
políticas sociales

Information and communication technologies in the health sector: opportunities and challenges for the reduction of inequalities in Latin America and the Caribbean

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Introduction

There are notorious health inequalities in Latin America and the Caribbean. A series of factors limit access to timely and quality medical care: scarcity of human resources, infrastructure, facilities and medicine, as well as low family incomes, physical and cultural distance between supply provided by the public sector and the population requiring care. Income levels, place of residence and ethnic origins are therefore variables that shape vulnerability and exclusion of millions of households throughout the region. This situation is accompanied by changes in health demand structure stemming from the fast speed of population aging and urban growth, especially in intermediate cities. On the other hand, increasing movement of people between countries, especially in border areas, poses the challenge of integrated strategies for epidemiological surveillance and healthcare. This situation is exacerbated by the rising cost of medical care, due –among other reasons– to the higher cost of health-related technologies (medicine and equipment), and more commonplace chronic diseases because of the increasing number of older people.

This scenario implies important challenges for the development of State policies and strategies that must include decisions regarding the incorporation of information and communication technologies (ICTs). The potential of these policies and strategies for reducing access limitations, improving efficiency in the health sector and in the quality of care and patient safety, are some of the elements that must be considered in order to decidedly face the difficulties and resistance that other sectors have already tackled.

Major changes and increasing improvements for ICTs, as well as the breakneck development of bioengineering and technological convergence are changing the way we can work around the issue of health.

The possible application of such technological innovation encompasses many, if not all activities related to health care, administration and education, offering opportunities to both increase coverage and improve the quality of care, as well as health system effectiveness and efficiency.

The concept of electronic health (e-health) is used herein to encompass the multiple potential applications of ICTs in this field, regardless of whether they are aimed at health sector authorities, organizations providing care and health professionals, or used as customized systems for patients and citizens in general. This concept includes applications ranging from electronic medical records and various types of telemedicine to health portals and hospital management systems, among others. This basically refers to everything that uses ICTs in order to improve health actions in the sphere of prevention, diagnosis, treatment, monitoring and management.

However, limited institutional progress has been made despite several electronic health initiatives being implemented throughout the region. Consequently, most of these projects have limited scope and are not properly integrated into health policies or national ICT strategies.

This document starts by identifying and describing the several benefits expected as a result of incorporating ICTs in health and goes on to summarize present and future challenges for health policies, especially inasmuch as the most vulnerable populations are concerned. Thirdly, the document showcases global progress made in several applications, strategies implemented and difficulties faced in some developed and LAC countries. The document finishes with generic proposals for the formulation of policies and strategies to be considered and adapted by countries throughout the region.

I. The potential of ICTs in health

The potential of electronic health is defined according to current challenges for the health sector in the region. These challenges create a scenario in which ICTs offer tools that are highly beneficial compared to the traditional provision of health care. In many cases, these seem to be the most equitable, effective and efficient way to proceed given their potential to improve access and timely care, trigger warnings, achieve cost savings and ensure more effective diagnosis and treatment.

Above all, these challenges are expressed by inequalities in access to and quality of health care, demographic and epidemiological transformations of the population (COM, 2006), by pressure exerted on health care systems in terms of the availability of resources (professionals, infrastructure, supplies, etc) and by the sustainability of public expenditure (COM, 2001; Álvarez, 2002). An estimated 20% to 25% of the population (nearly 200 million people) do not have regular and timely access to health care systems (PAHO, 2007). In addition, aging estimates and projections indicate that the over-65 age group will represent more than 10% of the total population in Latin America and the Caribbean by 2025 (World Population Prospects and CEPALSTAT, 2010).

There are at least three ways to deal with the concept of access: usage, health insurance or social security coverage, and the likelihood of receiving effective and appropriate healthcare when needed (Savedoff, 2009). The first two factors are limited insofar as they fail to refer to the population's real capacity to gain access to health services. For example, in terms of usage, healthier populations that use health care systems to a lesser degree seem to have less access compared to populations that more often resort to medical care or require hospitalization.

From an insurance coverage perspective, this factor's limitation stems from the failure to consider elements such as the availability of medical resources (beds, doctors, nurses) or the supply of public or private health services. The third approach is known as "effective coverage" (Shengelia et al., 2005) and is defined as a probability, applicable to both populations that continuously resort to healthcare services and to those that do not. This approach enables us to consider the availability of resources. Thus, the third perspective is defined as the fraction of potential health improvement that the health system could contribute with the services that it presently offers. We wish to point out that construction of the effective coverage index also incorporates an efficacy and quality aspect (Lozano et al., 2007).

Based on this, four factors are identified that condition access to health services. Firstly, the availability of resources, because there must be properly trained health professionals, facilities, equipment and medicine for the treatment of diseases. A second factor is the assignment of resources close to the population requiring the same. Thirdly, access may be limited by healthcare costs for patients and their families. Finally, the way healthcare services are provided may enter into conflict with the beliefs or social rules of the population, inhibiting demand for cultural reasons.

ICTs can be very useful in terms of improving status for each of these four conditioning factors. These technologies facilitate ongoing training of health professionals. They can also reduce the number of unnecessary or not-so-useful contacts between patients and the health system. In addition, these enable telemedicine. All of this improves access to health services. The electronic health record (eHR) and telemedicine have a positive effect on the location factor. Costs may be curbed as a result of more efficient services and the quality of care and patient safety improves as a consequence of the eHR and other systems, such as imaging, processing doctors' orders and support for medical decisions. ICTs also contribute to the empowerment of patients, enabling care in mobile situations and, above all, granting people access to their own health related information so that they may make their own decisions on matters of importance to them, such as those related to health.

Telemedicine, understood as the "provision of healthcare by means of ICTs in situations where the health professional and patient (or two healthcare professionals) are located in different places" (COM, 2008: 4), is a tool with undeniable value for increasing access to healthcare, especially in the case of the first two aforementioned factors.

ICTs increase the availability of medical resources by optimizing health care processes and bringing the knowledge of scarce specialists closer to "distant" locations through teleconsultation (remote access), in both real time and deferred time. It is therefore possible to reduce the need to move patients, whilst receiving timely care and lowering costs for both families and the system. In practice, this is applicable to all medical specialities.

Some applications are especially beneficial for improving access to healthcare. The following can be mentioned as examples: telediagnosis using videoconferences in real time; telemonitoring or telesurveillance of a patient's physiological and biometric parameters, for instance foetal telemonitoring in high-risk pregnancies; or telecare in the provision of health care to patients in their day-to-day lives, as in the case of the elderly or other patients with mobility limitations. Likewise, teleradiology, understood as the electronic transmission of digital images for interpretation and consultation purposes, facilitates patient access to specialists located in large urban centres. This offers permanent service while shortening waiting lists and cutting operating costs.

Likewise, several reports and studies (COM, 2004; Álvarez, 2002) refer to the ability of ICTs to create citizen-centred health systems that respect citizens' cultural and linguistic traditions. Among other benefits, these technologies can significantly contribute towards reducing the number of contacts, tests and referrals that may be an stumbling block for patients who do not speak a country's official language (Álvarez, 2002).

The electronic health record (eHR), understood as the set of documents containing data, assessments and information of any type related to the situation and clinical evolution of a patient during the health care process (Carnicero, 2003), is linked to the efficacy dimension in at least three aspects. To

begin with, it contributes to diagnosis and treatment considering the patient's full clinical history. Secondly, it allows for the generation of medical warnings based on complementary work with remote monitoring and the prescription of medication with no negative side-effects for patients (Wooton et al., 2009). Lastly, it increases epidemiological surveillance possibilities by generating a database that is updated on an ongoing basis.

The comparative advantages of eHRs, vis-à-vis paper-based medical records, can be summarized in three aspects: simultaneous and remote access; record security and confidentiality, and data processing for acquiring information and knowledge. Electronic health records help to improve a series of tangible elements, such as documentation order and uniformity, legible and inalterable information, information availability and therefore accessibility, confidentiality, and easy separation of clinical information from patients' personal information, thus enabling the processing of information and knowledge management without invading peoples' privacy (Carnicero, 2003 and 2004).

On the other hand, within a context of greater population aging and the consequent increase in the prevalence of chronic diseases, remote monitoring may be more effective for the control of such ailments than traditional care provided by health services. In this manner, it is possible to detect symptoms and abnormal health parameters before a routine or urgent medical consultation, enabling the adoption of corrective measures before the emergence of more severe complications (COM, 2008). For example, closer monitoring of patients suffering from heart failure facilitates early intervention. Likewise, remote monitoring reduces the frequency of visits to health centres and thus improves patients' quality of life. At the same time, timely modification of the treatment based on remote monitoring data may stabilize the patient, thus preventing or shortening hospitalization. These are evident benefits for patients, their families and the health system.

The use of ICTs in education facilitates the training of health professionals. This is especially relevant when these professionals work in isolated areas, and also improves the exchange of knowledge between educational centres. At the same time, the possibility of remote continuous updating¹ encourages professionals to settle and stay in these places.

In addition to the aforementioned contributions to greater efficiency resulting from interaction with other dimensions, important benefits are obtained in the management of health-related information linked to some telemedicine applications, eHR and different types of health information systems. Within a context of increasing complexity and volumes of data, both in terms of information and health related knowledge, enhanced storage, aggregation and analysis capabilities for the integration of administrative, clinical and health information is a fundamental decision making component in any health organization today.

We wish to highlight the potential of ICTs to create common health spaces that favour citizen mobility, enabling them to use health services and systems regardless of their place of origin. This not only involves applications at an international scale, but also within countries and even between health services operating in a single city. The adoption of interoperability standards is fundamental for this potential.

Applications such as the eHR and the "unique health card" are paradigmatic cases that create a common health space. Information required in order to qualify for healthcare is contained on a portable card compatible with healthcare centres. This greatly facilitates the integration of several healthcare centres at a national level and also health systems in different countries. The eHR needs to share patients' health-related information in a simple and safe manner and keep the original meaning of the information contained on the same unaltered. Peoples' health-related data is distributed in multiple, heterogeneous and autonomous information systems, hindering uniform access to health records. Data integration consists of combining data located in these heterogeneous systems in order to provide a single unified view (Carnicero, 2003).

¹ An interesting initiative is the Pan-American Health Organization Virtual Campus for Public Health (PAHO, 2003).

Greater understanding of the health characteristics and changes of a population can be achieved through the use of increasingly complex databases enriched with the data entered by eHRs and telesurveillance devices.

Among other potentialities, the availability of more comprehensive information about the health characteristics of a population provides new epidemiological surveillance possibilities as it enhances capabilities for the description, modeling, analysis and monitoring of trends in health conditions (Wooton et al., 2009). Likewise, possibilities of analyzing the social determinants of health also increase. For example, the measurement of risk factors associated to the social structure and its respective social positions (Marmot, 1999; Graham and Kelly, 2004; Wooton et al., 2009). Obviously, these applications and perspectives do not have an immediate impact on beneficiaries of healthcare systems, but their future contribution to the development of more equitable and effective public health policies is undeniable.

Finally, following Pharow (2008), we wish to highlight that the use of eHR provides greater power to patients in order to improve prevention processes; otherwise, it is difficult for people to make themselves responsible for their own health. This is increasingly relevant within a context of aging and epidemiological transformation. In addition, greater access to health information available in Web portals, both by patients and the community at large, contributes to “citizen empowerment” (COM, 2006) and has a favourable impact on healthier behaviour and self care. However, this requires sustained growth in digital literacy and the reduction of gaps for access to technology in Latin America and the Caribbean.

II. Context and challenges

Socio-demographic and epidemiological transformations and trends are fundamental elements to be considered in order to identify upcoming challenges for public health policies. At the same time, these challenges are a basis for defining the role played by ICTs for the achievement of health objectives and goals, and consequently in the development of a sectorial digital strategy within current health policies. This becomes more significant in a context of substantial inequalities, as evidenced in Latin America and the Caribbean, which could increase even further and have a severe impact on the welfare of large segments of the population.

A. Reforms and other structural conditioning factors

The eighties marked the beginning of deep-reaching health system reforms in Latin America. These reforms reflected the need for State modernization and health system transformations aimed at “increasing effectiveness, ensuring financial sustainability, promoting decentralization and assigning a more important role to the private sector” (PAHO, 2007).

By the late nineties and beginning of the 2000s, reforms for the countries in the region changed focus. There was a strong trend towards recovering the role of the State as system provider and regulator, despite greater decentralization of service management and the promotion of private sector participation. In general terms, an attempt was made to integrate public and private health sub-sectors at different territorial scales (Arriagada, Aranda and Miranda, 2005).

For example, in Chile the reform process can be analyzed by examining three very clear stages. In the eighties, changes aimed at decentralizing the system and promoting freedom of choice. A second stage sought to halt State downsizing and create regulations for sectors privatized during the eighties. Starting in 2000, emphasis was placed on the improvement and transparency of public management, promotion of citizen rights and participation, as well as the inclusion of eGovernment. Subsequently, between 2000 and 2006, efforts centred on two bills: The General Regime of Health Guarantees that established the Universal Access Plan with Explicit Guarantees (AUGE Plan), and the Health Authority and Network of Self-Managed Hospitals that strengthened the health authority and created greater flexibility for hospital management (PAHO, 2007).

Similarly to Chile, the Mexican health system reform began in the early eighties with a decentralization process. The second stage of this process continued throughout the following decade. Reforms decentralized the system, giving rise to health secretariats and services in each of the 31 Mexican states and in the Federal District.

The cases of Brazil, Colombia and the Bolivarian Republic of Venezuela illustrate the link between health system reforms and changes at a constitutional level. The origins of the present health system in Brazil stem from the 1988 Federal Constitution that establishes the basic principles of the Single Health System (SUS). Health is established as a social right with universal and equitable access guaranteed by the State. The SUS was regulated in 1990 and determines that access to health is provided through “a regionalized and hierarchical service provision network that is the responsibility of the three government levels (federal, state and municipal), including the supplementary participation of private enterprise” (PAHO, 2007).

In Colombia, health reform began in the early nineties within the framework of a general State transformation. A new Constitution was approved in 1991 and new laws were passed. Among these, three led to reforms in the health system: municipalisation, decentralization and social security. In 1993, the Comprehensive Social Security System was created as part of the Social Protection System. By 2002, the health system introduced a new reform that included the creation of the Ministry of Social Protection following the merger of the Ministry of Health and the Ministry of Labour and Social Security.

The health system reform process in the Bolivarian Republic of Venezuela began in 1987 and continued throughout the nineties. Two relevant milestones during this period were the National Health System Law (1987) and the Social Security laws permitted by the Fast Track Authority (1998). A new Constitution was approved in 1999, establishing health as a fundamental social right and the State as the institution responsible for guaranteeing that right.

Lastly, despite the fact that decentralization is an inseparable element of health reforms, this is not implemented the same way in all countries. In some of these countries, decentralization is incomplete, underway or even non-existent.

Within this framework of health reforms and with the incentive of progress made in electronic government policies, information and communication technologies have been gradually introduced in the region's health systems, albeit at a very slow pace. It could be argued that health system strategies have taken IT strategies into account, and that the latter have been reinforced by electronic government strategies.

