart information on health, while at the same time having ones health data treated with confidentiality.

- *Acceptability*, which means that health services, goods and facilities, have to be respectful of medical ethics and be culturally appropriate.
- *Quality*, which implies that health facilities, goods and services must be scientifically and medically appropriate and of good quality. This requires, *inter alia*, skilled medical personnel, scientifically approved and unexpired drugs and hospital equipment, safe and potable water, and adequate sanitation (UN Committee on Economic, Social and Cultural Rights 2000, para. 12).

It is problematic to apply this scheme to the right to enjoy the benefits of scientific progress and its applications. While the A-scheme is certainly relevant to the right to enjoy the benefits of scientific progress, it should be noted that this right is somewhat different than the rights to health and education, which imply services to be provided by the State, or the rights to food, housing and water, which concern goods to be provided by the State. The right to enjoy the benefits of scientific progress is not exactly a good or service and therefore demands a different approach. Some of the elements of the right to enjoy the benefits of scientific progress, for example, scientific freedom and scientific facilities, can be approached from this A-scheme. Other elements of the right, such as enjoyment of benefits or the concept of progress, do not directly fall within this scheme, although the issue of non-discrimination is also relevant to these elements.

Perhaps a better comparison can be made with the A-scheme established in relation to a right which has a similar structure as the right to enjoy the benefits of scientific progress and is included in Article 15(1)c ICESCR: the right to benefit from protection of moral and material interests resulting from scientific, literary or artistic production of which one is the author. This right also includes the idea of a right to benefit from something, which is different than a right to a certain good or service (UN Committee on Economic, Social and Cultural Rights, 2006).

This A-scheme focuses on availability and accessibility, but these items mainly concern legislation, policies and procedures. In other words, it is not science as such that should be available and accessible—as a good or service—but sufficient legal and political safeguards should be put in place. Availability, for example, includes that there should be sufficient and adequate legislation, regulations and remedies for protection. Accessibility refers to the fact that administrative and judicial procedures and remedies should be accessible, in terms of physical accessibility of courts and agencies, but also in terms of economic accessibility, in other words, not too expensive. Another item under accessibility is the accessibility of information, including information on relevant legislation and procedures. Such information should be understandable to everyone and should be published in various languages. Another item in the scheme is called ‘quality of protection’, which focuses on the quality of procedures, not on the quality of science itself. It is stated that the procedures for the protection of this right should be administered competently by judges and authorities. These are obviously important positive State obligations.

The scheme on the right to benefit from protection of moral and material interests resulting from scientific, literary or artistic production of which one is the author does not include the item of acceptability or cultural appropriateness. While this may be understandable in relation to copyright, this item could be relevant for the right to enjoy the benefits of scientific progress. It could, for example, be argued that scientific research should be culturally appropriate, which means respectful of cultural communities or cultural traditions in a country. Science, in terms of subjects and methods, should take cultural aspects into account.

Concluding and additional remarks

The above shows that science and health are firmly embedded in international human rights law and that there is a clear link between the two, as health is an important area of scientific progress. While the right to health is much elaborated in terms of normative content and State obligations, the right to enjoy the benefits of scientific progress and its applications still needs further clarification. This right, which is embedded in a binding international treaty, is meant to promote science with a human rights perspective. A human rights approach to science and health implies respect for the principles of human dignity, non-discrimination and equal opportunities, as well as a focus on the vulnerable and marginalised, instead of the economically advanced or privileged (Chapman 2007).

The right to enjoy the benefits of scientific progress includes the right to freely conduct science and the right to enjoy scientific advancement. Both these dimensions show an interesting dichotomy. As regards the right to freely conduct science, it can be argued that scientific freedom has been driving forces behind technological advancement and economic growth. At the same time, it is widely acknowledged that freedom to conduct science can be misused resulting in harmful science. As far as the enjoyment of scientific advancement is concerned, a similar dichotomy comes to mind. While on the one hand, scientific and technological advancement is more widely spread than ever through information and communication technologies, at the same time, progress is made at such high speed that the gap between the developed and the developing countries seems to widen. Many developing countries do not enjoy the benefits of scientific advancement, because too little of the knowledge and technology is accessible or applicable in these countries. This reaffirms the need to reinforce the link between science and human rights.