As an example, infrastructure was introduced in Uruguay in order to facilitate various e-government projects for both procedures and services. These included a high-speed network connecting the whole Uruguayan State (REDuy) and a Technological Platform to improve services for citizens. These two contributions facilitate the Electronic Clinical Record project.

TABLE 1
REFORMS AND DECENTRALIZATION IN LATIN AMERICA

Transformations	Transformation period		
	1980 – 1989	1990 -1999	2000 to date
Beginning of the reforms	Chile (1987)		
	Mexico (1987)	Argentina (1993)	
	Uruguay (1987)	Costa Rica (1994)	Ecuador (2008)
	Venezuela (Bol. Rep. of) (1987)	Colombia (1991)	
	Brazil (1988)	Panama (1994)	
Constitutional Reform	Chile (1980 Constitution)	Colombia (1999)	
	Brazil (1988)	Ecuador (1998)	Ecuador (2008)
		Venezuela (Bol. Rep. Of) (1999)	
		Argentina (1998)	
Decentralization Process		Brazil (1993- 1996)	Brazil (2000-2001)
	Chile (seventies till 1988)	Colombia (1990-1993)	Ecuador (2001-2002)
	Mexico (1984-1988)	Costa Rica (1997-1998)	Uruguay (2001 -2002)
		Mexico (1994- 2000)	Venezuela (Bol. Rep. of) (2000)
		Panama (1998-1999)	
		Venezuela (Bol. Rep. of) (1990-1999)	

Source: Own production based on Mesa-Lago (2005) and PAHO Health System Profiles.

Within this context of reforms, inequalities in health such as the ones described below are the result of multiple factors, including the economic capacity of States and their public policies, human resource allocation and sanitation conditions, among others.

Public expenditure on health is an indicator of the former factor, since this expresses economic capacity and political will, as well as social consensus reached during the institutional history of each country.

As illustrated in the following chart, public expenditure on health in the region ranges between 1% and 11% of GDP with a simple average of approximately 3.5%. Despite an important increase over the last 18 years, this is still well below the European average of over 6%.

In this sphere, it has been argued that one of the important challenges facing the region is to combine contribution-based (linked to the formal labour market) and non contribution-based regimes to reduce the exclusion mechanisms that affect important population groups (ECLAC, 2007). In addition, as described below, there are increasing demands on the sector resulting from the progressive aging of the population. This will be greater or less in accordance with each country's stage of transition.

Indeed, people's largest expenditure on health occurs during their final decade of life. Health systems therefore devote a significant part of their resources to the provision of curative and palliative services. Within this scenario, it has been estimated that countries in Latin America and the Caribbean will increase their expenditure on health between 3% and 9% of GDP by 2040 (ECLAC, 2010b).

TABLE 2
LATIN AMERICA AND THE CARIBBEAN (SELECTED COUNTRIES):
PUBLIC EXPENDITURE ON HEALTH

Country	Institutional coverage	1990		Circa 2007	
		As % of GDP	Per inhabitant in the year 2000 US\$	As % of GDP	Per inhabitant in the year 2000 US\$
Argentina	GN, GP and local governments	4.33	252	5.07	474
Bolivia (Plurinational State of)	Non Financial Public Sector	3.19	35
Brazil	Federal, State and Municipal	3.59	121	4.94	220
Chile	Central Government	1.76	54	3.35	209
Colombia	Central Government	0.93	20	1.94	58
Costa Rica	Total Public Sector	4.96	155	5.82	302
Cuba	Central Government	4.58	152	11.82	515
Ecuador	Central Government	1.45	19	1.26	21
El Salvador	Central Government	1.12*	20	3.44	90
Guatemala	Central Government	1.04	13	1.18	20
Honduras	Central Government	3.07	33	3.44	47
Jamaica	Central Government	2.14	75	2.42	87
Mexico	Central Government Budget Item	2.77	150	2.80	198
Nicaragua	Central Government Budget Item	3.07	21	3.71	33
Panama	Non Financial Public Sector	5.27	155	5.69	240
Paraguay	Central Government Budget Item	0.22	3	1.50	23
Peru	1990: Central Government Budget Item. 2007: Central Government	0.89	15	1.17	34
Dominican Republic	Central Government	0.88	16	1.57	56
Trinidad and Tobago	Central Government	2.49	108	3.41	376
Uruguay	Central Government Consolidated	2.83	141	4.46	364
Venezuela (Bol. Rep. of)	Central Government Budget Item - agreed	1.52	74	1.79	96

Source: Economic Commission for Latin America and the Caribbean (ECLAC), based on information extracted from the social expenditure database, 2009.

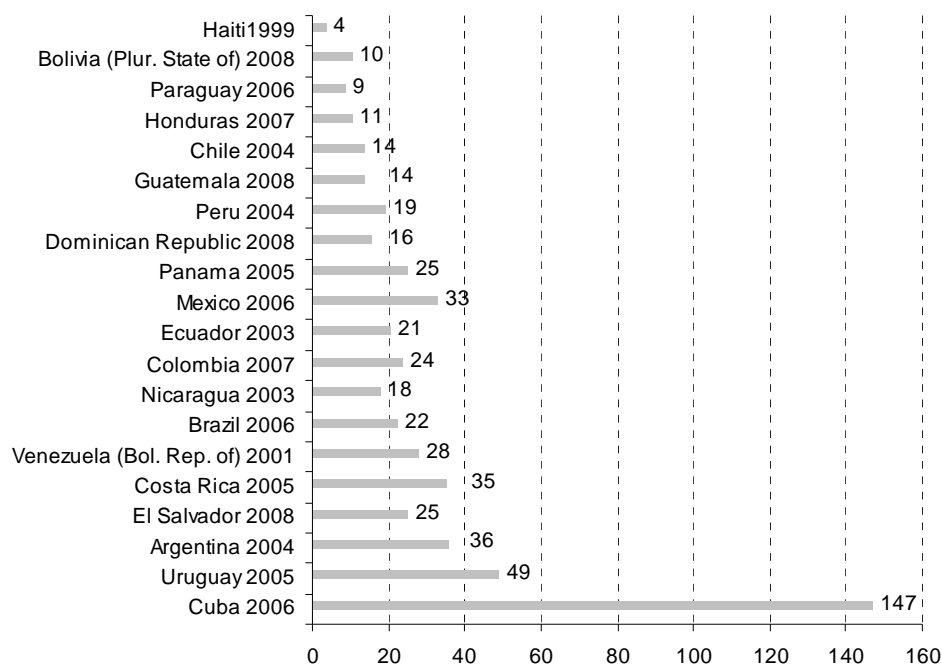
* For El Salvador 1993.

On the other hand, countries' ability to provide proper health care for their populations also depends on their qualified human resources allocation. The recommended density² for catering to a minimum level of mother and child healthcare is 25 human resources. Half the countries in LAC fail to meet this criterion (WHO, 2006a).

² The density of human resources in health is an index created based on two indicators available for all countries: doctors and nurses per ten thousand inhabitants.

FIGURE 1
LATIN AMERICA AND THE CARIBBEAN (SELECTED COUNTRIES):
DENSITY OF HUMAN RESOURCES IN HEALTH

(Number of doctors + professional nurses x 10,000 inhabitants)



Source: PAHO, Table generating system, 2009.

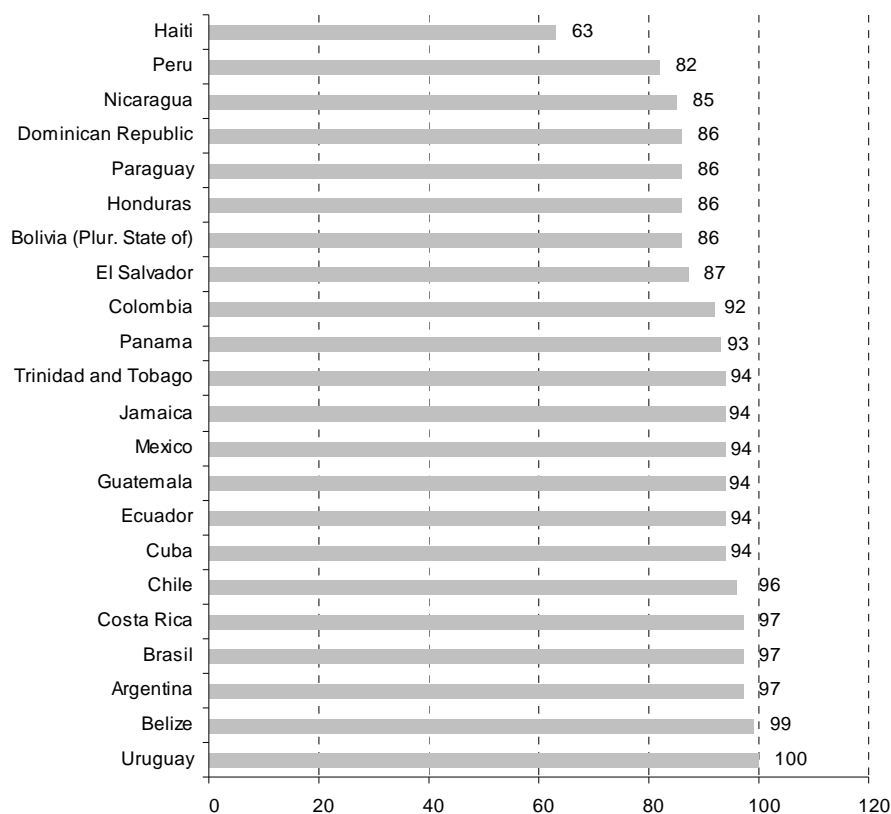
Problems of access to health associated to the low density mentioned above are exacerbated by two structural elements. Firstly, an important part of these resources are used by the private sector in the provision of care for wealthier sectors; and secondly, these tend to concentrate on the largest cities.

Information and communication technologies have an important role to play, both in reducing the cost of care and in organizational innovation to optimize the allocation and distribution of human resources.

However, together with the incorporation of ICTs, the region still evidences some deficit in sanitation conditions. For example, drinking water coverage is over 90% at a regional level, yet many countries have yet to complete their infrastructure.

In terms of challenges, we wish to highlight that demand for basic sanitation infrastructure will continue to increase, especially in intermediate cities that will experience the most substantial growth over the next few years (see point C in this chapter).

FIGURE 2
LATIN AMERICA AND THE CARIBBEAN (SELECTED COUNTRIES):
PERCENTAGE OF THE NATIONAL POPULATION WITH SUSTAINABLE ACCESS TO BETTER SOURCES
OF DRINKING WATER



Source: WHO, UNICEF. CEPALSTAT database, 2010.

B. Demographic and epidemiological trends

Latin American and Caribbean countries are experiencing different demographic transition stages, and thus different challenges. The concept of demographic transition is defined as an evolving process characterized by an important and normally non-synchronized drop in birth rate and mortality that determines the growth of human populations (ECLAC, 2006).

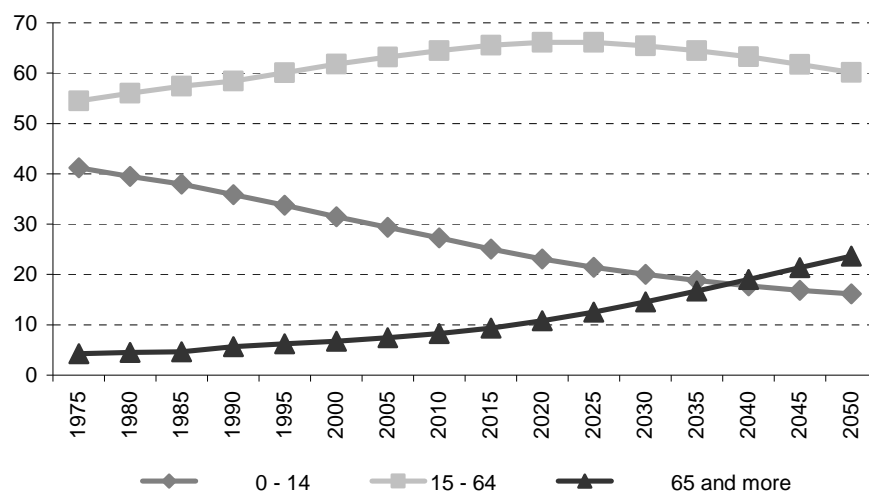
Subsequent methodological reviews (ECLAC, 2008) specify classification criteria using Total Fertility Rate (TFR), Life Expectancy (LE) and Natural Growth Rate (NGR).

Population aging is one of the most important expressions of demographic transition, involving a drop in the proportion of children and youngsters, and a relative increase in weight of the elderly population.

Graph 3 illustrates how the three age groups have evolved and will continue to do so, highlighting the fact that by 2040 the percentage of children under the age of 15 will be the same as the over-65 age group.

As expected, this aging trend is expressed differently in each country and –in terms of absolute numbers– defines scenarios that announce important changes in healthcare demand structure, as illustrated in chart 3.

FIGURE 3
LATIN AMERICA AND THE CARIBBEAN:
POPULATION DISTRIBUTION ACCORDING TO MAJOR AGE GROUPS (%), 1975-2050



Source: Own production based on the CEPALSTAT data base, 2008.

It is interesting to note that the number of children under fifteen years of age will diminish by one-third over the next thirty years, while the number of persons over the age of sixty-five increase more than threefold.

The epidemiological transition is closely related to the demographic transition. The former is primarily an expression of changes in morbidity and mortality, depending on the cause, as well as distribution of age at death. This process is characterized by a percentage drop in deaths resulting from communicable diseases and during the perinatal period, giving rise to the relative prevalence of deaths as a result of chronic and degenerative diseases, as well as those due to external causes. This is influenced by the more significant drop in mortality resulting from the first group of causes, primarily affecting children, and changing population age structures that lead to an increase in the number of deaths among the elderly (Chackiel, 2004).

Despite its limitations, empirical problems (the unexpected drop in mortality levels due to some degenerative diseases, together with an increase in morbimortality of certain infectious diseases and the reappearance of others such as tuberculosis) and aspects arguable in theoretical terms, the epidemiological transition theory is still used as a conceptual scheme for the identification of changes in mortality patterns per cause (ECLAC, 2010b).

Latin America and the Caribbean are peculiar. The region's health profile features the following characteristics: i) overlapping stages (high incidence of communicable and non-communicable diseases), ii) counter-transition (breakdown of the unidirectional transitional principle), iii) long-winded transition (epidemiological stagnation) and iv) epidemiological polarization (heterogeneity among social groups and geographic areas within each country).

The region currently faces the typical dynamics of a "modern" context, coexisting with an important number of elements belonging to "old" models (ECLAC, 2010b).

Given the existing relationship between age structure, morbidity, and especially mortality, the concept of demographic transition is fundamental when it comes to understanding epidemiological changes. The greater representation of older persons leads to an increase in the population at risk of dying as a result of chronic diseases.

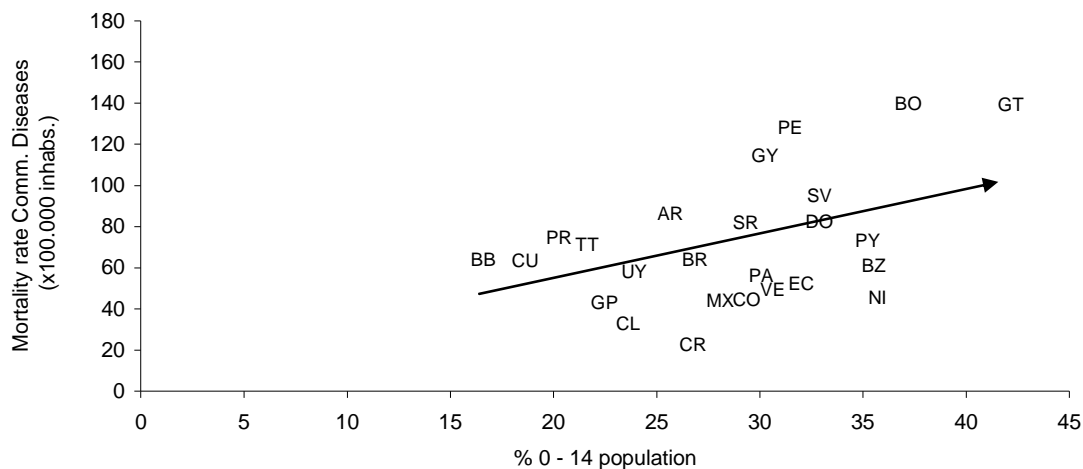
TABLE 3
LATIN AMERICA AND THE CARIBBEAN (SELECTED COUNTRIES):
SIZE OF 0-14 AND OVER-65 AGE GROUPS
(In millions of people)

Region / Country	2005-2010		2040-2045		Variation quotient	
	N 0-14	N 65+	N 0-14	N 65+	0-14	65+
Argentina	10.2	4.0	9.3	7.8	0.91	1.97
Bolivia (Plur. State of)	3.5	0.4	3.2	1.4	0.93	3.29
Brazil	51.3	11.5	33.7	38.9	0.66	3.40
Belize	0.1	0.0	0.1	0.1	0.93	4.25
Chile	4.1	1.3	3.5	4.1	0.86	3.13
Colombia	13.3	2.2	12.2	8.9	0.92	4.07
Costa Rica	1.2	0.3	1.1	1.0	0.90	4.06
Cuba	2.2	1.2	1.4	3.1	0.64	2.62
Dominican Republic	3.1	0.5	2.8	1.6	0.91	3.13
Ecuador	4.3	0.8	3.7	2.5	0.87	3.30
Guatemala	5.5	0.5	6.8	1.7	1.23	3.15
Honduras	2.7	0.3	2.6	1.0	0.95	3.65
Haiti	3.5	0.4	3.7	1.2	1.05	3.04
Jamaica	0.8	0.2	0.6	0.5	0.69	2.22
Mexico	32.1	6.1	24.1	22.8	0.75	3.76
Nicaragua	2.1	0.2	1.7	0.8	0.81	3.72
Panama	1.0	0.2	1.0	0.7	1.01	3.73
Peru	8.9	1.5	7.8	5.1	0.88	3.39
Paraguay	2.1	0.3	2.1	0.9	1.00	3.32
El Salvador	2.1	0.4	1.7	0.9	0.78	2.38
Trinidad and Tobago	0.3	0.1	0.2	0.2	0.79	2.77
Uruguay	0.8	0.5	0.7	0.7	0.83	1.57
Venezuela (Bol. Rep. of)	11.1	1.3	8.2	5.3	0.74	4.02

Source: For Latin America, CEPALSTAT. CELADE 2008. For Caribbean countries, United Nations Population Division. 2008 Review. Population database.

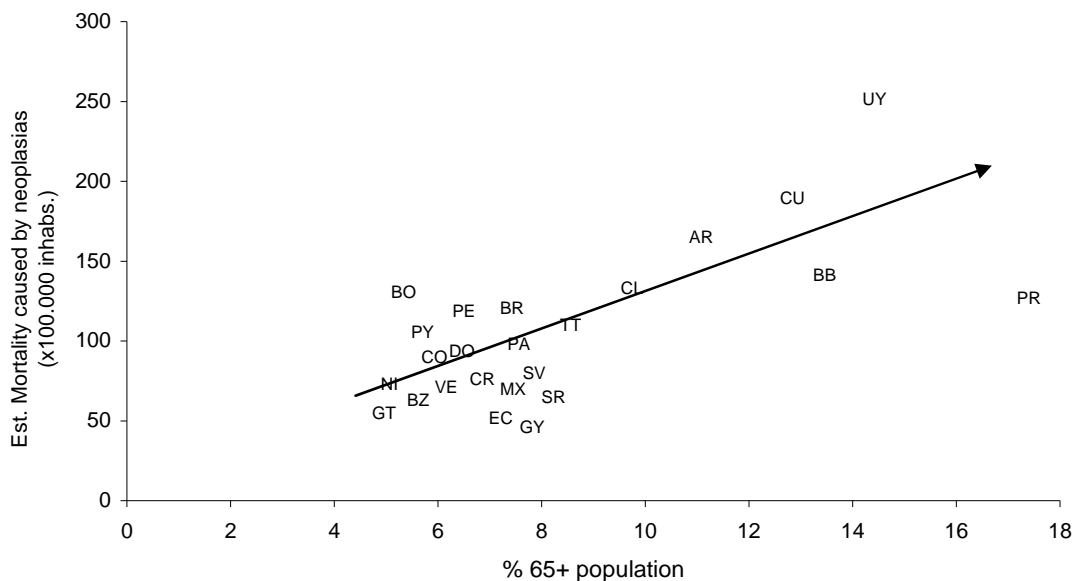
Mortality rates per age group reveal a close relationship with demographic and epidemiological transitions. Countries with greater relative weight of the 0 to 14 year-old age group evidence a high mortality rate caused by communicable diseases – Haiti, Bolivia, Guatemala and Guyana, among others. As a counterpart, countries with an older population have higher mortality rates due to neoplasias, as well as chronic and degenerative diseases. This is illustrated in the following two graphs.

FIGURE 4
LATIN AMERICA AND THE CARIBBEAN (SELECTED COUNTRIES):
ESTIMATED MORTALITY RATE RESULTING FROM COMMUNICABLE DISEASES
IN RELATION TO THE SIZE OF THE 0 TO 14-YEAR-OLD AGE GROUP, CIRCA 2005



Source: Own production based on the table generation system, PAHO and CEPALSTAT. 2007.

FIGURE 5
LATIN AMERICA AND THE CARIBBEAN (SELECTED COUNTRIES):
ESTIMATED MORTALITY RATE RESULTING FROM NEOPLASIAS IN RELATION
TO THE SIZE OF THE OVER-65 AGE GROUP, CIRCA 2005



Source: Own production based on the table generation system, PAHO and CEPALSTAT. 2007.

C. Trends in the spatial distribution of the population

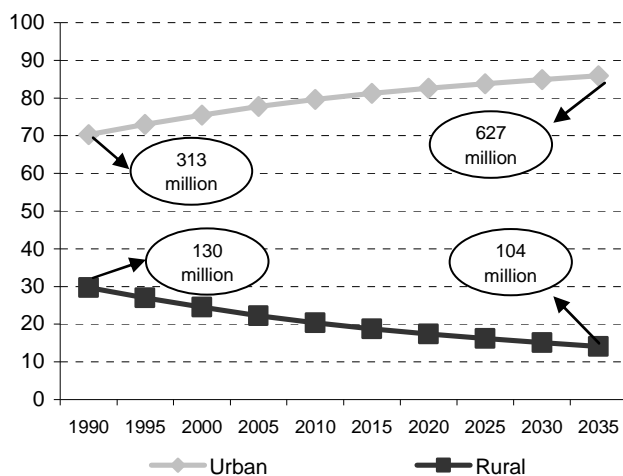
The design of public health policies and their complementary ICT strategies must consider geographically determined access barriers to health and their impact upon inequalities suffered by the most vulnerable sectors.

Latin America and the Caribbean is a highly urbanized region where nearly 80% of the population lives in cities. Its urban population has increased nearly sevenfold over the past 60 years and presently amounts to over 470 million people. This growth pace has recently slowed, but is still relatively high (1.51% for 2010-2015).

Some countries are nearly 90% urbanized (Venezuela, Argentina, Uruguay, Chile and Puerto Rico), while others are less than 60% urbanized (Haiti, Honduras, Guatemala, Nicaragua, Jamaica and Trinidad and Tobago).

On the other hand, the rural population has stagnated over the past two decades, amounting to approximately 125 million people (ECLAC, 2004b). This number is still considerable since one in five inhabitants live in rural areas despite the regional trend towards urbanization, as illustrated in the following graph. By 2030, one in six will be rural residents.

FIGURE 6
LATIN AMERICA AND THE CARIBBEAN:
URBAN / RURAL DISTRIBUTION AND POPULATION SIZE (1990 – 2035)



Source: World Urbanization Prospects, 2009.

One of the peculiarities of the urbanization process in the region is that city systems are structured around large cities in most countries. In fact, one out of every three persons in the region lives in cities with one million or more inhabitants (ECLAC, 2004b). In addition, city systems tend to be primate because in most countries of the region the capital city concentrates more than a quarter of the country's population, over a third of the urban population and an overwhelming economic, socio-cultural and political importance (Cuervo and González, 1997).

It is often argued that the existence of gigantic cities, with outstanding demographic size from a global perspective, is a characteristic of city systems in the region. There are presently over eight cities with more than five million inhabitants, home to 16% of the population, and 55 large cities (between 1 and 5 million inhabitants) where 19% of Latin American and Caribbean citizens live (see following chart).

TABLE 4
LATIN AMERICA AND THE CARIBBEAN:
CONCENTRATION OF THE POPULATION IN CITIES AND MAJOR CITIES (1990-2025)

Size	Indicators	Year				
		1990	2000	2010	2020	2025
5 million or more	Number of cities	5	7	8	8	8
	Population (millions)	56	77	93	100	102
	% urban population	18	19	20	18	18
	% total population	13	15	16	15	15
1 to 5 million	Number of cities	34	42	55	60	63
	Population (millions)	65	82	112	132	140
	% urban population	21	21	24	24	24
	% total population	15	16	19	20	20

Source: Own estimates based on United Nations, World Urbanization Prospects, 2010.

An important element to be considered is the internal dynamics of the peripheral growth of the metropolis, because this can result in inequalities. In Latin American countries, the main actors in the peripheral expansion of cities are the poor, who gradually expand the urban radius of cities. This socio-economically biased peripheral expansion implies that Latin American metropolitan areas accumulate deficiencies, underprivileged populations and prejudices expressed in various dimensions (Rodríguez, 2002).

These differences are reflected in some demographic and social welfare indicators: “In early 1990, infant mortality rates in the municipality of Sao Paulo dropped to 20 per thousand in areas where poverty affected less than 30% of the population, and increased to more than 60 per thousand in places where 50% or more of the population were poor. Shantytowns have become common in the southern part of Sao Paulo and this zone, with no green areas and where less than 15% of households have basic utilities, gives rise to a social reality very different to that of the rest of the metropolitan space” (ECLAC, 1998).

The increased weight of metropolitan populations compared to urban and national populations stems from the high net-in migration balance that has taken place in the past. However, since the 1990 census, the net migration rate in all cities dropped significantly, thus increasing the proportion of growth as a result of the vegetative component. Intermediate cities currently evidence important growth patterns, strengthening their relative weight (see following chart). Consequently, fundamental focus must be placed on the effects of this phenomenon on health demand structure.

TABLE 5
LATIN AMERICA AND THE CARIBBEAN:
POPULATION GROWTH 2010 – 2025 PER SIZE OF CITIES

Size	Indicators	Year		Variation 2010 - 2025
		2010	2025	
5 million or more	Number of cities	8	8	
	Population (millions)	92.8	101.9	9.7%
	% total population	16	14.8	
1 to 5 million	Number of cities	55	63	
	Population (millions)	111.7	140.3	25.6%
	% total population	18.8	20.4	
500 thousand to 1 million	Number of cities	58	63	
	Population (millions)	40.9	47.0	14.9%
	% total population	6.9	6.8	

Source: World Urbanization Prospects, 2010.

Prospects in all countries are certainly not identical. In countries that experienced earlier urbanization, growth is concentrated in cities of smaller relative size. On the other hand, in those with later urbanization, the main or capital city will keep growing substantially, as illustrated in chart 6.

TABLE 6
LATIN AMERICA AND THE CARIBBEAN (SELECTED COUNTRIES):
ESTIMATED POPULATION GROWTH (%) (2010-2025) FOR CITIES OF DIFFERENT SIZES
AND TOTAL POPULATION

Country	City size (number of inhabitants)			Total population
	Five or more million	One to five million	500 thousand to 1 million	
Argentina	5.2	47.6	21.8	13.2
Belize	-	-	47.2	27.1
Bolivia (Plur. State of)	-	29.3	31.5	23.3
Brazil	10.3	20.6	12.0	15.0
Chile	7.3	-	11.9	12.4
Colombia	15.4	30.4	35.4	16.0
Costa Rica	-	26.4	-	18.9
Dominican Republic	-	25.5	29.4	19.4
Ecuador	-	24.4	-	16.7
Guatemala	-	53.1	58.2	38.6
Honduras	-	44.0	46.3	28.5
Jamaica	-	-	12.9	5.5
Mexico	7.8	24.8	17.1	13.1
Panama	-	27.6	-	21.6
Peru	14.6	-	21.2	18.2
Paraguay	-	33.7	-	24.2
El Salvador	-	25.1	-	19.4
Trinidad and Tobago	-	-	-	3.9
Uruguay	-	1.1	-	5.2
Venezuela (Bol. Rep. of)	-	18.4	60.4	21.8

Source: World Urbanization Prospects and CEPALSTAT, 2010.

D. Health inequalities and exclusion

As stated, health inequalities are largely due to several barriers that hinder access to quality and timely health care. Such barriers are related to the characteristics of the health system in each country and to factors associated to patients and their families. This chapter describes inequalities using certain feasible indicators of variables that represent individual or family factors and others that highlight health system characteristics. However, we wish to highlight that both dimensions often overlap, if not always. In addition, available data is scarce and seldom collected, hampering more extensive regional diagnosis.

1. Infant Mortality

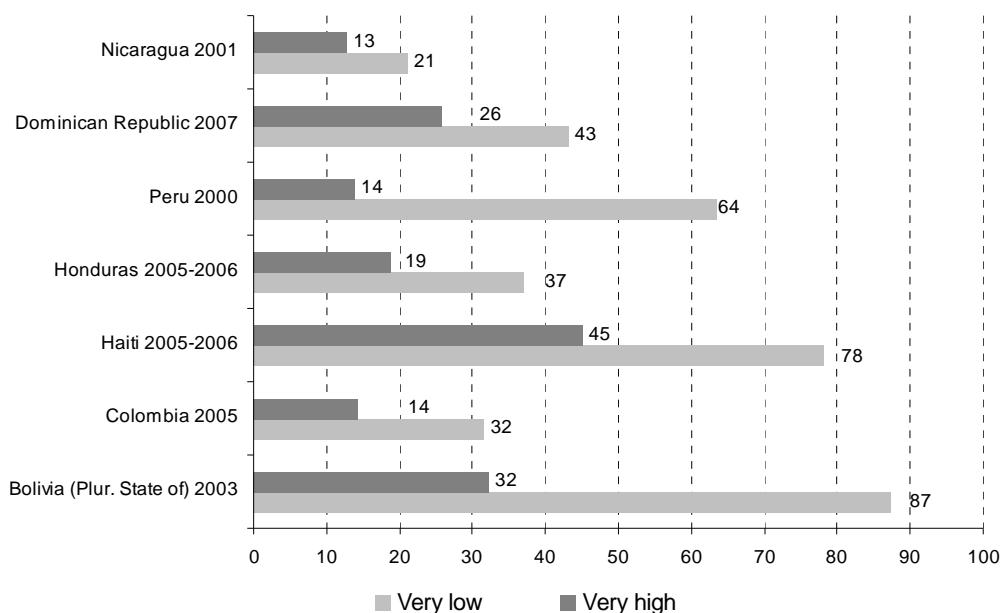
Despite the fact that national averages in the region show a remarkable drop in infant mortality and in the mortality rate of children under the age of five over the past 20 years, there are still dissimilar trends

stemming from the effects of gaps in terms of ethnic group, area of residence, mothers' educational level and household socioeconomic status.