By ratifying human rights treaties, States engage themselves to respect, protect and fulfil legal obligations resulting from the provisions of these treaties. The above shows that, based on the different theories on State obligations as developed in international human rights law, the right to enjoy the benefits of scientific progress and its applications implies several legal obligations for States, notably in relation to health. Important negative obligations are, for instance, to respect scientific freedom and participation in and access to science, including the free flow of scientific information on health, and not to interfere with cross border scientific cooperation in the area of health. Important positive obligations are, for example, to develop laws, institutions and policies to establish a scientific infrastructure and to enable access to scientific results and applications in the field of health, such as vaccines and medicines, as well as to provide safeguards to prevent harm caused by scientific research or experiments in the field of health.

This is, however, still a rather abstract way of describing State obligations. In order for State obligations to develop from abstract legal concepts to concrete measures and policies, the content of the right to enjoy the benefits of scientific progress and its applications should be further explored. First and foremost, several concepts incorporated in Article 15(1)b need to be clarified. What is, for example, meant by ‘science’, ‘scientific progress’, ‘benefits’ and ‘applications’? Although these concepts all have a definition in dictionaries and encyclopaedias, it remains difficult to determine which developments could be considered ‘scientific’ and what is meant by ‘progress’ in relation to science. A related question is: *who* decides whether or not a

certain development is ‘progress’ and for whom? The same can be said in relation to benefits: *who* decides which developments are beneficial and for whom? Until there is some consensus on the meaning of these concepts in relation to the right, the concrete steps to be taken by States remain vague and thereby hard to monitor.

Another remark concerns the enforceability of the right to enjoy the benefits of scientific progress and its applications. Although this right is part of an international legally binding treaty and thereby implies certain State obligations and measures to be taken at national level, this does not mean that individuals or communities can always directly enforce this right and invoke it in a court of law. This right allows for progressive realization, taking into account the available resources. Accordingly, implementation of this right implies important policy decisions. It is therefore unlikely that individuals can directly invoke this right before a judge. This, however, does not mean that the right does not exist, or that States are not legally bound to implement it. By ratifying international human rights treaties, States accept the norms in those treaties as well as the legal obligation to implement them.

One of the major challenges in implementing the right to enjoy the benefits of scientific progress lies in the area of the privatization and commercialization of science and health. Economic globalization has boosted the role and power of multinational corporations, which has in certain cases weakened the power of States, especially that of less developed countries. Major pharmaceutical companies, for instance, have more financial resources than some governments. Consequently, scientific research and progress are often more directed by commercial interest than by human rights concerns. Despite the inclusion of provisions on scientific progress in international human rights instruments, it is clear that scientific research and progress are not always inspired by human rights concerns. Investments in research are often determined by commercial interest, rather than by development needs and it is not always States that take the main decisions. Medical and pharmaceutical research is expensive and increasingly dependent upon investments by companies. Consequently, scientific progress is often driven and controlled by private corporations. A related consequence is that much of the scientific and technological knowledge is not in the hands of governments, but in the hands of private companies or institutions. Corporations and businesses themselves may not be bound directly by international human rights standards, but they too have responsibilities in relation to the advancement of human rights, at least to respect them. At the same time, State obligations in relation to science and health include, as shown above, the obligation to protect individuals from harmful actions or violations of human rights by third parties, including companies.

The right to enjoy the benefits of scientific progress may not be a well-known human right and may not be the right that is considered to be most pressing in relation to human dignity. However, the above shows that its relevance is growing and that this right has a clear and important link with other human rights, notably the right to health. Recognition of its importance by international bodies, such as the Committee on Economic, Social and Cultural Rights and the International Bioethics Committee, is an important step. Hopefully, States will follow and accept this right as part of the set of international human rights norms. At the same time, a further exploration of the normative content and State obligations of the right to enjoy the benefits of scientific progress and its applications is indispensable in order to have this right better implemented, as such and in relation to other rights, notably the right to health.

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