This demonstrates the continued existence of major inequalities in terms of both access to health services and quality of care.

In households with a lower level of welfare, the infant mortality rate can be four times greater than that of higher income households (see graph 8). The strong correlation between welfare and family income evidences how much the economic gap affects access to health services. Moreover, the deficit in quality becomes evident from the fact that infant mortality among high welfare households in the region is far greater than the average infant mortality rate for Europe, which comes to approximately 6.8 deaths per one thousand live births.

FIGURE 7
LATIN AMERICA AND THE CARIBBEAN (SELECTED COUNTRIES):
INFANT MORTALITY WITH REGARD TO THE LEVEL OF HOUSEHOLD WELFARE
(Rate per 1,000 live births)

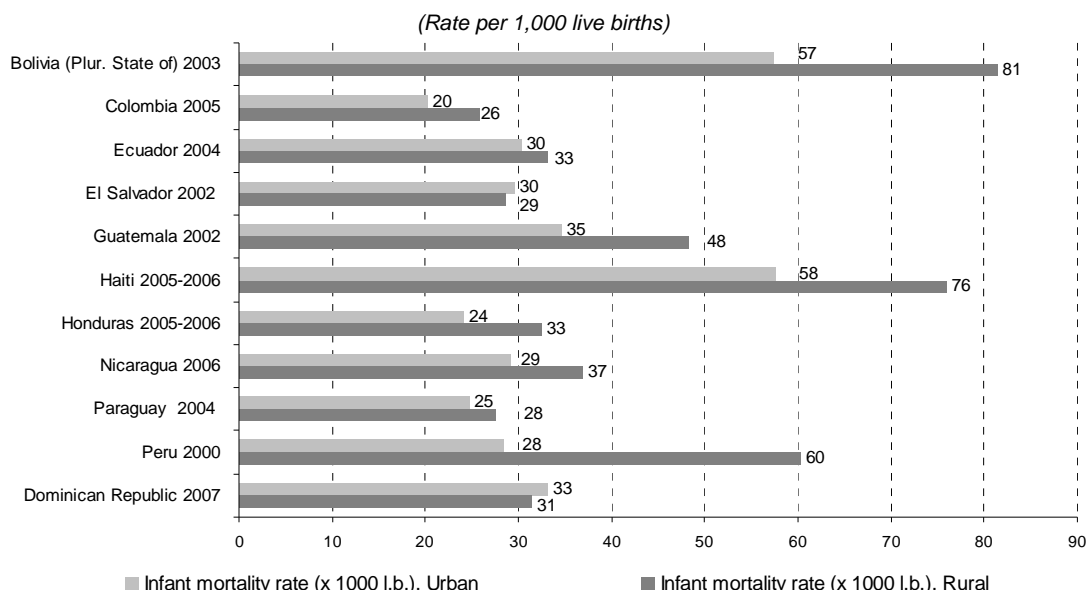


Source: Macro International Inc., 2009. MEASURE DHS STAT compiler.

With regards the economic gap, attention shall have to focus on the growth of intermediate cities presented in the previous chapter. If there are no active land-use planning policies in place to curtail spatial segregation, it is very probable that the pattern of peripheral growth experienced by cities and its aftermath of poverty and deprivation will be replicated in many cases.

In rural households, infant mortality rates can duplicate that of urban households, evidencing access difficulties resulting from geographic factors (see following graph). This is not only caused by the healthcare resources deficit in rural areas (doctors, infrastructure, facilities, etc.), but also because rural household incomes are lower. It is widely known that cities, and especially major cities, concentrate such resources and often force rural populations in need of medical centres to travel long distances with road and public transport infrastructure deficits.

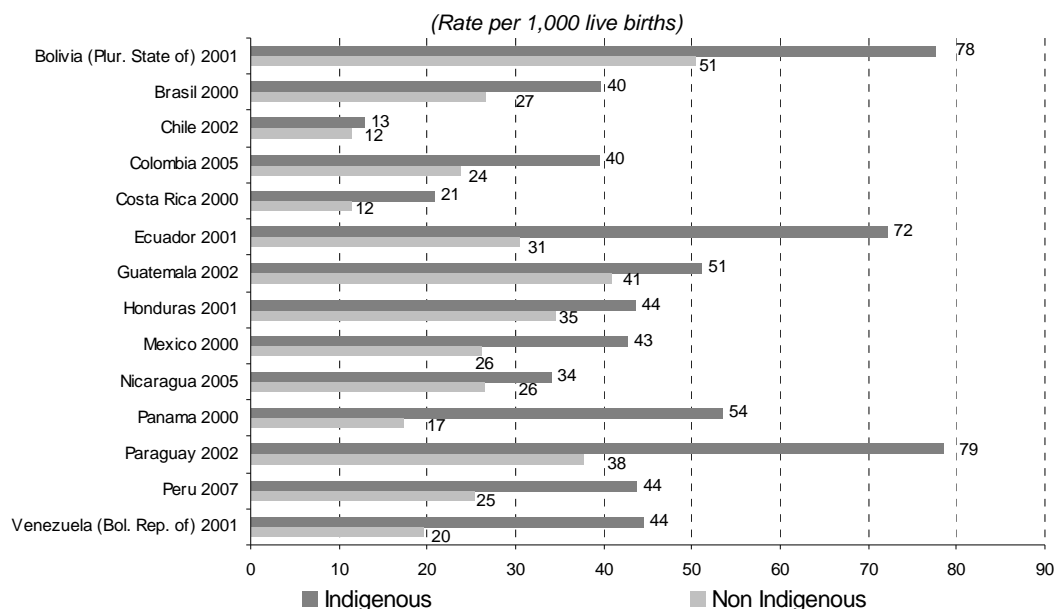
FIGURE 8
LATIN AMERICA AND THE CARIBBEAN (SELECTED COUNTRIES):
INFANT MORTALITY BY AREA OF RESIDENCE



Source: Macro International Inc, 2009. MEASURE DHS STATcompiler.

People’s ethnic origin is an indicator that facilitates study of the effect of cultural barriers on access to health services. The following graph illustrates that in many countries the infant mortality rates of indigenous populations is more than twice that of the non-indigenous population. However, as in the previous case, there is a strong correlation between ethnic origin and income. Consequently, this indicator also incorporates economic gap elements. Likewise, it includes geographic gap elements, since important segments of the indigenous population live in rural areas.

FIGURE 9
LATIN AMERICA AND THE CARIBBEAN (SELECTED COUNTRIES):
INFANT MORTALITY PER ETHNIC ORIGIN

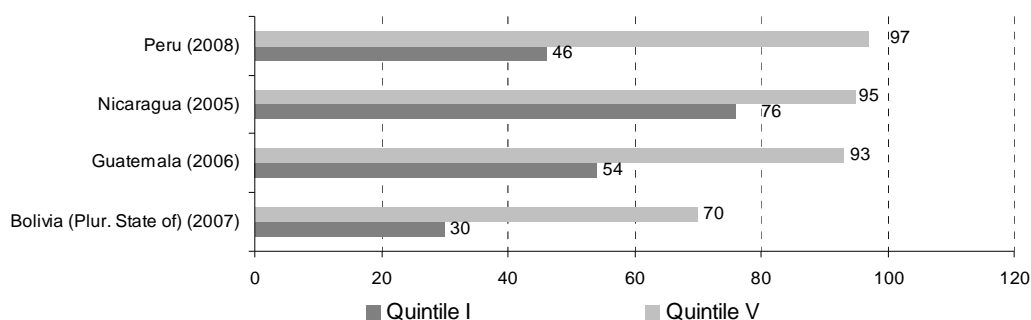


Source: Latin American and Caribbean Demographic Centre (CELADE) – ECLAC Population Division, special processing of census microdata.

2. Access to medical care

Another revealing indicator of this inequality is the prevailing type of care received when medical care is requested. Higher income households (fifth quintile) have greater access to healthcare provided by doctors, while lower income households (first quintile) are mostly attended by paramedics. The following graph shows that lower income populations gain access to medical care that in proportional terms is clearly inferior to that provided to higher income households.

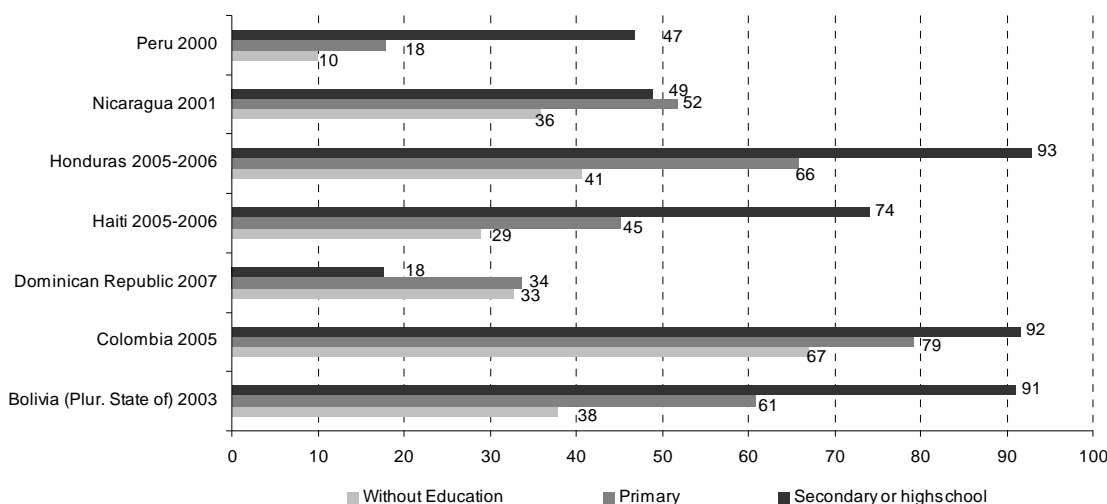
FIGURE 10
LATIN AMERICA (SELECTED COUNTRIES):
ACCESS TO GENERAL MEDICAL CARE BY INCOME LEVEL
(Population percentage of each group)



Source: ECLAC, processing home surveys, 2009.

Likewise, mothers' educational level affects the type of prenatal care received. The following graph shows that the higher the level of education, the greater the probability of access to a doctor for prenatal care. As mentioned in previous cases, education is also a variable that is correlated with income. This data consequently reflects the existing socioeconomic gap in terms of access to better quality medical care.

FIGURE 11
LATIN AMERICA (SELECTED COUNTRIES):
ACCESS TO PRENATAL MEDICAL CARE BY MOTHERS' EDUCATIONAL LEVEL
(Population percentage of each group)



Source: Macro International Inc, 2009. MEASURE DHS STATcompiler.

III. Progress made in the incorporation of ICTs

A. ICTs in health policies and programmes

Incorporation of ICTs in LAC health services is relatively backlogged compared to other sectors such as education and government. However, a boom of public and private initiatives started in the mid-2000s. These were new initiatives or the enhancement and improvement of already existing initiatives.

There is currently a wide variety of projects underway. Among other objectives, these projects aim to provide healthcare in remote areas, connect primary healthcare centres to specialists in more complex centres, obtain timely epidemiological information, train health professionals in distant locations and improve management systems. However, many of these projects are limited in scope, unsustainable and not integrated into health policies or national ICT strategies.

In contrast, over the past decade, in European Union countries, as well as in Australia, Canada and the USA, the incorporation of ICTs to health has become a policy priority and these technologies have consequently been gradually incorporated into health systems.

At an international level, successful experiences in the incorporation of ICTs into public health policies evidence three major approaches: 1) continuity of a State policy with adequate leadership and technical support; 2) a development perspective benefiting from the social integration opportunity at a national and international scale, and 3) public and private efforts incorporating citizen participation.

In European countries,³ ICT projects for health services tend to be ongoing and linked to larger strategies in the health, technology and communications sectors. These ICT projects also tend to make progress in stages. In terms of major phases, the first aspect approached is the development of infrastructure for connection; subsequently, management and the adoption of interoperability standards; and finally, projects that allow for the evolution of information and communication technologies within the health sphere.

Good examples of progress in stages considering the creation of networking infrastructure and services can be found in England, Germany and Spain. One of the oldest national ICT programmes in the global public health sector was developed in 2002 in England⁴ with a 2010 timeframe. The Programme aimed to provide a connection –provision of infrastructure and systems– to the National Health Service (NHS) through information and communication technologies, thus enabling patients to make informed choices while increasing clinical and management efficiency, among others. It also set out to ensure a secure broad band infrastructure network to connect all NHS entities.

In the case of Germany, the electronic health strategy promoted by the Federal Ministry of Health and Social Security, which dates back to 2005, considered the establishment of basic ICT infrastructure⁵ and the implementation of the private electronic patient registry as fundamental spheres of intervention (Stroetmann, 2007).

ICTs appeared in Spain's National Health System back in the early nineties, initially in clinical-administrative applications and subsequently in clinical activity by the mid-nineties. In 2006, Spain passed the Cohesion and Quality Law establishing the National Health System Quality Plan that includes the electronic health strategy. The ICT strategy for health services is therefore part of the National Health System quality strategy. Among other achievements, this led to the establishment of a secure health intranet, certified for the exchange of clinical information among the 17 Autonomous Communities (ACs). Balearic Islands and Valencia ACs are testing access. The first phase of interoperability has therefore been achieved (Carnicero, 2010 and the Ministry of Health and Social Policy, 2009).

ICT applications for health services are a novelty when it comes to public policy in LAC countries. There are some outstanding initiatives within the sphere of policy and strategy definitions, even though these are still at an early stage. Some examples worthy of mention are the current scenarios in Argentina, Colombia, Mexico and Uruguay. In Argentina (2009), we wish to highlight the importance of inter-institutional coordination in the different territorial levels of government, as well as the link between eHealth policies and general ICT policies and strategies. Colombia (2008) developed a clear framework for the promotion and strengthening of eHealth. In Mexico, there is sustained interest over time (since 2001), but with ups and downs in the implementation of its initiatives. In Uruguay (2008), the institutional framework was strengthened in order to develop the digital information society with various legal bodies and a top-notch coordinating agency.

However, the general government level scenario in LAC contrasts with experience at a university level and in the private sector, where the most important efforts to explore the advantages of using ICTs in health services were observed.

³ For additional *information* see Carnicero, Javier and David Rojas (2010).

⁴ Each country in the United Kingdom (England, Scotland, Wales and Northern Ireland) has its own health service administration. They are all public and financed by the National Health Service. In general terms, these offer the same range of services (in essence, only administrative provisions differ). The four services operate independently, but there is close cooperation and collaboration in order to ensure that all citizens receive similar quality of care. In certain border areas, residents in one country seek care in the neighbouring country if this is more convenient for them. The NHS espouses the principle of free health care for all and is financed through general taxes (Jones et al., 2007).

⁵ Applications should be based on this infrastructure without having to bear basic or additional costs. See eHealth Country Report for Germany at www.euser-eu.org/ShowCase.asp?CaseTitleID=569&CaseID=1206&MenuID=109, query date, July 2009.

In Ecuador, where ICTs in health services are absent from public policies, several projects have been developed at a university level in recent years. These projects mainly focus on meeting the needs of rural and deprived⁶ regions and are generally supported by international cooperation funds (Mijares, 2010).

In Colombia, the progressive incorporation of telemedicine has led to the creation and consolidation of ICT programmes in the most important universities - Universidad Nacional, Universidad de Antioquia and Universidad de Caldas, among others. These universities have been working on education, electronic medical records and clinical application programmes for several years. The teaching of remote care for chronic illnesses has gradually become more and more important, together with interactive tools for information exchange between different actors (Vélez, 2010).

On the other hand, the application of ICTs for Panamanian health services started in 1999 with the founding of the Centre for Medical Documentation and Information (CDIM) as part of the Universidad de Panamá Faculty of Medicine. The Centre benefited from the private sector installation of a fibre optic ring in Panama City, enabling ground breaking research in the field of teleneurophysiology. Starting in 2000, Universidad de Panamá took on the responsibility of generating knowledge, teaching and dissemination in this area. Among other agreements, the university signed agreements with the Arizona Telemedicine Program (ATP)⁷ and contributed to the design of the National Telemedicine Programme (Vega, 2010).

In European countries, as well as in Australia, Canada or USA, ICT policies for health services are geared towards optimizing healthcare services by improving accessibility, service quality, cutting costs and improving management. In addition, priority has been assigned to the integration of systems enabling healthcare despite inhabitants' mobility.

European States seek to ensure that modernization of the health system supports the strategic objective of national and European integration. International cooperation initiatives are promoted within this framework. For example, an international cooperation project related to communications networks called the Baltic Health Network enables joint work between Denmark, Norway, Switzerland, Estonia and Lithuania through a closed and secure network. A sample of this cooperation is the implementation of teleradiology between Denmark and Estonia. Radiology reports are produced in Estonia.⁸

An example of equivalent integration at a country level is the National Teleradiology Programme of Panama, which aims to reduce the high concentration of radiologists in the capital city. As part of this programme, digital X-Ray machines have been installed in 12 points interconnected by satellite so that a dedicated team of six radiologists can send and read images in the capital city (Vega, 2010).

In Europe, convergence between countries is favoured by regional leadership. The European Parliament takes the lead in standardizing the use of ICTs for health services, as well as in the identification and dissemination of good practices, among others. The strategic objectives defined by the European Union are adopted –and adapted to their own contexts– by countries in order to develop ICT policies and strategies at a national level. This determines system design type and reliability while conditioning information available, its territorial reach, security levels in accordance with the regulatory framework, protection of investments previously made by institutions (legacy) and the connection of old

⁶ Eight projects can be mentioned 1) Telemedicine for Mobile Surgeries, Universidad del Azuay; 2) Telemedicine Pilot Project for the Santa Elena Peninsula, Escuela Superior Politécnica del Litoral; 3) Telemedicine for Rural Sites, Universidad Tecnológica Equinoccial; 4) Use of Telemedicine in Medical Care, Virtual Network of Health Libraries. A set of projects developed by the Universidad de Cuenca Faculty of Medical Sciences; 5) Rural Telehealth Tutupaly, Universidad Técnica Particular de Loja; 6) Experience of the Teletrauma Centre of FAE and satellite connectivity support, and others, for national projects; 7) SENPLADES telemedicine project, Ministry of Public Health (MSP), Telecommunications and Information Society Ministry, National Telecommunications Secretariat (Senatel) and Universidad Técnica Particular de Loja; 8) Telemedicine network for isolated areas. Collaboration projects between various national institutions and international support that include FUNDAMYF, TELESALUD VENEZUELA, CAF, FUNDAMIGA, FUNDETEL and the Universidad San Francisco de Quito (USFQ) Institute of Telemedicine and eHealth.

⁷ A group that had been awarded the prize for the best telemedicine programme in the United States of America at that time.

⁸ The Danish Health Data Network (2008), which brings together the Danish health sector, at <http://www.sundhed.dk/Fil.ashx?id=7538&ext=pdf&navn=SDSDWoHit.pdf>, visited in September 2009.

and new services for interoperability purposes. This implies the adoption of open standards. A sample of cooperation between European Union member states is the ePSOS project (European patient smart open services), featuring the participation of 12 member states. The project aims to provide safe access between European healthcare systems to patients' health-related information, especially to a basic summarized clinical record and electronic prescriptions (Abad et al., 2009).

However, in the various Latin American and Caribbean integration bodies – Andean Community (CAN), Caribbean Community (CARICOM), Central American Integration System (SICA), Common Market of the South (MERCOSUR), Mesoamerica Integration and Development Project, Bolivarian Alliance for the Peoples of our America (ALBA), Union of South American Nations (UNASUR) and Centre for Latin American and Caribbean Studies (CELAC)–, the issue of ICTs in health is not one of their priorities. This situation was recognized during a recent meeting of the Latin American and Caribbean Economic System (SELA) which confirmed delays in the implementation and development of ICT strategies in public health policies and recommended the promotion of a digital health agenda for the region – including interoperability – and cooperation among LAC countries for the transfer of experiences and the acquisition of technologies.⁹

De Los Ríos (2010), highlights that some of the main difficulties for the implementation of health-related agreements in the region are “the perception of the role of health in integration, simply as a means to control disease and pandemic affecting the free transit of merchandise and people; barriers imposed by national regulations and rules, and the absence of institutionalized mechanisms to standardize regulations with the participation of relevant public health entities, with the sole exception of Mercosur with SGT-11”. She also confirms scarce participation of the health sector in teams created for the study and analysis of investment impacts on social and environmental aspects, and in decision-making related to health infrastructure resources. The latter falls within the context of major investment projects, such as IIRSA and Proyecto Mesoamérica,¹⁰ which seek integration at a physical-territorial, transport, energy and communications level.

Cooperation for the development of ICTs for health services in LAC and Europe, as well as in other parts of the world, not only calls for government efforts, but also government efforts in conjunction with the private sector. Incorporation of the private sector is justified by the value of its research capacity and experience, as well as its development of ICTs and systems based on these technologies. The State spearheads ICT policies and strategies for health services but the private sector has a key role to play in the provision of solutions harnessing their potential.

Good examples of leadership by States are to be found in Europe, in both France and Germany. In 2002, in France,¹¹ the State established the regulatory principles and general policy guidelines emphasizing that ICT implementation must focus on the creation of infrastructure, development and usage of legislative frameworks, as well as the adoption of these new technologies by civil society. The State undertook the task of promoting supply and demand for ICTs, acting upon supply to create confidence, found companies, and foster research and innovation regarding ICTs, and also upon demand in order to disseminate and democratize Internet access, educating and training the French how to use ICTs. In addition to stimulating supply and demand, the French Plan suggested direct intervention by the

⁹ Point 7h of the Conclusions and Recommendations of the Regional Meeting for Health Consultation, Integration and Convergence in Latin America and the Caribbean. Latin American and Caribbean Economic System, Permanent Secretariat, Caracas, Bolivarian Republic of Venezuela: 22-23 July 2010.

¹⁰ Initiative for the Integration of Regional South American Integration (IIRSA) is a plan involving twelve South American governments for the construction and expansion of infrastructure such as highways, ports, power lines, oil pipelines, hydroelectric power plants and telecommunications, among others. Proyecto Mesoamérica represents a top-notch political space for the articulation of cooperation, development and integration efforts between 10 countries (Belize, Colombia, Costa Rica, El Salvador, Guatemala, Honduras, Mexico, Nicaragua, Panama and the Dominican Republic), facilitating the management and execution of projects aiming to improve quality of life for inhabitants in the region (see www.seguimiento-iirsa.org and www.proyectomesoamerica.org).

¹¹ In November 2002, the French Prime Minister, Jean-Pierre Raffarin, presented Plan RE/SO 2007: *Pour une République numérique dans la société de l'information* (For a numerical Republic in the information society). http://www.internet.gouv.fr/informations/information/plan_reso2007/

State in the development of a cultural policy based on the widespread use of ICTs in all government sectors and spheres of social life.

The German strategy regarding ICTs for health services (2003) considered the establishment of a Telematic Health Society aiming to provide the planning, implementing and managing necessary infrastructure services. Single identification of patients was facilitated by creating a Company Coalition Centre to develop a Health Insurance Policyholder Number, safeguard personal data and introduce an electronic health card.¹²

Public-private partnership is one of the approaches and solutions encouraged by the governments that comprise the World Health Assembly –maximum WHO decision-making body– for the provision of ICTs.¹³ The relevance of this approach is also supported by the Commonwealth Business Council.

There are many examples of successful public-private partnerships. In 2006, in Canada,¹⁴ Infoway¹⁵ and the Canadian Standards Association¹⁶ signed an agreement to pursue the creation of standards for ICTs in health services which led to the establishment of an electronic health record (eHR) that is completely interoperable throughout Canada. In Singapore,¹⁷ within the framework of its 2006 Master Plan entitled Intelligent Nation 2015 (in2015), a four-year public and private multi-agency effort was launched to promote the adoption of ICTs in primary healthcare centres and to provide better patient care. By means of ICTs, general practitioners plan the treatment of their patients in a coordinated and integrated manner with other hospitals and less complex healthcare centres, and have made headway towards the creation of an eHR. In India, we wish to highlight an example of south-south cooperation: the Pan-African Health Network. The Indian Ministry for Foreign Affairs, through Telecommunications Consultant India Ltd. (TCIL), is creating telemedicine and distance learning infrastructure via satellite and fibre optics for 53 nations of African Unity. In India, 10 highly-specialized hospitals provide telehealth services to African countries.¹⁸

B. Experiences and applications

The patient's perspective

The key idea underlying ICT applications in health services is people-centred strategies. From this perspective, technologies are mere instruments for resolving the health problems of a diverse and heterogeneous population.¹⁹

The experience of countries that have made the most progress in the implementation of ICT policies in health services highlights the importance of working in close relation with capacities and

¹² See eHealth Country Report for Germany: <http://www.euser-eu.org/ShowCase.asp?CaseTitleID=569&CaseID=1206/&MenuID=109> Query date, July 2009.

¹³ Based on the need to expand public health services and referring to private and non-profit sectors. The association aims to ensure “inclusive access” to health.

¹⁴ www.hc-sc.gc.ca

¹⁵ Canada Health Infoway is an independent non-profit corporation founded in 2001 by the Federal Government of Canada, which seeks to accelerate development and adoption of electronic medical projects throughout the country.

¹⁶ A non-profit association that aims to support trade, industry, government and consumers in the development of standards related to needs such as public security and health.

¹⁷ www.in2015.sg

¹⁸ By 2008, countries where the project had already been implemented were Benin, Botswana, Burkina Faso, Burundi, Cameroon, Djibouti, Egypt, Ethiopia, Gabon, Gambia, Ghana, Malawi, Mauritius, Mozambique, Nigeria, Niger, Rwanda, Senegal, Seychelles and Uganda.

¹⁹ Considering such heterogeneity, it is worth mentioning the idea of cultural relevance, or adaptation to the specific characteristics of groups, according to ethnic origin, gender or age, in ICT applications. This involves elements such as the cosmivision of native peoples and digital literacy. All things considered, this seeks to consider users in such a way as to respect the principle of the right to be different and prevent the widening of access gaps. Although this point has not been discussed in this document, we wish to highlight its importance for future research. For additional information, please refer to the discussion on intercultural health in Alarcón et al. (2004).

abilities of citizens and patients, while improving the health professional training. Although the latter is necessary, it is not yet enough.

One of the interesting elements when it comes to understanding the place of patient perspective in today's healthcare, including electronic health applications, entails the need to improve the cost/effectiveness ratio, leading to increased interest in the subjective aspects of patients' health and quality of life (Sullivan, 2003).

Based on a diagnosis done in Europe, the European Health Telematics Association (EHTEL)²⁰ in conjunction with the European Patient Forum, an international alliance of patient and expert organizations, created the Patient's Chapter for eHealth. This is a document that seeks to empower patient groups and exert influence over the various components of the electronic health system, generating a list of issues to be reported to national authorities, public policies and associated legislation related to this sphere of health. In concrete terms, it suggests using several technologies in order to support consultation processes, increasing the use of e-mail, opening access to medical records and supporting the understanding of contents. The patient must understand the information contained in his/her medical record, be aware of the way it is used and provide his/her explicit consent regarding use of the same. For this purpose, there must be a formal and open record of those that have accessed and/or modified the record.²¹

In this context, the electronic health record (eHR) is viewed as a tool that can lead to increased and enhanced community involvement in their health status. The eHR is a unique source of patient information that aims to provide better and more adequate care in order to attend people's health requirements. Considering the fact that health prevention actions become increasingly relevant as chronic illnesses become more commonplace, there must be patients willing to use this tool, who will therefore be more empowered patients (Pharow, 2008). Within this framework, an informed patient will be responsible and active in looking after his/her own health (Tang et al., 2006).

The existence of an eHR may potentially modify not only the loci, but the property of the information it contains (Sittig, 2002). It is no longer just the doctor who fills in a record with the background information he/she deems relevant, because the information provided by the patient becomes relevant since he/she can decide what data should be included and what data may be hidden. In other words, ownership of information and control of the same is shared by the patient and the healthcare provider.

With regard to the information contained in electronic medical records, a series of concrete initiatives can be mentioned as examples:

- Work is underway in Australia in order to make massive use of electronic medical records.²² In May of this year, it was announced that the biggest revolution in the application of resources to health²³ will take place between 2010 and 2011, allowing citizens to review their on-line electronic medical history and make informed decisions about their health care. Likewise, it was stated that citizens will be able to access healthcare anywhere in the country and directly authorize access to their medical record. In addition, they will be able to control what is added to their record. Together with other measures, the Australian State hopes this will encourage

²⁰ A paper entitled "eHealth for Individuals, Society, and Economy" presented by David Garwood, Secretary of the Patient's Chapter for eHealth, at the 2009 eHealth for Society Conference held in the Czech Republic.

²¹ This is linked to three elements taken from Eysenbach's 2001 definition of e-health: the active participation of patients is needed to lower costs and be more efficient; patients and consumers must be empowered through their access to medical records and knowledge available on the Internet. Finally, a new relationship should be fostered between the patient and the health professional, where decisions are made jointly. Taken from What is e-health? in the Journal of Medical Internet Research, Volume 3, Issue 2, 2001, e20. Consulted at <http://www.jmir.org/2001/2/e20/> 14 July 2010.

²² However, the electronic medical record is not mandatory in order to access medical care. In fact, as of 2012, anyone wishing to do so may register on-line for a personally-controlled e-health registry.

²³ The electronic medical registry system was identified as a national priority by the National Health and Hospital Reform Commission and the National Primary Health Care Strategy draft. It was also supported by the National Preventive Health Strategy.

patient confidence, improve health care, lower expenditure and stop the same mistakes from being repeated in the future.

- Patients were first allowed access to their own eHR in France in 2009. Patients were therefore allowed more participation and made more responsible for self-care, while entitling them to manage the information in their eHR. They are given the right to hide certain data and they authorize professionals to view their eHR.
- The Digital Clinical History System in Spain, to which we have already referred, offers the following functionalities to citizens: access to the set of health-related personal information, registry of access to their data sets and the option of hiding sets of data from the several professionals they normally consult (Etreros et al., 2009).

Security of personal data

Given the confidential nature of healthcare information and the high level of confidence that health professionals attach to reliable records, the physical security of data must be ensured, as well as the privacy of personal data (PAHO, 2003). Likewise, together with citizen demand for more active participation in the management of their eHR (data updating, maintenance, ownership), it is also fundamental that citizens be certain that the system ensures privacy of information (Chhanabhai and Holt, 2007). Consequently, they will have a more positive attitude regarding adoption of this tool.

We wish to highlight that, as is the case with all applications available in information flow networks, electronic records run the risk of intentional and unintentional privacy invasion. These situations require technical and ethical safeguards. From a patient standpoint, and also in terms of adequate provision of services, both types of threats are important.

Security objectives of clinical information are: availability (access to and use of information whenever necessary); identification and authentication (identification of the professional and the patient, as well as systems, services and computers); authorization (determining who can access what and for what purpose, establishing profiles, roles and privileges for each possible user); integrity (actions to prevent information from being transformed during storage or transport of the same); non-rejection (a procedure to ensure that no party is able to deny its participation in the transaction); audit and traceability (the possibility of tracing user access to information, transactions and their circumstances). All these objectives shall be achieved regardless of whether the information is in electronic format or in conventional paper files. However, it is clearly far easier to achieve these objectives using electronic systems such as digital certificates and signatures, among others. It must be highlighted that organization measures are far more important than electronic mechanisms (Garbayo, 2003).

New rules and resources were introduced this year in the United States²⁴ in order to enhance privacy of health related information and thus help citizens to become aware of their rights and safeguard their personal health data. This initiative is spearheaded by the Office of the National Coordinator of ICTs in health (ONC) and the Civil Rights Office of the Ministry of Health (OCR). It seeks to ensure that the expansion of ICTs in health services does not undermine citizens' confidence that their health-related information will be protected and secure.²⁵ Thanks to the Health Information Technology for Economic and Clinical Health (HITECH updated in 2009), privacy and security regulation presently in force in the USA will now include a wider range of individual rights and tighter protection of data handling by identifiable third parties.

²⁴ U.S. Department on Human and Health Services (HHS) <http://www.hhs.gov/news/press/2010pres/07/20100708c.html>.

²⁵ Health information in the USA is protected by a federal law, the *Privacy Rule*. Its first project was presented in 1999. 2010 amendments are listed as follows: 1) expansion of individuals' right to access their information and to restrict certain types of dissemination of health information protected by health coverage plans; 2) members of entities covered by the HIPAA 2006 (*Health Insurance Portability and Accountability*) are required to comply with the same regulations of the entities that are covered; 3) new limitations are imposed on the use and dissemination of protected health information for marketing and fund raising purposes, and 4) the sale of protected health information without the patient's authorization is strictly forbidden.

At a European level, the European Guideline for data protection is the reference text for personal data protection matters. It establishes a regulatory framework aimed at striking a balance between closely protecting people's private lives and the free circulation of personal data within the European Union (EU). For this purpose, the Guideline sets stringent limits on the collection and use of personal data, requesting the creation -in each member State- of an independent national entity responsible for the protection of such data. This Guideline considers health-related information as a special treatment category (European Parliament and Council, 1995).

In Spain, the basic regulatory Law on patient autonomy, rights and obligations in clinical information matters establishes the validity of electronic health records. This regulation, and the Organic Law for the protection of personal data, which is the transposition of the European guideline, make up part of the regulatory framework for electronic health records (Andérez, 2003).

It is also possible to find examples of the importance of regulations in LAC. Among these, we wish to highlight the cases of Mexico and Uruguay. The Official Mexican Standard (NOM) dealing with clinical records dates back to 1999 and changed after the use of electronic means for the storage of health-related information was recognized as something completely auxiliary. Autonomous use of the same was authorized in 2003 and privacy issues were incorporated. A draft regulation on privacy was published in 2010, promoting amendments of article 16 of the Political Constitution regarding privacy and people's right to protect their personal data (Gertrudis, 2010).

Since 2008, a set of regulations have been introduced in Uruguay that will promote progress in areas such as government, health, education and trade. With an approach based on the protection of rights, the following laws and organizations have been incorporated into the legal framework, among others: 1) the Personal Data Protection and "Habeas Data" Law; 2) The Law on Access to Public Information, and 3) the Citizens Rights Directorate. In addition, we can also mention the creation of the National IT Security Incidents Response Centre; regulation via decree for the adoption of an IT security policy by public entities: recognition of admissibility, validity and legal efficacy of the electronic document and electronic signature, and the creation of the Electronic Certification Unit as a control entity (Margolis et al., 2010).

1. Clinical-administrative systems

ICTs were introduced into the health system through certain medical equipment (the best example is computerized axial tomography) and management services. Hospital managers started with the development of IT programmes for economic and financial management services, such as accounting, invoicing or payroll. Applications were subsequently developed for clinical-administrative services, such as hospital bed management, outpatient consultations or management of the clinical record archive. All of this, together with the patient master file and surgical block management forms part of what became known as a HIS (hospital information system). These applications were followed by coding programmes for the patient classification system. The next step was the introduction of IT in clinical records (Carnicero, 2004). Primary health care went through a similar process. The introduction of ICTs in clinical-administrative systems evidenced the importance of patient identification as one of the prerequisites for electronic health records.

This process took place in several countries besides Spain. For example, Germany has moved away from patient administration systems focusing on economic optimization, payment, and patient reimbursement systems that were generally privately managed, seeking new instruments based on clinical documents that entail new connection demands to the public and private sectors. This situation is similar to that of LAC countries. In Costa Rica, most ICTs are related to health system management (Cortés, 2010). In Mexico, ICT applications initially focused on administrative management, in Federal State national state services, the private sector and social security (Gertrudis, 2010).

2. Unique patient identification

The exchange of electronic information demands certainty in the identity of patients, the health professional producing such information and the health centre where this is done. Consequently, the implementation of unique health identifiers is a condition for the establishment of ICT policies and applications in the sector. When the objective is to maintain a single or unified system,²⁶ it is important to have an exclusive and straightforward identification system for people that, among other factors, enables a link to be established between the eHR and a single patient. Indeed, the absence of such a system is an obstacle for the use of electronic health records.

International experience also confirms how important this instrument is for improving healthcare quality. For example, both in New Zealand²⁷ and in the USA it has been acknowledged that the unique patient identifier has been able to reduce medical errors, improve the efficiency of the system and patient confidence, while protecting their privacy.

The use of a unique patient identifier implies having the necessary safeguards in place to avoid identification errors between persons, thus preventing mistakes in diagnosis and medication that could have fatal consequences. For this reason, an intelligent card has been created in some European countries²⁸ and in the USA. Among other features, this card stores a photograph of the citizen and his/her medical record. In addition, Backhouse and Dyer (2007) state that in order to achieve interoperability of patient identifiers, a healthy balance must be struck between the need to exchange data and the prevention of threats against privacy and security.

As a fundamental requirement for the operation of the eHR, the 17 Autonomous Communities in Spain have developed procedures to ensure the correct identification of patients. Consequently, a national database of health cards has been created, linked to the National Health System Quality Plan that receives information from the data bases belonging to the 17 health care services (Carnicero, 2010).

As part of the development of the eHR, Australia expects all its citizens to have an individual health care identifier²⁹ by the end of 2010. In strategic terms, this will initially focus on certain vulnerable groups,³⁰ and then encompass the whole population.

3. Remote medical appointments

For remote medical appointments, patients select and register the dates and times of doctor's appointments from an Internet portal. Many European countries have developed this system. For example, patients and citizens can get information and communicate with the health system by accessing the Danish portal www.sundhed.dk. In Spain, the widespread use of this system has been relatively successful in primary care. This was initially supported by a call centre, and recently by means of the Internet (Carnicero, 2010).

In 2004, the UK introduced a national electronic reference system enabling patients to choose the place, date and time of their first appointments in hospitals or clinics.³¹ Whenever a doctor feels that a patient requires an appointment with a specialist, the health system shows which hospitals and clinics are available to provide treatment. The doctor discusses the appropriate clinical options for treating the problem with the patient. Finally, the patient chooses where and when he/she wishes to receive care, in accordance with the medical recommendations received and uses his/her unique registration number to

²⁶ In terms of being grouped together, related.

²⁷ A patient identification system was introduced in New Zealand in 1992 (National Health Index), presently covering 95% of the population.

²⁸ In England, the unique patient or citizen identifier is called the NHS number. Spain calls it "Tarjeta de Sanitaria".

²⁹ This indicates that the eHR shall have a 16-digit number and will store name, address and date of birth.

³⁰ Chronic and complex patients, the elderly, indigenous Australians, mothers and newborn babies.

³¹ *Personal appointment book or Choose and book*. See Internet portal NHS Connecting for Health: <http://www.chooseandbook.nhs.uk/>, query date, August 2009.

choose from among the list of hospital and clinic options. The doctor then enters a password and processes the appointment request in the system.

4. Electronic Health Record (eHR)

Due to its usefulness in clinical and administrative processes, its quality and security, and its potential to accumulate information for health research, the electronic health record (eHR) is one of the main ICT applications, even though it is probably one of the most difficult to implement. The eHR entails introducing ICTs at the very heart of health-related activities, such as recording the relationship between the patient and his/her doctors and other health professionals who provide care. The concept of health record changes after the introduction of IT. It evolves from a record of a patient's process or processes linked to a professional or medical centre and goes on to become the person's record of all health-related information that make up part of an integrated information system (Carnicero, 2004).

For some years now, several developed countries have been incorporating eHRs into public health systems, evidencing that an extremely sensitive area is interoperability; i.e. the use of standards to share information.

Canada is a successful example. As already stated, the country features an eHR that is interoperable throughout its territory. Spain has also experienced widespread and successful implementation³² of the eHR with coverage approaching 100% in primary care. Its functionalities include the prescription of medicines and supplementary exams, and the initial appointment with the specialist, among others. Some communities have also introduced systems with electronic prescriptions. In hospitals, the situation is heterogeneous. All hospitals built over the past five years feature an eHR system and are therefore known as "paperless hospitals". In older hospitals, implementation has been far more difficult in view of the complexity associated to change management. To date, some 300 million Euros have been invested in this process. Approximately half of this investment has been financed by the State, while the other half was financed by Autonomous Communities (Carnicero, 2010). Special attention must be paid to the system in Spain because the National Health System (SNS) is an organization where service management decisions are strongly decentralized in the Health Services of Autonomous Communities. The existence of different systems for the management of individual health records in each community poses a challenge to interoperability. Movement of citizens throughout the country means that essential information about the individual's health be accessible to any health professional whenever citizens require healthcare at any SNS centre. The Electronic Health Record System of the National Health Service offers a solution to this challenge, expanding the accessibility of information beyond the geographic borders of each Autonomous Community (Etreros et al., 2009). As previously stated, this system is already operating in two ACs.

In 2004, France designed a project to produce a tool, called Dossier Médical Personnel (DMP),³³ to improve the registration patient information. However, due to its overambitious objectives, short deadlines, absence of strategies for dealing with resistance to change by health professionals, insufficient technical and administrative means, and lack of budget definitions, the project had still not been implemented by 2008 (Ministère de la Santé et des Sports, 2008). The project consequently had to be reformulated, and a DMP recovery programme was published in April 2009.

There have been valuable experiences in this field in LAC but these have not yet been consolidated. As is the case throughout the rest of the world, the biggest challenges for countries in the region are related to legislation, standards, interoperability and financing issues.

In Mexico, the Ministry of Health started to develop an eHR in 2007, under a Mexican interoperability standard. The eHR was scheduled to take place in six phases between 2007 and 2012.

³² One of the success factors is that the first electronic clinical history developments date back to the mid-nineties when primary healthcare doctors played a central role (Carnicero, 2010).

³³ Promoted by Law 2004-810 dated August 13, 2004 related to Health Insurance.

Likewise, local initiatives are underway in Chiapas, Yucatán and Nuevo León. In 2008, the Belize Health Information System was launched, providing nationwide access with computerized and centralized medical records. The Bolivarian Republic of Venezuela developed a standardized health record³⁴ using free software platforms that coexist with a series of private electronic medical records, as well as other public institutions³⁵ (Silva, 2010). Argentina is probably the country in the region with the most experience and international recognition in this field. Noteworthy examples are the work of Hospital Italiano in Buenos Aires, and the interconnection between the 43 hospitals managed by the Ministry of Health of the city of Buenos Aires.

5. Electronic prescriptions

The electronic prescription is a relatively new tool that is presently in its first application stage in developed countries. This application creates a link between the patient, the doctor issuing the prescription and the pharmacy filling the prescription. In addition, this can potentially improve medication quality, cost and safety for patients, while also improving medication consumption control. The electronic prescription is the information system that links the doctor to the pharmacy and –in turn– the pharmacy with the entity paying for the benefit, which is often the health service. The electronic prescription is an example of how a person's health information is shared by various entities involved in the provision of care in different health centres and even under different management centres (Carnicero, 2009).

In Germany, the 2007 national strategy for ICTs in health, prioritized the electronic prescription and deemed that the same would become mandatory for citizens in the future. In 2009, England considered this to be an instrument that will provide the possibility of sending electronic prescriptions to pharmacies chosen by patients in the near future.³⁶ In Spain, the electronic prescription system has been widely introduced in some communities, such as Andalusia and the Balearic Islands, while other communities are currently in a pilot test phase (Carnicero, 2010). By November 2008, in Andalusia, the electronic prescription system was already benefiting 93% of the population (only small locations did not have access to the same). 670 health centres and 3526 pharmacies operated with this model, and it was being used by a total of 5282 family doctors (Peinado, 2008).

Trinidad and Tobago implemented a system of free medication for its 40,000 chronic patients. Each patient in the programme receives an intelligent card granting access to the network of 115 private pharmacies that supply medication. Pharmacies process the prescription and save the dosage prescribed. The amount of medication supplied is checked on-line, comparing the amount of medication supplied with the amount authorized in the period. Once the transaction is closed, the information is transmitted to a central database (NIPDEC-Infotech) where the stock level of drugs is checked in each pharmacy and at a central level (Sandor, 2010).

6. Telemedicine

In Europe, most telemedicine applications are still considered to be at an experimental stage. In 2008, French health authorities stated³⁷ that despite heavy public investment during the 2000s, there were still no conclusive evaluations of those applications. In many applications there are no formal protocols, for example regarding the transfer of images, and there are no clear agreements between establishments that provide telemedicine services and those requiring these services; no quality assessment systems for services, etc. The absence of an institutional framework means that programme continuity rests on the

³⁴ National Public Health System for Social Inclusion (SINAPSIS).

³⁵ As an example, we wish to highlight the National Armed Forces Health System (SANOS).

³⁶ *The Electronic Prescription Service (EPS)*. Internet Portal: NHS Connecting for Health: http://www.connectingforhealth.nhs.uk/systemsandservices/eps_query date, 13 August 2009

³⁷ Ministère de la Santé et des Sports, Direction de l'Hospitalisation et de l'Organisation des Soins, Rapport: La place de la télémédecine dans l'organisation des soins, November 2008.

shoulders of those performing telemedicine applications. If these fail to promote this practice, there is nothing to ensure any continuity of the same.

Over the past five years, Spain has made substantial progress in the field of medical imaging, especially in the use of RIS (Radiology Information Systems) and PACS (Picture Archiving and Communications Systems). There is also widespread use of clinical analysis laboratory systems, primarily due to underlying commercial interests. However, according to Carnicero (2010), telemedicine projects are mostly at a pilot stage and have not been disseminated at a massive scale.³⁸ There are teledermatology projects in the Balearic and Canary Islands where telepathology (pathologic anatomy), image transfer, Teleictus projects, etc. have also been developed. Other experiences that are beginning to expand in some communities are networks of image-based diagnosis services (for example, in Madrid and Catalonia).

Notwithstanding the economic feasibility and the proven positive impact on the provision of health services, telemedicine services in Germany have not been disseminated at a massive scale. The integrated care of chronic diseases (diabetes and heart) was launched in 2004, in some regions of the country, within the context of special insurance programme funds.

Benefits associated to telemedicine in Europe are primarily associated to the treatment of chronic diseases and the work of doctors in the network. For example, the digital radiology system of hospitals in the Madrid Community in Spain, which enables the existence of a single virtual radiology service for various hospitals. As a counterpart to the European situation, in Canada “ the geographic distance separating citizens from medical centres, creates an ideal environment for the use of telemedicine”.³⁹ In Canada, in general terms, the main results of their evaluation of programmes show positive effects. These include the improved and immediate access of specialists (timely referral of patients), which leads to better management of hospital beds; less waiting time between the posting of images and report reception; fewer losses of images and medical examination files; and a positive impact by reducing plastic residues and contaminants associated to image laboratories.⁴⁰

In Canada, pilot programmes have led to the design and execution of long-term policies. Thus, through the Canada Health Infoway, an investment programme was created for telemedicine⁴¹ in 2001, (still operating to date) that supports health projects in various jurisdictions. Investments are made in programmes that increase and expand the coverage of telemedicine solutions in northern, rural and remote communities, as well as in native communities (First Nations and Inuit), and provide innovating telemedicine solutions (telepathology, teleophthalmology, teleoncology, telecardiology, etc.) and home care to patients suffering chronic diseases.

Despite the novelty of telemedicine in the world, LAC countries have interesting experiences in this field. As an example, we wish to highlight the experiences of Hospital Garrahan and Instituto Oftalmológico Zaldívar in Argentina, among many others. The programme at Hospital Garrahan is presently in its third stage of development. The hospital has provided cross-consultation services via e-mail for the past 12 years and is now making progress towards the implementation of a telemedicine

³⁸ During the last National Health System Quality Awards, special recognition was made of the Remote Control System for Heart Patients at the Madrid Clinical Hospital.

³⁹ Quote from the Telemedicine in Emergency. Paper. American College of Emergency Physicians. Available at <http://www.acep.org/WorkArea/DownloadAsset.aspx?id=8988>.

⁴⁰ Among the telemedicine projects implemented by the Canadian Ministry of Health we wish to highlight two that have been evaluated. Between 1998 and 2001, the *National First Nations Telehealth Research Project* was implemented in First Nations communities (Anahim Lake in British Columbia, Fort Chipewyan in Alberta, Southend in Saskatchewan, Berens River in Manitoba and La Romaine in Quebec) aimed at face-to-face consultations in real time with specialists in urban medical centres, as well as complex medical care on-line using available technology - otorhinolaryngology, ophthalmology and cardiology, etc. In 2003, the *Central British Columbia-Yukon Telemedicine Initiative* was launched in order to enable the fast transmission of X-Ray images between 10 rural hospitals and distant health care centre and expert radiologists in reference hospitals in *British Columbia*. http://www.hc-sc.gc.ca/fnihah-spnia/pubs/services/_ehealth-esante/2001_tele-rpt/index-eng.php and http://www.hc-sc.gc.ca/hcss/pubs/chipp-ppics/2003-bcb-yk-tele/bcbyktele_intro-eng.php.

⁴¹ Available in <http://www.infoway-inforoute.ca/lang-en/about-infoway/approach/investment-programs/telehealth>.

programme that will provide support to health centres in provinces with highly complex consultations. The project at Instituto Zaldívar provides virtual consultations: store-and-forward and in real time (Oliveri, 2010).

In Jamaica, telemedicine projects have been developed since 1997. According to the Development and Research Unit of the University of the West Indies (UWI), telemedicine is being used in an increasing number of medical specialities, such as dermatology, oncology, psychiatry and home medical services (Sandor, 2010). In Costa Rica, telemedicine geared towards specialized consultation and emergencies has existed for nearly a decade. Cross-consultation is used in few cases and in response to wishes of the respective parties (Cortés, 2010). In Panama, emphasis has been placed on telemedicine in rural areas and in prisons. With regard to specialities, teleradiology is relevant in view of the problem of scarcity and concentration of specialists in Panama's capital city. In the Bolivarian Republic of Venezuela, an interesting effort is underway in order to bridge the technological gap. For this purpose, the National Technological Innovation Centre (CENIT) was created in 2005. Some of the most outstanding projects are the Digital Hospital, intelligent operating rooms and the equipment Medicarro. All these projects use wireless access.

Lastly, in view of its size and sustainability, we wish to highlight the University Telemedicine Network (RUTE) in Brazil as one of the good examples in the region. RUTE is an initiative promoted by the Brazilian Ministry of Science and Technology (MCT), coordinated by the National Network for teaching and research (RNP) and involves university hospitals in all States and primary care centres in ten States. The initiative supports the improvement of infrastructure for telemedicine, education and research, and promotes the integration of projects among institutions in this Network and in the healthcare network, sharing medical records, consultations, exams and second opinions. It currently connects 57 teaching university hospitals, and by 2012 plans to encompass 132 hospital centres, including the federal department for native peoples' health.

The national teaching and research network has been operating since 1991 and presently includes more than 400 institutions, representing approximately one million users. The 57 hospitals in RUTE have a solid infrastructure: 1) 1 Gbps connection in cities with Redecomep; 2) formal existence of the Telemedicine and Telehealth nucleus; 3) a suitable videoconference, teleconsultation and telediagnosis room; 4) a standardized videoconference room; 5) personnel trained in ICTs and videoconferencing, and 6) specific interests groups created and functioning (Coury et al., 2010).

Some of the biggest difficulties faced by the development of telemedicine are ethical and related to legal aspects associated to implementation of the same. For example, in France these aspects are essentially considered to safeguard the personal relationship between patients and doctors, professional secrecy, equal access, quality and safe care, and the reliability of technological devices (Ministère de la Santé et des Sports, 2008). Despite this consensus, there is still legal uncertainty in France regarding the practice of telemedicine, and this is one of the most urgent aspects that need to be developed in order to make significant progress.

In LAC, one example of the difficulties faced by the exercise of telemedicine is found in Colombia. In 2006, the Ministry of Social Protection adopted a resolution regulating the provision or rendering of health services through telemedicine. Since then, the resolution has been put to the test and challenged regarding a whole series of aspects related to positions (status), roles and responsibilities of health professionals, patients and/or patient associations, among others (Vélez, 2010).

IV. Policy and strategy guidelines⁴²

Based on three central elements, we are able to make a summarized description of the main challenges faced by the health sector in the region:

- First; there is an immediate and urgent challenge regarding limited access to health services for large segments of the population. By means of certain indicators, we have accounted for huge differences linked to income, education, place of residence and ethnic origin.
- Second; epidemiological profiles come up and demand the simultaneous implementation of health strategies to face both communicable and non-communicable diseases. This is partly due to the failure to respond to inequalities in a timely manner, and partly due to demographic transformations. Non-communicable diseases increase steadily as the population ages.
- Third; this occurs within a framework of insufficient human and financial resources, unmet basic health needs, and a prospect of tremendous pressure on public health expenditure.

The progress described for several regions around the world illustrates the multiple potential of ICTs for meeting these challenges, despite the early stages of such progress.

⁴² This chapter reflects on the contributions made by the eLAC Regional Mechanism Working Group on Health presented at the workshop "Taller Seguimiento y análisis de políticas y metas regionales de salud electrónica y telemedicina", held in November 30 and December 1, 2009 at the ECLAC offices in Santiago, Chile.

It seems that it is no longer possible to offer long-term solutions without including these technologies. Thus, the dilemma becomes finding the best alternatives for providing better health care, optimizing processes and cutting costs, incorporating these tools into public health policies and strategies in each country.

In order to further advance in this same direction, we propose a sectorial strategy in each country, necessarily articulated with the more general “digital agenda”. This means that health authorities must participate in ICT policy decisions made by other government entities, or promote them if these do not exist or are insufficient.

On the other hand, we wish to highlight that we do not intend to draw up an electronic public health policy, but rather to specify the use of IT in health policies and outline the way in which ICTs are able to contribute to the solution of problems and challenges within health systems in each country. ICTs are a tool that certainly transforms the way in which health care is delivered, but these must still be defined as a means and not an end in themselves. The ICT strategy for health services must be always integrated to the general health system strategy because it is a fundamental instrument for reaching these objectives.

Likewise, given the fact that the use of these technologies makes a significant contribution to improving management by incorporating increasing degrees of efficiency, a more systemic approach will be required in order to integrate these into management policies, especially in areas that are fundamental for the achievement of public health objectives and goals.

The guidelines presented below must be considered guiding criteria to be adapted by sectorial authorities to the specific needs of each country, based on the challenges linked to inequalities and demographic and epidemiological transitions, the availability of resources, and the level of progress achieved in the incorporation of ICTs to government and the various sectors of the economy.

1. Institutional framework and infrastructure

The decision to invest in an ICT strategy will largely depend on sectorial leadership and its capacity to involve a wide variety of actors. These transformations require extensive consensus to legitimate the will to change, as well as different sectors (study centres, universities and private companies) featuring accumulated knowledge and relevant practices as the result of often longer and more intensive experience compared to the public sector.

At the same time, in order to better support decision making, trained professional teams are required to link medical, public health and ICT know-how. Due to the current lack of specialists in LAC, this could be a very productive field for south-south cooperation.

The scope of the effort and investment required means that special attention must be paid from the very onset to the institutional framework within which the process will be developed. This framework should consider the following spheres of competency: definition of priorities and development of plans; generation and/or recommendation of rules; coordination of the various working groups; and project monitoring and evaluation. Strategy sustainability will largely depend on the creation of technical teams capable of acting as counterparts for the implementation of projects and their subsequent deployment at a massive scale.

One of the first concerns of these technical teams, which will be strengthened as a result of the institutional framework and as the strategy is implemented, should be to ensure the availability of infrastructure and services for networking, ideally through a health intranet in order to support the applications previously defined in the plans. Based on the aforementioned competencies, an additional priority should also be the definition of regulations and standards in order to guarantee interoperability.

This institutional framework is also related to the need for a legal framework that contributes to the promotion of electronic health applications. This basically means providing security for the various actors in the system. This initially implies providing security for patients in terms of data privacy and legal support for health actions used by ICTs. Legislation is also required with regard to patients' access

to their own data. These considerations play an important role in a process where resistance to change –technological and cultural in nature– is overcome by reducing levels of uncertainty and risk.

Finally, in this first sphere of guidelines, and in order to guarantee the safety and quality of both healthcare and administrative procedures, there is a need to generate a unique patient identifier system. Some countries in LAC already possess a single identification for citizens that may be used as a health registry: however, an exclusive “health card” type of system has been suggested in order to ensure greater confidentiality and privacy.

2. Integral information management

The improvement of management, greater efficiency and better quality health care are closely linked to the possibility of integrated management of administrative, clinical and health information.

To the extent that an important part of the clinical or administrative data managed refers to the patient, this line of action considers the electronic health record to be a central component, which is fundamental for improving the quality of care.

Even if it is possible to make initial headway in the development of modules for the management of certain specific processes, such as logistics processes linked to infrastructure, equipment, inputs or invoicing processes, data will only be effectively integrated following incorporation of the eHR

The assurance of interoperability (technical, semantic and operative) in order to enable the exchange of data and knowledge within the health system helps to resolve its fragmentation and to facilitate safe care everywhere and at all times.

3. Implementation of telemedicine applications

This third line of action is directly related to providing healthcare to the population that faces difficulties in access to such care due to the aforementioned factors.

Implementation of these applications requires connectivity between the different levels of healthcare. Availability of such healthcare should have been assured through actions undertaken during the first line of this strategy.

Specific types of applications (teleradiology, telemonitoring, teledermatology, etc.) to be implemented will depend on the priorities established by population requirements, as well as specific progress made by countries in this respect.

The optimization and reallocation of human resources will be an important aspect that must be taken into consideration.

4. Education, training and information

This fourth line of action aims to meet the requirements of health teams on the one hand and of patients and the general community on the other.

With regard to health teams, this line of action aims to provide eLearning for updating knowledge and healthcare protocols, which is directly linked to improving quality.

With regard to patients and the community, it aims to provide information regarding self care and the encouragement of healthy lifestyles that will become increasingly relevant as chronic-degenerative illnesses become more commonplace.

The cornerstone of the knowledge society is human capital. For this reason, the appropriate development of ICTs for health and the efficient harnessing of their potential depend on the availability and quality of human resources.

This entails appropriate staffing with properly trained and experienced personnel in each position and at each level. This means enhancing professionalization of ICTs for health services by means of specific undergraduate and graduate education, as well as in-service training. On the other hand, knowledge regarding ICTs for health services must necessarily be regarded as a fundamental component of the personal capabilities of all actors in the sphere of health care. Consequently, users need to be trained and educated in order to ensure efficient use of digital tools by health professionals, managers and the general population.

V. Conclusion

ICTs are a powerful tool for reducing inequalities and accelerating progress for the achievement of health goals. However, this necessarily requires decisive leadership by leading health authorities and the participation of the several actors involved in a common agenda promoted by State policy. This is the way to coherently and systematically advance towards the development of infrastructure and connectivity based on validated and interoperable systems for health education, prevention of diseases, medical care and service management.

Likewise, digital literacy of the population is a fundamental need in order to reap the full potential of ICTs in health services. As shown, the role of patients and citizens becomes increasingly important in health strategies and even more so with the incorporation of ICTs, as long as people are able to access these, know how to use them and use them in a meaningful manner.

Since ICTs have a strong impact on production, education and health sectors, among others, access to and use of these technologies provides new employment opportunities, as well as social interaction and integration. ICTs are called upon to support economic and social development for countries in the region, contributing across the board to the achievement of the Millennium Development Goals and to the overcoming of poverty and inequalities (CEPAL, 2010a). Despite this potential, timely and adequate implementation of ICTs in health services becomes urgent in order to prevent the risk of widening gaps even further.

Bibliography

- Abad, Iciar et al. (2009), Algunas consideraciones sobre seguridad de la información en el proyecto europeo de historia clínica digital (proyecto epSOS). *Derecho y salud*. Vol. 18. January-June: 87-99.
- Alarcón, Ana María et al. (2004), Política de Salud Intercultural: Perspectiva de usuarios mapuches y equipos de salud en la IX región, Chile. *Revista Médica de Chile*, 132 (9).
- Álvarez, Richard (2002), The promise of e-Health – a Canadian perspective. *E-health International*, I:4, Canada. Canadian Institute for Health Information.
- Andérez, Alberto (2003), Aspectos legales de la historia clínica informatizada. En: Carnicero (coordinador), Informe SEIS. De la historia clínica a la historia de salud electrónica. Madrid, España. SEIS.
- Arriagada, Irma, Verónica Aranda and Francisca Miranda (2005), Políticas y programas de salud en América Latina. Problemas y propuestas, Serie Políticas Sociales, Santiago, Chile. United Nations Publication.
- Carnicero, Javier (2010), Experiencia española en sanidad electrónica. Fernández, Andrés y Oviedo, Enrique (eds.), *Salud electrónica en América Latina y el Caribe: avances y desafíos*, Santiago de Chile, Economic Commission for Latin America and the Caribbean (ECLAC), unpublished.
- Carnicero, Javier and David Rojas (2010), Aplicación de las tecnologías de la información y las comunicaciones en los sistemas de salud de Bélgica, Dinamarca, España, Reino Unido y Suecia. Serie Políticas Sociales, Santiago, Chile. United Nations Publication

- ____(2009) Protección de datos y receta electrónica. En Cáliz, Rafael, Roberto Cantero, Javier Carnicero, Javier Etreros, David Larios, Rafael Millán et al.. El derecho a la protección de datos en la historia clínica y la receta electrónica. Thomson Aranzadi.
- ____(2004) La historia clínica informatizada. En: León, Pilar (Ed). La implantación de los derechos del paciente. EUNSA: Pamplona (España).
- ____(2003), Informe SEIS. De la historia clínica a la historia de salud electrónica. Madrid, España. SEIS.
- ECLAC (Economic Commission for Latin American and the Caribbean) (2010a), Documento de Síntesis El progreso de América Latina y el Caribe hacia los Objetivos de Desarrollo del Milenio. Desafíos para lograrlo con igualdad. United Nations Publication.
- ____(2010b), Población y salud en América Latina y el Caribe: retos pendientes y nuevos desafíos. Santiago, Chile. United Nations Publication.
- ____(2008), Transformaciones demográficas y su influencia en el desarrollo de América Latina y el Caribe, Trigésimo segundo período de sesiones de la CEPAL, Santo Domingo, República Dominicana.
- ____(2007), Panorama social de América Latina. (LC/G.2351-P), Santiago, Chile. United Nations Publication.
- ____(2006), Modelo de análisis del impacto social y económico de la desnutrición infantil en América Latina, Santiago, Chile, Serie Manuales. United Nations Publication.
- ____(2004a), América Latina y el Caribe: estimaciones y proyecciones de población 1950-2050, Boletín demográfico, No.73, Santiago, Chile. United Nations Publication.
- ____(2004b), Panorama Social de América Latina, Edición 2004 (LC/G.2259-P), Santiago, Chile, March. United Nations Publication.
- ____(1998), Ciudades intermedias de América Latina y el Caribe: Propuestas para la Gestión Urbana, Santiago, Chile.
- Chackiel, Juan (2004), La dinámica demográfica en América Latina, serie Población y desarrollo, N 52 (LC/L.2127-P), Santiago, Chile, Economic Commission for Latin America and the Caribbean (ECLAC), May.
- Chhanabhai, Prajesh and Alec Holt (2007), Consumers are ready to accept the transition to online and electronic records if they can be assured of the security measures. *Medscape General Medicine*, 9 (1), 8.
- Comisión de las comunidades europeas (2008), COM 689, La telemedicina en beneficio de los pacientes, los sistemas sanitarios y la sociedad. Comunicación de la Comisión al Consejo, al Parlamento Europeo, al Comité Económico y Social y al Comité de las Regiones, Bruselas, Bélgica.
- ____(2006), Health and aging in the knowledge society: employment, social cohesion and e-health potential, Brussels, Belgium.
- ____(2004), COM 356, e-Health - making healthcare better for European citizens: An action plan for a European e-Health Area.
- ____(2001), COM 723, El futuro de la asistencia sanitaria y de la atención a las personas mayores: garantizar la accesibilidad, la calidad y la sostenibilidad financiera.
- Cortés, Jaime (2010), Telesalud en Costa Rica: experiencias y retos. Fernández, Andrés y Oviedo, Enrique (eds.), Salud electrónica en América Latina y el Caribe: avances y desafíos, Santiago, Chile, Economic Commission for Latin America and the Caribbean (ECLAC), unpublished.
- Coury, Walter et al. (2010), Iniciativas de telesalud en Brasil. Fernández, Andrés y Oviedo, Enrique (eds.), Salud electrónica en América Latina y el Caribe: avances y desafíos, Santiago, Chile, Economic Commission for Latin America and the Caribbean (ECLAC), unpublished..
- Cuervo, Luis and Josefina González (1997), Industria y ciudades en la era de la mundialización. Un enfoque socioespacial, Bogotá, D.C., Tercer Mundo Editores.
- Danish Health Data Network (2008), IT brings the Danish health sector together, en <https://www.sundhed.dk/Fil.ashx?id=7538&ext=pdf&navn=SDSDWoHit.pdf>
- De los Ríos, Rebecca (2010), La integración regional y el rol de la salud, presentación en Reunión Regional de Consulta: Integración y Convergencia para la Salud en América Latina y el Caribe, Caracas, July 22nd and 23rd.Sistema Económico Latinoamericano y del Caribe, SELA.

- Etreros, Javier and others (2009), El sistema de Historia Clínica Digital del Sistema Nacional de salud. Accesibilidad y protección de la información como elementos clave. Derecho y salud. Vol. 18. January-June: 99-110.
- Garbayo, José Antonio, Javier Carnicero and Jokin Sanz (2003), La seguridad, confidencialidad y disponibilidad de la información clínica. En Carnicero J (Coordinador). Informe SEIS. De la historia clínica a la historia de salud electrónica. Madrid, España. SEIS.
- Gertrudis, Nancy (2010), Política, programas y proyectos de salud electrónica en México. Fernández, Andrés y Oviedo, Enrique (eds.), Salud electrónica en América Latina y el Caribe: avances y desafíos, Santiago, Chile, Economic Commission for Latin America and the Caribbean (ECLAC), unpublished.
- Graham, Hilary and Michael P. Kelly (2004), Health inequalities: concepts, frameworks and policy, England, Health Development Agency.
- Jones Vicky and Carol Jollie (2007), eHealth strategy and implementation activities in England: Report in the framework of the eHealth, ERA project, Centre for Health Management, Tanaka and Business School, Imperial College, London, June.
- Kahn, James G., Joshua Yang and James S. Kahn (2008), The Relationship among Economic Development, Health and the Potencial Role of mHealth. En Making the eHealth Connection. Bellagio, Italia. Disponible en [http://www.ehealth-connection.org/files/conf-materials/Relationship among Economic Development_0.pdf](http://www.ehealth-connection.org/files/conf-materials/Relationship%20among%20Economic%20Development_0.pdf)
- Lozano, Rafael and others (2007), Evaluación comparativa del desempeño de los sistemas estatales de salud usando cobertura efectiva. Salud Pública de México, Vol.49, Suplemento 1, Mexico.
- Marcelo, Alvin B. (2009), Telemedicine in Developing Countries: Perspectives from the Philippines. En Wooton et al. (Eds.), Telehealth in the Developing World. International Development Research Centre. 28-33.
- Margolis, Álvaro and others (2010), Principales hitos y desafíos para Uruguay en el desarrollo de la salud electrónica. Fernández, Andrés y Oviedo, Enrique (eds.), Salud electrónica en América Latina y el Caribe: avances y desafíos, Santiago, Chile, Economic Commission for Latin America and the Caribbean (ECLAC), unpublished.
- Marmot, Michael and Richard Wilkinson (1999), Social determinants of health. OMS, Dinamarca, Oxford. University Press.
- Mesa-Lago Carmelo (2005), Las reformas de salud en América Latina y el Caribe: su impacto en los principios de la seguridad social, Santiago, Chile, Economic Commission for Latin America and the Caribbean (ECLAC)-Documento de proyectos, Santiago, Chile.
- Mijares, María Teresa (2010), Potencialidades para el desarrollo de la salud electrónica en Ecuador. Fernández, Andrés y Oviedo, Enrique (eds.), Salud electrónica en América Latina y el Caribe: avances y desafíos, Santiago, Chile, Economic Commission for Latin America and the Caribbean (ECLAC), unpublished.
- Ministère de la Santé et des Sports, Direction de l'Hospitalisation et de l'Organisation des Soins (2008), Rapport: La place de la télémédecine dans l'organisation des soins, Paris.
- Ministerio de Sanidad y Política Social. Gobierno de España (2009). Plan de calidad para el Sistema Nacional de Salud. Balance de actividades y acciones previstas.
- Mishra, Saroj and Indra Pratap Singh (2008), A Developing Country Perspective. En Making the eHealth Connection. Bellagio, Italy, 2008. Disponible en http://www.ehealth-connection.org/files/conf-materials/mHealth_%20A%20Developing%20Country%20Perspective_0.pdf
- Oliveri, Nora (2010), Antecedentes y aplicaciones de salud electrónica en Argentina. Fernández, Andrés y Oviedo, Enrique (eds.), Salud electrónica en América Latina y el Caribe: avances y desafíos, Santiago, Chile, Economic Commission for Latin America and the Caribbean (ECLAC), unpublished.
- Pan American Health Organization (PAHO) (2007), Salud en las Américas, Washington.
- _____(2003), e-Salud en Latinoamérica y el Caribe. Tendencias y temas emergentes. Available at http://www.ehealthstrategies.com/files/esalud_lac_2003.pdf
- ____Perfiles de los sistemas de salud de los países. Available at [/www.paho.org/Spanish/DPM/SHD/HP/Perfil_Sistema_Salud.htm](http://www.paho.org/Spanish/DPM/SHD/HP/Perfil_Sistema_Salud.htm), consulted in March, 2010.

- Parlamento y Consejo europeos (2009), Directiva 95/46/CE del Parlamento Europeo y del Consejo, de 24 de octubre de 1995, relativa a la protección de las personas físicas en lo que respecta al tratamiento de datos personales y a la libre circulación de estos datos. Available at: http://eurlex.europa.eu/smartapi/cgi/sga_doc?smartapi!celexplus!prod!DocNumber&lg=es&type_doc=Directive&an_doc=1995&nu_doc=46
- Peinado, Antonio and Alicia Aguilar (2008), Receta electrónica. En: Carnicero, Javier (Coordinador). La gestión del medicamento en los Servicios de Salud. Informes SEIS (8). Pamplona: Sociedad Española de Informática de la Salud.
- Pharow, Peter and others (2008), How can the German Electronic Health Card support patient's role in care management. *Studies in Health Technologies and Informatics*, 137, 3836-401.
- Rodríguez, Jorge (2002), Distribución territorial de la población de América Latina y el Caribe: tendencias, interpretaciones y desafíos para las políticas públicas, Serie Población y Desarrollo, No.32, Santiago, Chile. Economic Commission for Latin America and the Caribbean (ECLAC), diciembre.
- Rojas, Misael (2010), Tecnologías de información y comunicación en salud: proyectos habilitantes y aplicaciones en Chile. Fernández, Andrés y Oviedo, Enrique (eds.), *Salud electrónica en América Latina y el Caribe: avances y desafíos*, Santiago, Chile, Economic Commission for Latin America and the Caribbean (ECLAC), unpublished.
- Sandor, Tomás (2010), Sistemas de información para la salud pública en el Caribe. Fernández, Andrés y Oviedo, Enrique (eds.), *Salud electrónica en América Latina y el Caribe: avances y desafíos*, Santiago, Chile, Economic Commission for Latin America and the Caribbean (ECLAC), unpublished.
- Savedoff, William D. (2009), A moving target: universal access to healthcare services in Latin America and the Caribbean. Washington. Inter-American Development Bank (IDB).
- SEIS (2010) Sociedad Española de Informática de la Salud. Líneas estratégicas en Tecnologías de la Información y Comunicaciones para la Salud en España.
- Shengelia, Bakhuti et al. (2005), Access, utilization, quality, and effective coverage: An integrated conceptual framework and measurement strategy. *Social Science and Medicine*, 61, 97-109.
- Silva, Ricardo (2010), Proyectos tecnológicos para la salud electrónica en la República Bolivariana de Venezuela. Fernández, Andrés y Oviedo, Enrique (eds.), *Salud electrónica en América Latina y el Caribe: avances y desafíos*, Santiago, Chile, Economic Commission for Latin America and the Caribbean (ECLAC), unpublished.
- Sittig, Dean (2002), Personal Health Records on the Internet: a snapshot of the pioneers at the end of the 20th century. *International Journal of Medical Informatics*, 65 (1), 1-6.
- Stroetmann Karl A. and Stefan Lilischkis (2007), eHealth strategy and implementation activities in Germany: Report in the framework of the eHealth ERA project, empirical: 30 June.
- Sullivan, Mark (2003), The new subjective medicine: taking the patient's point of view on health care and health. *Social Science and Medicine*, 56 (7), 1595-1604.
- Tang, Paul et al. (2006), Personal Health Records: definitions, benefits, and strategies for Overcoming Barriers to Adoption. *Journal of the American Medical Informatics Association*, 13 (2), 121-126.
- Vega, Silvio (2010), Programa Nacional de Telemedicina y Telesalud en Panamá. Fernández, Andrés y Oviedo, Enrique (eds.), *Salud electrónica en América Latina y el Caribe: avances y desafíos*, Santiago, Chile, Economic Commission for Latin America and the Caribbean (ECLAC), unpublished.
- Vélez, Jorge (2010), Regulaciones, aplicaciones y desafíos para la salud electrónica en Colombia. Fernández, Andrés y Oviedo, Enrique (eds.), *Salud electrónica en América Latina y el Caribe: avances y desafíos*, Santiago, Chile, Economic Commission for Latin America and the Caribbean (ECLAC), unpublished.
- Wooton, Richard and others (2009), Telehealth in the developing world, Canada. International Development Research Centre.
- World Health Organization (WHO) (2006a), *The World Health Report, Working Together*, Washington.
- _____(2006b), *Building Foundations for eHealth. Progress of Member States, Report of the WHO Global Observatory for eHealth*. Available at http://www.who.int/goe/publications/bf_FINAL.pdf
- _____(2010), *Global eHealth Survey 2009*. Available at <http://www.who.int/goe/data/en/>



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